INTERNATIONAL SOCIETY OF LYMPHOLOGY

TURKISH SOCIETY OF LYMPHEDEMA AND LIPEDEMA

INTERNATIONAL SOCIETY OF 60th Anniversary Celebration LYMPHOLOGY

30th ISL World Congress of Lymphology

15-19 October 2025

Royal Seginus Hotel, Antalya-Türkiye

Discover Groundbreaking Advances in Lymphology in the Mediterranean Beauty of Antalya!

ABSTRACT BOOK

Professional Congress Organizer (PCO):

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E-POSTER PRESENTATIONS

EP-01

Evaluation of Treatment Response in Breast Cancer-Related Lymphedema Using Estimated 0-kHz Bioimpedance (R0): A Prospective Study

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OBJECTIVE: Bioimpedance analysis (BIA) is a method used to evaluate body composition and fluid distribution, and it has been applied in both the diagnosis and treatment monitoring of lymphedema. Low-frequency currents in BIA are known to better reflect extracellular fluid, which is particularly relevant in lymphedema. When a 0-kHz current is applied, all current flows exclusively through the extracellular fluid; thus, the impedance measured at 0 kHz (R0) represents the impedance of extracellular fluid alone. Although R0 offers a precise reflection of fluid status in patients with lymphedema, it cannot be directly measured using current BIA devices. Therefore, in clinical practice, low-frequency impedance measurements below 5 kHz are often used as a substitute. This study aimed to assess the treatment effect of complex decongestive physical therapy (CDPT) in patients with breast cancer-related lymphedema (BCRL) by analyzing changes in R0.
MATERIAL AND METHODS: This prospective study included 50 patients with suspected lymphedema following breast cancer treatment and confirmed lymphatic dysfunction on lymphoscintigraphy. All participants underwent a 10-session CDPT program, administered once weekly. Circumference measurements were taken before and after treatment at 10 cm above the elbow, at the elbow, and 10 cm below the elbow. The limb volume (Vol) was derived from the measured circumference using the truncated cone formula. The change in limb volume (dVol) was calculated using the following formula: dVol = (pre Vol - post Vol) / pre Vol. The expected 0-kHz impedance (R0) of both upper extremities was estimated, and the change in R0 (dR0) was calculated using the following formula: dR0 = (pre R0 - post R0) / pre R0. Correlation between dR0 and dVol was analyzed, and an optimal cutoff value of dR0 for reflecting clinically meaningful volume reduction was determined via ROC curve analysis.
RESULT: The circumference at 10 cm above the elbow significantly improved after treatment ($p = 0.039$). Although dVol showed a tendency toward improvement post-treatment, the change was not statistically significant ($p = 0.152$ and $p = 0.109$, respectively). A statistically significant negative correlation was found between dR0 and dVol ($r = –0.666$, $p < 0.001$). The optimal cutoff value of dR0 indicating significant volume improvement was –0.33, as determined by ROC curve analysis.
CONCLUSION: Changes in estimated R0 were significantly correlated with volume reduction in patients with breast cancer-related lymphedema. A dR0 cutoff value of –0.33 may serve as a useful threshold for identifying clinically meaningful treatment response. These findings suggest that R0-based bioimpedance analysis could offer a practical and objective tool for evaluating treatment efficacy in BCRL.

Keywords: Lymphedema, Bioelectrical Impedance Analysis, Breast Neoplasms

Table 1. Characteristics of patients with lymphedema and changes in parameters after CDPT.

	Initial	Follow-up	p-value
Age (yr)	57.46 ± 9.12		
Lesion side			
Right	23		
Left	27		
BMI (kg/m2)	24.25 ± 3.65	23.02 ± 2.88	0.899
Cancer treatment			
Surgery	50		
Chemotherapy	10		
Chemotherapy + Radiotherapy	31		
Limb circumference (cm)			
Above elbow 10cm	27.27 ± 2.78	26.87 ± 3.20	0.032*
Elbow	24.45 ± 1.92	24.19 ± 2.09	0.121
Below elbow 10cm	22.43 ± 2.19	22.24 ± 2.38	0.297
Limb volume (mL)	977.4 ± 164.3	957.4 ± 191.7	0.152
Bioimpedance analysis			
0 kHz impedance	370.18 ± 77.15	373.37 ± 76.37	0.794

*CDPT, complex decongestive physical therapy; BMI, body mass index. *p<0.05.*

EP-02

Lessons Learnt from an 15-year Experience with Lymphatic Surgery: Technical Considerations to Reduce Morbidity

Pedro Ciudad

Pedro Ciudad

OBJECTIVE: Complications experienced during lymphatic surgery have not been ubiquitously reported, and little has been described regarding how to prevent them. We present a review of complications reported during the surgical management of lymphedema and our experience with technical considerations to reduce morbidity from lymphatic surgery.
MATERIAL AND METHODS: Based on the complications identified during the past 15 years, we discussed the best approach for reducing the incidence of complications during lymphatic surgery based on our experience.
RESULT: The most common complications using groin vascularized lymph node transfer (VLNT), submental VLNT, lateral thoracic VLNT, and supraclavicular VLNT included delayed wound healing, seroma and hematoma formation, lymphatic fluid leakage, iatrogenic lymphedema, soft-tissue infection, venous congestion, marginal nerve pseudoparalysis, and partial flap loss. Regarding intra-abdominal lymph node flaps, incisional hernia, hematoma, lymphatic fluid leakage, and postoperative ileus were commonly reported. Following suction-assisted lipectomy, significant blood loss and transient paresthesia were frequently reported. The reported complications of excisional procedures included soft-tissue infections, seroma and hematoma formation, skin-graft loss, significant blood loss, and minor skin flap necrosis.
CONCLUSION: Evidently, lymphedema continues to represent a challenging condition; however, thorough patient selection, compliance with physiotherapy, and an experienced surgeon with adequate understanding of the lymphatic system can help maximize the safety of lymphatic surgery.

Keywords: intraoperative complications, lymph nodes, lymphatic vessels, lymphedema, postoperative complications, surgical procedures.

EP-03

What Lipedema Patients Wonder: An Analysis of AI Responses in Terms of Quality, Reliability, and Readability

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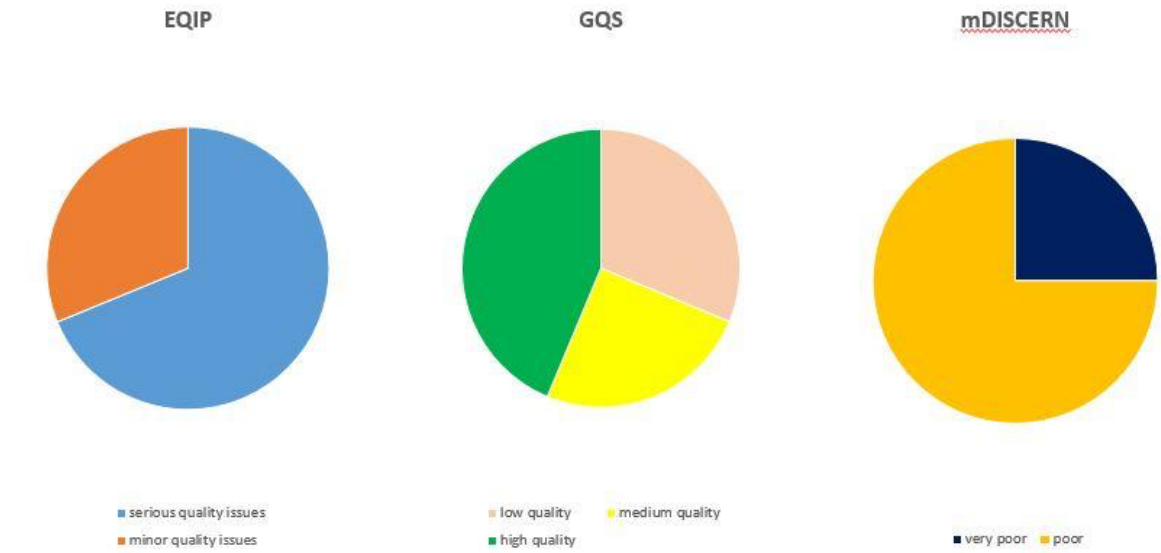
OBJECTIVE: Lipedema is a chronic and progressive disease characterized by the abnormal accumulation of adipose tissue, typically in the lower extremities. Often mistaken for obesity and lymphedema, lipedema presents with symptoms such as pain, easy bruising, and movement restrictions. Access to accurate information is crucial for patients to achieve the correct diagnosis and appropriate treatment options.
In recent years, AI-powered information sources have become widely used by patients seeking knowledge about lipedema. However, there is a lack of data regarding the adequacy of information obtained from these sources in terms of readability, quality, and reliability. This study aims to evaluate the readability, quality, and reliability of AI-generated responses to frequently asked questions about lipedema.
MATERIAL AND METHODS: To better understand the information-seeking behaviors of lipedema patients, a comprehensive literature review was conducted. Additionally, various patient forums, social media groups, and online health platforms were examined. Through this process, the most frequently discussed topics, information gaps, and common questions directed at healthcare professionals were analyzed. Based on the collected data, 16 key questions that patients most commonly ask about lipedema were identified.
These selected questions were individually submitted to the AI chatbot ChatGPT-4o. To prevent bias arising from sequential responses, each question was processed in a separate session. The obtained responses were archived in a publicly accessible database for evaluation in terms of readability, quality, and reliability. The responses can be accessed at: https://archive.org/details/chatgpt-lipedema-answer.
For readability analysis, the following indices were used: Simple Measure of Gobbledygook (SMOG), Automated Readability Index (ARI), Gunning Fog Index (GFOG), Flesch-Kincaid Grade Level (FKGL), Coleman-Liau Index (CLI), and Flesch Reading Ease Score (FRES).
For quality assessment, the Ensuring Quality Information for Patients (EQIP) score and Global Quality Score (GQS) were applied.
For reliability evaluation, the Journal of American Medical Association (JAMA) criteria and mDISCERN score were utilized.

RESULT: The average readability scores of the AI-generated texts were as follows:
SMOG: 14.33 ± 1.41
ARI: 11.98 ± 1.96
GFOG: 15.73 ± 2.37
FKGL: 13.25 ± 1.85
CLI: 14.20 ± 1.89
FRES: 27.96 ± 10.93
The readability level of AI responses was significantly higher than the recommended 6th-grade level ($p < 0.001$). These findings indicate that the texts require approximately 13 years of education to understand, making them potentially difficult for patients to comprehend.
The quality assessment scores were as follows:
EQIP: 47.99 ± 4.64
GQS: 3.00 ± 1.09
According to the EQIP evaluation, 68.8% of the texts contained serious quality issues, while 31.2% had minor quality concerns. Based on the GQS scores, 31.3% of the texts were classified as low quality, 25% as medium quality, and 43.7% as high quality.
The reliability assessment results were:
JAMA Score: 0.00
mDISCERN Score: 1.75 ± 0.44
According to the JAMA criteria, all texts contained insufficient data. Based on the mDISCERN analysis, 25% of the texts were classified as very poor, while 75% were categorized as poor.
CONCLUSION: This study demonstrates that AI-generated responses regarding lipedema are not sufficiently readable for patient comprehension and are inadequate in terms of quality and reliability. AI-based medical information sources should be further developed to provide clearer, more reliable, and higher-quality content to support patient education.

Keywords: Lipedema, artificial intelligence, ChatGPT, online medical information.

Figure - Quality and Readability Analysis



Frequently Asked Questions About Lipedema

What is lipedema, and how is it defined?
Are there different stages or types of lipedema?
How common is lipedema in the population?
What are the most noticeable symptoms of lipedema?
What are the underlying causes of lipedema?
What factors increase the risk of developing lipedema?
What health problems can lipedema lead to if it progresses?
How is lipedema diagnosed?
What tests or imaging methods are used to diagnose lipedema?
What are the stages of lipedema, and how are they classified?
Can lipedema be treated? What treatment options are available?
What is the recovery process like after lipedema treatment?
Is it possible to prevent lipedema or reduce its risk?
How does living with lipedema affect daily life?
What lifestyle changes and self-care methods are recommended for lipedema patients?
When should someone with suspected lipedema see a doctor?

EP-04

A Case of Lipedema with Delayed Diagnosis, Significant Pain, and Loss of Quality of Life

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OBJECTIVE: Lipedema is a chronic and progressive adipose tissue disorder, primarily seen in women, triggered by hormonal changes and associated with genetic predisposition. Its most distinctive feature is the symmetrical accumulation of fat in the lower extremities that does not extend distal to the ankle, meaning the feet are generally spared. This characteristic is critical in differentiating lipedema from other conditions such as lymphedema and obesity. Patients often experience pain upon palpation, easy bruising, a sensation of swelling, and functional limitations. However, due to clinical similarities, lipedema is frequently misdiagnosed as lymphedema, venous insufficiency, myxedema, or simple obesity, leading to diagnostic delays and inadequate treatment. In this case report, the diagnostic process, differential diagnosis, and the impact of advanced-stage lipedema on daily life will be emphasized.
CASE: A 65-year-old female patient presented to our outpatient clinic with complaints of progressively increasing lower extremity swelling for about 15 years, widespread leg pain, tenderness, easy bruising, difficulty walking, and significant limitations in daily activities (Image-1). It was learned that the symptoms accelerated particularly after menopause and efforts to lose weight did not result in a meaningful reduction in leg volume. The patient reported inability to stand for long periods, difficulty climbing stairs, trouble sitting and standing, and problems falling asleep at night due to leg pain. A family history of similar complaints in her sister supported genetic predisposition. There was no history of systemic disease. Height: 160 cm, Weight: 96 kg, BMI: 37.5 kg/m².
Physical Examination
• Symmetrical, nodular, soft but distinctly painful fat tissue accumulation on palpation in the lower extremities
• Increased fat tissue and hanging fat lobules over the knees, inner thighs, and hips
• Widespread telangiectasias and ecchymoses
• Complete sparing of the area below the ankle, no pitting edema, Stemmer sign negative
• Minimal truncal adiposity
• Functional limitation due to loss of balance and pain while walking

Laboratory and Imaging
• Hb: 11.2 g/dL, TSH: 1.1 µIU/mL, Fasting glucose: 98 mg/dL, HbA1c: 5.5%
• Thyroid, liver, kidney functions and D-dimer: normal
• Venous Doppler Ultrasound: normal
• Soft tissue Ultrasound: diffuse thickening and heterogeneity of subcutaneous fat tissue, no edema

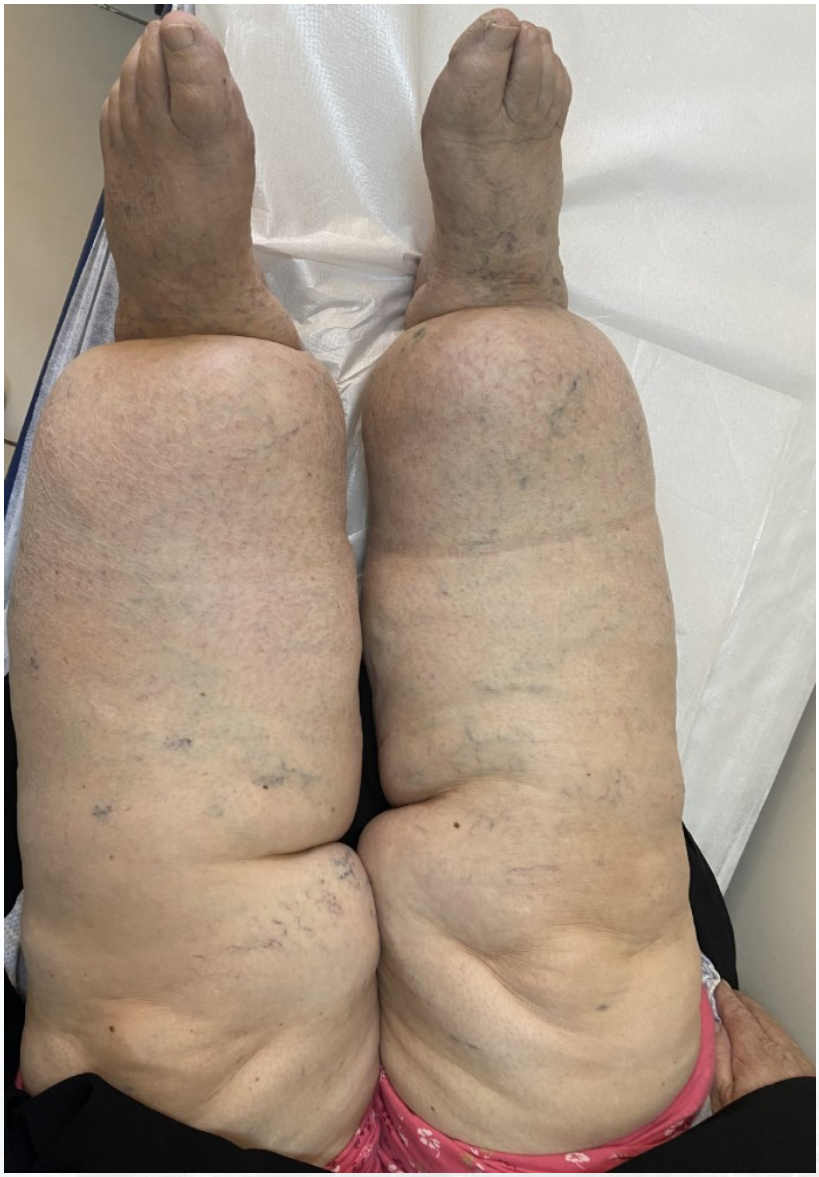
Differential Diagnosis
• Lymphedema: feet spared, Stemmer negative → excluded
• Obesity: localized and resistant fat distribution → excluded
• Venous insufficiency: normal Doppler and skin findings → excluded
• Myxedema: normal thyroid, no mucopolysaccharide accumulation → excluded
• Dercum's disease: no lipomatous masses → excluded

Diagnosis
Based on physical examination and clinical evaluation, the patient was diagnosed with Stage 3 lipedema.

Treatment and Follow-up
• Compression stockings, exercise, and postural education
• Manual lymphatic drainage
• Sleep hygiene education
• Optional advanced-stage surgical treatment (liposuction) planned
Various questionnaires were administered to more objectively assess the patient's clinical status regarding pain, sleep quality, depression, and quality of life, and the results are presented in Table-1.
RESULT: This case presents typical features of lipedema (foot sparing, symmetrical fat accumulation, pain on palpation, telangiectasia, bruising, resistance to weight loss) while also highlighting less emphasized aspects such as sleep disturbances related to pain, depressive symptoms, and severe functional impairment. Other clinical conditions, particularly lymphedema, were excluded in the differential diagnosis, and the diagnosis was established clinically.
Lipedema is not merely an aesthetic problem; over time, it can lead to serious physical, functional, and psychosocial deterioration. As in this case, delayed diagnosis decreases quality of life and causes social isolation. Therefore, early diagnosis, holistic evaluation, and personalized treatment are essential.

Keywords: Lipedema, Chronic adipose tissue disorder, Quality of life, Functional impairment

Clinical appearance of the lower extremities in advanced-stage lipedema



The image shows bilateral symmetrical enlargement of the lower extremities with sparing of the feet, consistent with stage 3 lipedema. Noticeable nodular subcutaneous fat accumulation, skin laxity, and fat lobules are visible, particularly around the thighs and knees.

Objective Questionnaire Assessments

Scale / Questionnaire	Score	Comment
VAS (Pain)	7/10	Severe pain, especially worsened after prolonged standing
PSQI (Sleep Quality)	12/21	Difficulty falling asleep, night awakenings; poor sleep quality
Beck Depression Inventory	18/63	Mild depression; mood affected by pain and functional loss
SF-36 Physical Function	40/100	Limitations climbing stairs and prolonged standing
SF-36 Pain	35/100	Pain negatively impacts daily life
SF-36 General Health Perception	45/100	Patient perceives worsening health
SF-36 Energy / Vitality	30/100	Early fatigue during daily activities
SF-36 Social Function	55/100	Reduced social participation and withdrawal
SF-36 Mental Health	60/100	Reduced social participation and withdrawal

EP-05

Lipedema Awareness: An Age-Based Evaluation in Women Attending a Physical Medicine and Rehabilitation Outpatient Clinic

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OBJECTIVE: Lipedema is a chronic and progressive condition characterized by symmetrical fat accumulation in the lower extremities. It predominantly affects women and is often misdiagnosed as obesity or lymphedema, leading to delays in diagnosis. Without early detection, it can significantly impair quality of life. Awareness of lipedema is generally low both among the general population and healthcare professionals. This study aims to evaluate lipedema awareness among women attending a physical medicine and rehabilitation (PM&R) outpatient clinic and to assess the relationship between awareness and age.

MATERIAL AND METHODS: This cross-sectional study included a total of 120 female participants aged over 18 who presented to the PM&R outpatient clinic of a university hospital. The participants were divided into two age groups:

• Group 1: 18–45 years (n=60)
• Group 2: ≥46 years (n=60)

A structured 15-item questionnaire assessing awareness of lipedema was administered (Table-1). The questionnaire was categorized under three domains: general knowledge, clinical features, and diagnosis/treatment knowledge. Each correct answer was scored as one point. Participants scoring 9 or above were considered to have “good awareness.” Demographic data were also collected.

RESULT: The mean age of the participants was 46.3 ± 12.5 years. The average total awareness score in the overall sample was 5.6 ± 2.1. Group 1 had a mean score of 6.3 ± 2.0, while Group 2 had a mean of 4.9 ± 1.9. Awareness levels were significantly higher in the younger age group ($p < 0.001$). The proportion of participants with good awareness was 22% in Group 1 and 7% in Group 2, indicating higher knowledge levels among younger women.

Subgroup analysis revealed the following:

• General Knowledge: 42% of Group 1 and 26% of Group 2 participants knew that lipedema is more common in women. Recognition of the condition as involving symmetric fat accumulation was 36% in Group 1 and 20% in Group 2.
• Clinical Features: The proportion of participants who correctly identified symptoms such as pain, easy bruising, and tenderness was 34% in Group 1 and 18% in Group 2. Less than 25% of participants in either group were aware that the hands and feet are typically not affected in lipedema.
• Diagnosis and Treatment Knowledge: In Group 1, 31% were aware that lipedema does not resolve with dieting alone, compared to 14% in Group 2. Knowledge of the limited role of imaging in diagnosis was present in 28% of Group 1 and 11% of Group 2. Awareness of surgical treatment options was low in both groups, with only 22% of the overall sample reporting any knowledge.

In both age groups, awareness that lipedema may be linked to hormonal changes was low (30%). Additionally, fewer than 35% of participants knew that lipedema can be mistaken for obesity or lymphedema.

CONCLUSION: Lipedema awareness among women attending the PM&R outpatient clinic is generally low and decreases significantly with age. Younger individuals tend to have higher awareness, possibly due to greater access to digital resources and better health literacy. Lack of knowledge regarding diagnostic and treatment processes may lead to delayed diagnosis. Therefore:
• Educational materials and brochures should be provided in outpatient settings.
• Brief screening questions should be incorporated into routine evaluations.
• Community-based awareness campaigns should be launched to support early diagnosis.
This study underscores the importance of awareness initiatives and serves as a preliminary step toward broader research efforts in this field

Keywords: Lipedema, Awareness, Physical Medicine and Rehabilitation

Questionnaire Content and Response Options

Question Content	Response Options
1.Have you heard of lipedema before?	Yes / No
2.Do you know that lipedema is more common in women?	Yes / No / Not sure
3.Do you know that lipedema is characterized by abnormal fat accumulation?	Yes / No / Not sure
4.Do you know that lipedema can occur during hormonal changes?	Yes / No / Not sure
5.Do you know that lipedema can have a genetic predisposition?	Yes / No / Not sure
6.Do you know that lipedema involves symmetrical fat accumulation?	Yes / No / Not sure
7.Do you know that the hands and feet are usually not affected?	Yes / No / Not sure
8.Do you know that easy bruising and tenderness occur in lipedema?	Yes / No / Not sure
9.Do you know that lipedema is a progressive disease?	Yes / No / Not sure

10.Do you know that lipedema can be confused with other diseases?	Yes / No / Not sure
11.Do you know that lipedema can be diagnosed by clinical examination?	Yes / No / Not sure
12.Do you know that imaging methods have a limited role in diagnosis?	Yes / No / Not sure
13.Do you know that lifestyle changes, physical therapy, and compression are beneficial?	Yes / No / Not sure
14.Do you know that weight loss does not cure lipedema but only relieves symptoms?	Yes / No / Not sure
15.Do you know that surgical methods like liposuction are treatment options in advanced stages?	Yes / No / Not sure

General knowledge and awareness about lipedema (Questions 1–5) Clinical features (Questions 6–10) Diagnosis and treatment knowledge (Questions 11–15)

EP-06

Sarcopenia in Women with Lipedema: A Pilot Study Based on Ultrasound and Functional Observations

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OBJECTIVE: Lipedema is a chronic and progressive soft tissue disorder predominantly seen in women,characterized by symmetrical fat accumulation in the lower extremities,tenderness,pain,and edema.Due to its similarity to obesity or lymphedema,diagnosis is often delayed.In advanced stages,mobility loss,physical inactivity,and significant limitations in daily life activities are observed.These factors may increase the risk of developing sarcopenia,which is marked by a decrease in muscle strength and mass.
Although sarcopenia is generally associated with elderly individuals,it is also a common clinical issue affecting functional independence in other patient groups experiencing physical limitations and inactivity.Lipedema and sarcopenia may be two interrelated processes that potentially exacerbate one another.However, data on the prevalence of sarcopenia in lipedema patients are limited.
This study aimed to evaluate sarcopenia in women diagnosed with lipedema by assessing muscle thickness and functional performance,and to investigate the relationship between lipedema stage and the prevalence of sarcopenia.
MATERIAL AND METHODS: This cross-sectional pilot study included 12 female patients who were diagnosed with lower extremity lipedema and presented to a physical medicine and rehabilitation outpatient clinic.Lipedema staging was performed using the Wold classification.
Inclusion criteria:
• Age ≥18 years
• Clinical diagnosis of lower extremity lipedema
Exclusion criteria:
• Lower extremity surgery(e.g.,knee prosthesis,meniscus surgery)
• Peripheral nerve injury
• Inability to walk due to advanced osteoarthritis
• Neuromuscular disease
• Active oncological disease or systemic inflammatory condition
Muscle mass was assessed via rectus femoris muscle thickness.Measurements were taken using the ESAOTE MyLabX7 Exp ultrasound system(ESAOTE S.p.A, Genoa, Italy)with a linear probe operating in the 4–15 MHz frequency range(Fig-1A).Patients were positioned supine with muscles relaxed, and measurements were obtained at the midpoint between the lateral femoral condyle and the greater trochanter(Fig-1B).The mean of three measurements taken with minimal compression was used. A rectus femoris thickness of <10 mm was considered indicative of low muscle mass.
Muscle function was evaluated using the 5 Times Sit-to-Stand Test(Chair Stand Test -CST).Patients who required ≥12 seconds or were unable to complete the test were considered to have low muscle function.
Considering that body mass index(BMI)may be elevated in individuals with lipedema due to disease-specific fat accumulation,direct measurement of muscle thickness was preferred over ratio-based methods like STAR in this study.
Patients with both low muscle mass and low muscle function were defined as “sarcopenic.”

RESULT: The mean age of the 12 participants was 48.6 ± 5.8 years,and the mean BMI was 33.9 ± 5.1 kg/m².
Lipedema stage distribution was as follows:
• Stage II(n=2)
• Stage III(n=6)
• Stage IV(n=4)
All participants underwent the 5 CST:
• Stage II:Mean CST time was 10.5±0.7 seconds
• Stage III:Mean CST time was 13.7±1.2 seconds (4 patients had times ≥12 seconds)
• Stage IV:Mean CST time was 16.8±1.6 seconds (all patients had times ≥12 seconds)
Rectus femoris muscle thickness was successfully measured in all patients:
• Stage II:Mean thickness =14.2±1.1 mm
• Stage III:Mean thickness =10.1±0.9 mm
• Stage IV:Mean thickness =8.3±1.0 mm
All Stage IV patients had a muscle thickness below 10mm.
Sarcopenia was diagnosed in patients with CST time ≥12 seconds and rectus femoris thickness <10 mm.
• No sarcopenia was detected in Stage II patients.
• 4 out of 6 Stage III patients(66.6%) were diagnosed with sarcopenia.
• All Stage IV patients(100%) were diagnosed with sarcopenia.
CONCLUSION: This pilot study found that sarcopenia is more frequently observed in female patients with lipedema,particularly in advanced stages of the disease.Both reduced muscle thickness and decreased functional capacity became more evident as the stage of lipedema progressed.
These findings suggest that lipedema is not solely limited to fat tissue involvement, but in later stages,it may also negatively impact muscle structure and function.
Our study highlights the importance of evaluating muscle health in the management of lipedema and serves as a preliminary step toward more comprehensive research in this field.

Keywords: Lipedema, sarcopenia, ultrasonography, muscle thickness

Figure 1A/1B

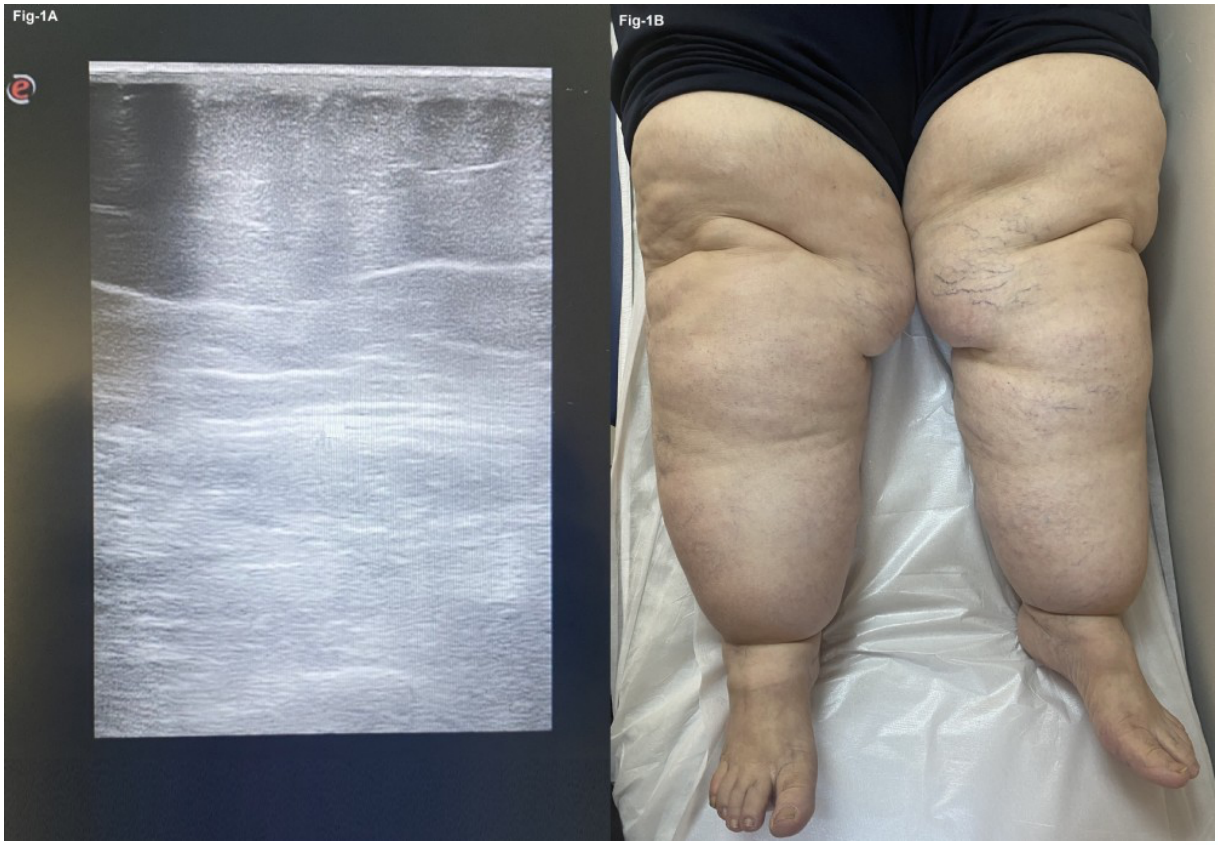

Figure 1. (A) Ultrasound image showing the measurement of rectus femoris muscle thickness. (B) Clinical photograph of the patient in supine position demonstrating lower extremity swelling. Measurements were taken at the midpoint between the lateral femoral condyle and the greater trochanter, with the muscle in a relaxed state

EP-07

Comparing the direct effect of lymphatic dynamic transport after low-level laser therapy in healthy volunteers: a randomized controlled trial

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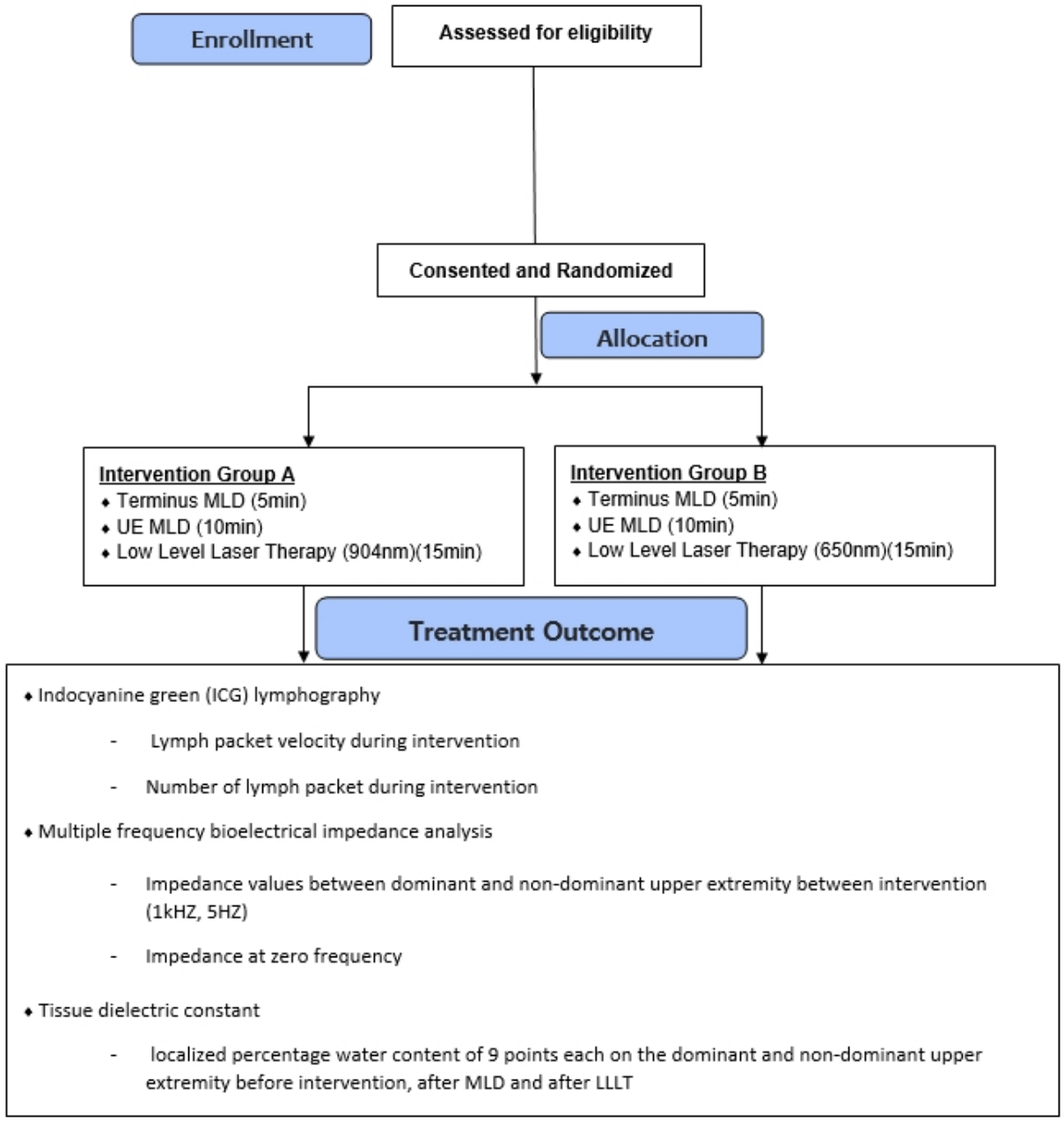
OBJECTIVE: This study is aimed to explore the direct effects of low-level laser therapy (LLLT) at different wavelengths on lymphatic motility healthy individuals. The goal was to identify the most effective protocol and assess the potential application of LLLT in managing lymphedema
MATERIAL AND METHODS: The study included 32 healthy participants (12 males, and 20 females), divided into two groups. Each participant underwent a single session of unilateral upper extremity manual lymphatic drainage (UE MLD), followed by two types of LLLT applied to the ipsilateral axilla region to promote lymphatic drainage. Indocyanine green (ICG) lymphography was used during each treatment session to evaluate the immediate effect of LLLT on lymphatic motility. Additionally, extracellular fluid (ECF) and local tissue water level were assessed before and after the intervention using multiple frequency bioelectrical impedance analysis (MFBIA) and tissue dielectric constant (TDC).
RESULT: No significant differences were observed in baseline characteristics between the two groups, except for the percentage water content of hand and breast area before treatment. In the analysis comparing the velocity of lymph packets, a significant increase was observed in the velocity during the UE period compared with the resting period in group. In the case MFBIA values before and after treatment, body water content tended to decrease in both groups after treatment but in the inter-group comparison, there was no significant difference between the two groups. In the case of TDC value, overall patients showed decreased in body water content immediately after UE MLD and LLLT in most measured area. Otherwise, no significant difference in the amount of body water reduction between the two groups after LLLT was confirmed. Intra group analysis comparing the change of velocity and number of lymph packet between each time point showed increased velocity after UE MLD in group B and increased number of packets in both groups. However, number of lymph packet decreased significantly after LLLT compared to resting period in both groups. The Wilcoxon Rank Sum Test comparing velocity of lymph packet during each time points between group A and group B showed no significant statistical difference. In addition, there were no significant differences of lymph packet in all intervention period in intergroup comparison analysis. The linear mixed model result indicated that the increase of velocity of lymph packet during treatment showed significant negative correlation to overall LLLT controlling for other factors. In addition, increase of numbers of lymph packet during treatment showed significant positive correlation with UE MLD and negative correlation with LLLT.
CONCLUSION: In this study, we quantitatively evaluated the lymphatic motility and tissue water content after different types of LLLT in healthy participants. A single application of LLLT to the healthy subjects showed no direct effect on lymphatic motility. Therefore, to validate the reliability of the treatment effects of LLLT on lymphedema, it is essential to verify its impact in patient groups using ICG

lymphography. In addition, clinical studies to prove the differences in LLLT effects by wavelength in patient groups and the effectiveness of LLLT based on various targeted areas of lymphedema is needed.

Keywords: Lymphedema, Breast cancer lymphedema, Upper extremity, Low-level light therapy

Flow diagram of the study



EP-08

Clinical Effects of TECAR Therapy in the Conservative Management of Lipedema: A Randomized Controlled Trial

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OBJECTIVE: This study aimed to evaluate the clinical efficacy of Transfer Energy Capacitive and Resistive (TECAR) therapy in women with Stage 2 lipedema, focusing on limb circumference, pain, functional status, and quality of life.
MATERIAL AND METHODS: A prospective, randomized controlled trial was conducted with 30 female patients diagnosed with Stage 2 lipedema. Participants were randomized to a TECAR therapy group (n=15) or a control group (n=15). Both groups received compression garments and a structured exercise program; the TECAR group additionally underwent six TECAR sessions over three weeks. Outcomes included lower limb circumference, Visual Analog Scale (VAS) for pain, Lower Extremity Functional Scale (LEFS), and Lymphedema Quality of Life Questionnaire-Leg (LYMQOL-Leg), assessed at baseline and at one and three months post-treatment.
RESULT: TECAR therapy resulted in greater reductions in lower limb circumference compared to standard care, with sustained improvement in the supramalleolar region at three months ($p<0.05$). A significant short-term reduction in pain was observed at one month ($p = 0.003$) only in the TECAR group, but this effect was not maintained at three months ($p > 0.05$). Functional scores trended toward improvement without reaching significance ($p=0.058$). The overall quality of life score improved significantly in the TECAR group ($p=0.002$), although individual LYMQOL subdomains including function, appearance, mood, or symptoms did not reach statistical significance ($p > 0.05$).
CONCLUSION: As an adjunct to standard care, TECAR therapy appears to reduce pain and limb volume and enhance overall quality of life in Stage 2 lipedema. Further long-term studies are needed to confirm these findings.

Keywords: Lipedema, TECAR Therapy, Pain Management, Quality of Life

EP-09

Brachial Plexus Injury Secondary to Chronic Upper Extremity Lymphedema Following Breast Cancer Treatment: A Case Report

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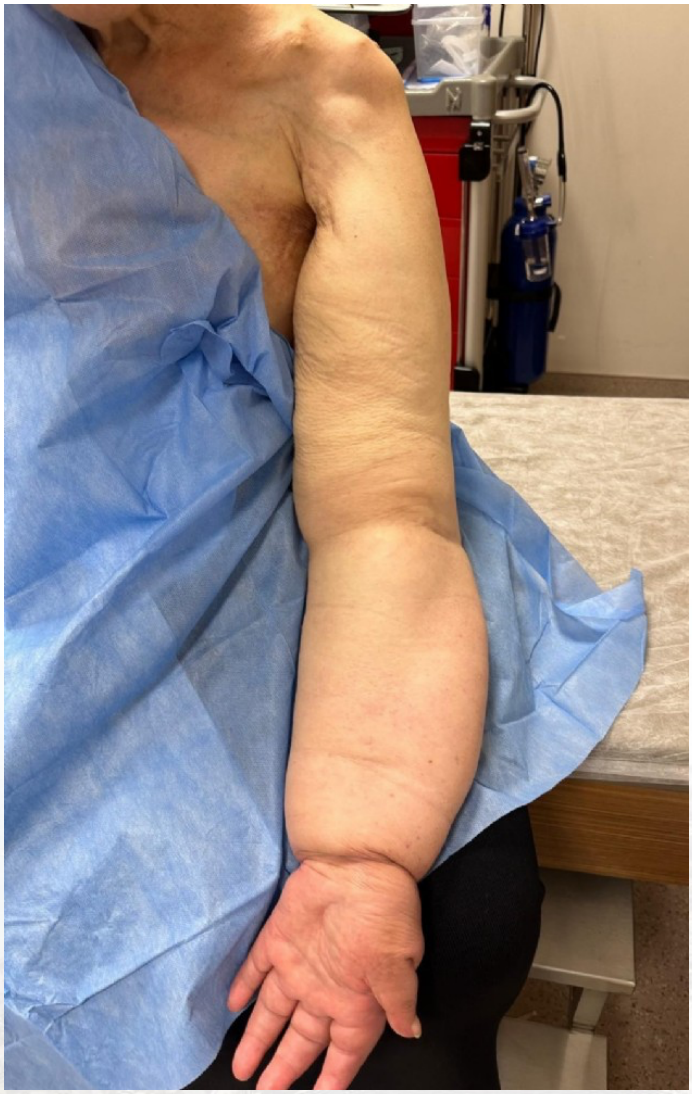
OBJECTIVE: Lymphedema is the abnormal buildup of protein-rich fluid in the limbs due to lymphatic dysfunction, most often from obstruction. It can be primary (congenital, praecox, tarda) or secondary to factors like infection, cancer, surgery, radiation, or trauma. Treatment is prolonged and may be conservative or surgical. Complications include recurrent infections, skin changes, postural issues, psychosocial effects, joint restriction, brachial plexophaty and rarely lymphangiosarcoma. (1-3). The aim of this case report is to highlight that untreated or insufficiently managed upper extremity lymphedema can result in brachial plexus injury.
CASE: 75 year- old woman underwent total mastectomy and axillary lymph node dissection of the left breast 12 years ago for breast cancer, followed by chemotherapy and radiotherapy. One year after completing radiotherapy, she developed swelling and edema in her left arm, which progressively worsened. The patient, who previously earned her living by producing handicrafts, experienced increasing difficulty in performing her work. Over the past five years, she received regular manual lymphatic drainage and compression bandaging. Three years prior, she sustained a right humeral neck fracture after a fall, treated with internal fixation, which further impaired her daily activities. One year ago, she presented to the Physical Medicine and Rehabilitation outpatient clinic with sudden onset numbness and weakness in the left arm. Her medical history was notable for hypothyroidism and coronary artery disease. Physical examination revealed findings consistent with stage 4 lymphedema in the left arm. Sensory assessment showed diminished light and coarse touch compared to the right arm. Motor examination demonstrated flaccid paralysis of the left upper limb, with muscle strength graded 0/5 in C5–T1 myotomes. Biceps, brachioradialis, and triceps deep tendon reflexes were absent. The limb was entirely non-functional, and the patient supported it with her right hand for positioning. Electromyography was limited by edema but suggested brachial plexopathy or C8–T1 motor neuron/axon involvement. MRI showed no trunk/root abnormalities, but there was soft tissue and muscle edema around the left axilla/shoulder and postoperative changes in the axillary region. Axillary nerve status remained uncertain.A diagnosis of brachial plexus injury secondary to chronic lymphedema was made, and the patient was enrolled in a comprehensive rehabilitation program.
RESULT: Post-mastectomy upper limb lymphedema can increase the risk of brachial plexus injury, complicating rehabilitation. In a study of 105 non-traumatic brachial plexopathy cases, 31% had radiotherapy, 24% breast cancer, 19% lung cancer, 18% benign tumors, and 10% other malignancies. In breast cancer, symptomatic brachial plexopathy after treatment occurs in 1.8–4.9% of patients (5). In lymphedema patients, brachial plexopathy is typically progressive and resistant to treatment. Early recognition requires vigilant monitoring for symptoms such as pain, numbness, and weakness. Prompt

initiation of a multidisciplinary treatment approach—including manual lymphatic drainage, multilayer compression bandaging, and rehabilitation—may help slow disease progression and preserve upper limb function.

Keywords: Breast cancer, lymphedema, brachial plexopathy

Lymphedema Case Photo



Flaccid appearance of the left upper extremity of a patient with stage 4 lymphedema

EP-10

Clinico-functional correlation of severity of upper extremity lymphedema in breast cancer patients

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OBJECTIVE: To examine the association between clinical severity and lymphatic function of breast cancer related lymphedema
MATERIAL AND METHODS: We conducted prospective cross-sectional study between June 2021 and December 2024 to patients diagnosed with secondary lymphedema after breast cancer surgery. No patients had previous primary lymphedema, history of trauma, metastasis or infection of both arms. The circumference was measured for the proximal and distal to elbow crease and around metacarpal-phalangeal joint. We divided the patients into 2 groups according to international society of lymphology (ISL) stage,2 mild group(ISL stage 1 and 2A) and severe group (ISL stage 2A and 3). This clinico-functional correlation was determined after examining lymphatic function, via indocyanine green (ICG) lymphography in patients with breast cancer lymphedema, and the severity of edema and degree of fibrosis, via ultrasound, bioimpedance measurement. This study was approved by our institutional review board.
RESULT: Among a total of 151 patients, 94 were classified into the mild group based on the ISL stage, while 53 patients were categorized into the severe group. According to ICG lymphography findings, the MDACC stages were distributed as follows: 6 patients in stage 1, 30 patients in stage 2, 92 patients in stage 3, and 19 patients in stage 4. When analyzing differences in patient demographics by MDACC stage, based on status of lymphatic function preservation, it was observed that a higher MDACC stage was associated with a greater proportion of patients with a history of radiation therapy. However, no significant differences were noted in other demographic parameters.(Table 1)
When comparing clinico-functional parameters between patients with mild and severe lymphedema based on ISL stage, significant differences were observed in subcutaneous tightness and shear wave velocity on ultrasonography. Additionally, in the case of segmental dermal backflow (DB) stages assessed via ICG lymphography, significant differences were confirmed across all regions between the two groups. Bioimpedance analysis (BIA) parameters also showed significant differences between the mild and severe groups. (Table 2)
In assessing correlations between various clinic-functional parameters, ICG DB showed no significant correlation with US parameters including thickness ratio, RC, RC ratio, shear wave velocity. (Table 3) Otherwise, there was moderate correlations between BIA values including 1kHz LIR and 5kHz LIR o with ICG stage of lower medial side and hand region. (Table 4) In addition, analysis of 74 patients showed moderate correlation between ICG DB stage (UM) and TDC3 (UL), TDC5 (hand) and ICG DB stage (LM) and TDC1 (LL) and ICG DB stage (hand) and TDC1 (LL).

CONCLUSION: In patients with upper extremity lymphedema, superficial lymphatic function had a significant correlation with subcutaneous edema and extracellular fluid accumulation. Therapeutic approaches promoting the preservation of lymphatic function for edema reduction will be valuable indicators for identifying symptom relief at the affected site

Keywords: mphedema, Breast cancer, Indocyanine, Upper

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EP-11

Lower Limb Lymphedema with Hyperkeratosis: Clinical Outcomes of Complex Decongestive Therapy – A Case Report

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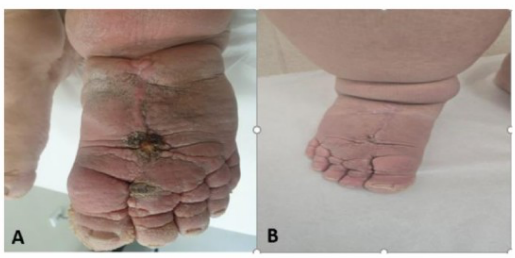
OBJECTIVE: Lymphedema is a disease characterized by the accumulation of protein-rich lymph fluid in the interstitium, which develops due to congenital or acquired insufficiency of the lymphatic circulation system. Complex decongestive therapy (CDT) is still the most effective treatment strategy in controlling symptoms, but results differ according to etiology, site and extent of involvement.
CASE: A 46-year-old female patient presented to our outpatient clinic with complaints of bilateral lower extremity swelling and painful, firm skin thickening on the dorsum of her right foot. The patient, who complained of pain in the lymphedema area, was diagnosed with bilateral stage 3 lymphedema accompanied by hyperkeratotic lesions on the dorsum of her right foot. There was pitting edema in the bilateral lower extremities, and the Stemmer sign was positive. The volume of the right lower extremity was 15.620 ml, and the left lower extremity was 15.142 ml. The patient's treatment plan included skin care, manual lymphatic drainage, multilayer bandaging, and lymphedema exercises. After 10 sessions of CDT, the volume of the right lower extremity decreased to 13.563 ml, and the volume of the left lower extremity decreased to 13.917 ml. Significant regression was observed in the hyperkeratotic lesions on the dorsum of the right foot.
RESULT: CDT is considered the gold standard in the treatment of lymphedema. It should be noted that CDT, with its significant effects on lymphedema symptoms and volume loss, can also be used in wound healing and the treatment of hyperkeratosis.

Keywords: lymphedema,complex decongestive therapy, hyperkeratotic lesions

Regression of hyperkeratotic lesions after CDT treatment



Regression of hyperkeratotic lesions after CDT treatment

EP-12

Primary Congenital Lymphedema of the Upper Limb: A Case Report Emphasizing the Role of Conservative Management

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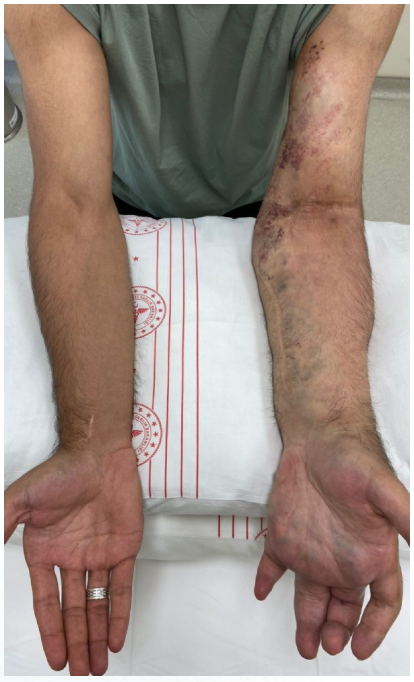
OBJECTIVE: Primary idiopathic lymphedema is a rare disorder, affecting approximately 1 in 100,000 individuals, and most frequently involves the lower limbs. Upper limb involvement accounts for only about 10% of primary cases and is often reported as isolated case studies. This condition is typically congenital, resulting from developmental abnormalities such as lymphatic vessel hypoplasia, valve absence, or impaired lymphatic function. The aim of this case report is to present a rare case of primary congenital upper limb lymphedema, review the diagnostic workup, and emphasize the importance of conservative treatment—particularly Complex Decongestive Therapy (CDT)—as the primary management approach, reserving surgical intervention for refractory or severe cases.
CASE: A 32-year-old man presented with swelling of the left upper limb since birth. He had no family history of similar conditions. Physical examination revealed moderate, non-pitting, non-tender edema involving the entire limb, with no generalized lymphadenopathy or abnormal findings in the breasts and axillae. Motor examination showed normal muscle tone but reduced range of motion in all planes, with active range reduced by approximately 15 degrees and passive range by 10 degrees compared to the right arm. Manual muscle testing revealed a score of 4/5 on the affected side and 5/5 on the unaffected side. A scar line was noted over the arm and elbow from previous lymphatic bypass surgeries performed in 2003 and 2011, and the patient reported worsening edema after both surgeries. All pulses were palpable. The affected limb appeared more violaceous than the contralateral side, with partial blanching on palpation, suggesting a venous component. Doppler ultrasound revealed multiple non-thrombosed superficial varicose veins in the left brachium and antebrachium, aneurysmal dilation of the median cubital vein, and possible basilic vein thrombosis secondary to surgery, with deep veins unaffected. Contrast-enhanced chest and abdominal CT scans in arterial and venous phases excluded systemic disease or proximal obstruction. Circumferential measurements confirmed that the left upper limb was consistently larger than the right at all measured points. The patient had undergone multiple courses of physical therapy, including manual lymphatic drainage and compression therapy, before and after surgery. Prior to surgery, Phase 1 CDT had been effective in reducing swelling, whereas postoperatively CDT no longer provided benefit.
RESULT: This case confirms the diagnosis of primary congenital upper limb lymphedema, established by lifelong symptoms, characteristic clinical findings, and exclusion of secondary causes through imaging and examination. Primary lymphedema more commonly affects the lower limbs, and upper limb cases require thorough evaluation to rule out secondary etiologies such as surgical lymph node dissection, radiation, or malignancy. CDT remains the gold standard for reducing swelling and maintaining limb function, combining manual lymphatic drainage, compression, skin care, and exercise. Surgical interventions such as lymphatic bypass surgery, lymph node transfer, liposuction, and debulking may be considered in selected cases, but their outcomes vary, and they require lifelong compression therapy for optimal results. In this patient, two lymphatic bypass surgeries failed to improve swelling and were associated with a loss of effectiveness of conservative measures. The violaceous discoloration and Doppler findings suggest that coexisting venous abnormalities may have contributed to the persistence or worsening of symptoms, potentially influencing the response to treatment. Based on current knowledge, surgery should not be considered a first-line treatment for

primary lymphedema, and conservative therapies like CDT should be prioritized due to their proven efficacy and lower complication rates. Surgical intervention should be reserved for patients unresponsive to non-surgical measures or with severe impairment in quality of life. Comprehensive evaluation, attention to possible venous involvement, and a multimodal management strategy are essential to optimize outcomes.

Keywords: Primary lymphedema, upper limb, complex decongestive therapy

Figure 1 Anterior view of the arms



EP-13

Axillary Web Syndrome Extending to the Chest Wall

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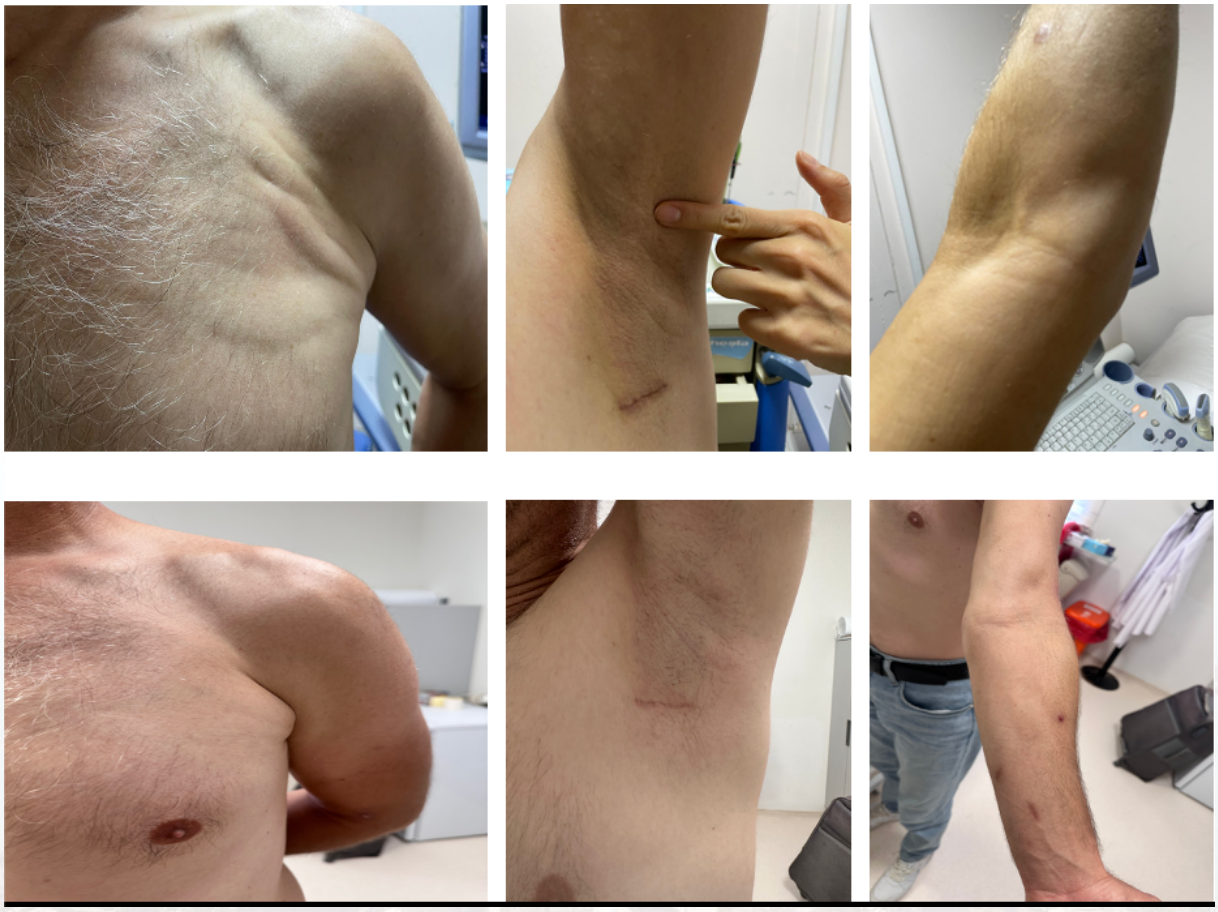
University of Health Sciences, Fatih Sultan Mehmet Research and Training Hospital, Departmant of Physical Medicine and Rehabilitation

OBJECTIVE: Axillary Web Syndrome (AWS) is a condition that is often overlooked and seen after breast cancer surgery, which usually includes axillary lymph node dissection. It may also occur in other shoulder and axillary pathologies such as trauma, infection, sentinel lymph adenectomy, and melanoma surgery combined with axillary lymphadenectomy. AWS presents as a “tight” cord in the subcutaneous tissue in the axilla. The cords usually begin in the axilla, spread down the anteromedial surface of the arm to the elbow, and then proceed down the anteromedial surface of the forearm and sometimes to the root of the thumb.
Common symptoms include pain in the axilla that can radiate down the arm, and limited shoulder movement, particularly abduction. AWS most commonly develops 2–8 weeks following breast cancer surgery.The incidence of AWS after breast cancer surgery has been reported as 6% to 86%. The most frequently discussed theory is that thrombosis, inflammation and fibrosis of the veins and lymphatics result from damage to the superficial lymphatics and veins during axillary surgery.
CASE: A 48-year-old male patient was diagnosed with diffuse large B-cell lymphoma. A lymph node excisional biopsy was performed from the left axillary area for diagnosis. Patient was treated with chemotherapy.
Approximately 6 weeks after the excisional biopsy, the patient began to develop limited movement and pain in his left shoulder. The patient was referred to the lymphedema clinic with a preliminary diagnosis of lymphedema.
Physical examination revealed limited shoulder movement. Shoulder abduction was 150 degrees using a conventional goniometer, and internal rotation was 45 degrees. During internal rotation of the shoulder, striations were noted on the anterior chest wall around the pectoral muscle. Subsequently, during shoulder abduction and flexion, cords extending to the axilla and from there to the cubital area were noted.The patient's elbow extension was measured at 165 degrees. The patient's initial VAS score was 6 and the QDASH score as 27. The volume difference in both upper extremities was determined to be 1%. The patient was referred to us with a preliminary diagnosis of lymphedema and was thought to have AWS. In ultrasound examination dermoepidermal complex was easily distinguished, hypoechoic fat tissue was observed normally between the hyperechoic septa in the epidermis. No signs of erythema, warmth, or inflammation were detected. The patient's laboratory findings were normal.
The patient was initiated into a programme of physical therapy. Firstly, active stretching of pectoralis major and minor, finger ladder exercises and active stretching exercises in the direction of shoulder abduction and flexion, cord stretching for the palpable cord in the cubital and axillar area, passive skin traction, cord release/traction and cord mobilization exercises were taught and told to apply 2 sets of 7-10 repetitions per day. Three months after the patient's initial presentation, the cords disappeared, and VAS: 0 QDASH: 0 was recorded.
RESULT: The purpose of this case report is to describe a case of AWS in a patient who underwent axillary lymph node dissection for lymphoma treatment. Unique features of this case include widespread proximal webbing in the breast and trunk and upper extremity involvement. In fact, it

differs from the AWS cases generally described in the literature in that it is not identical in location to those commonly described in the literature, but rather occurs after a single lymph node dissection for the diagnosis of lymphoma. The case is similar to the literature in terms of time of onset, the patient's age, and low body mass index.
AWS should be considered in patients with shoulder limitation and pain following minor or major axillary surgery, and it should be kept in mind that its spread can vary widely.

Keywords: axiller web syndrome, lymphoma, pain, lymphedema

Before and After Therapy



EP-14

Yellow Nail Syndrome Presenting With Lymphedema

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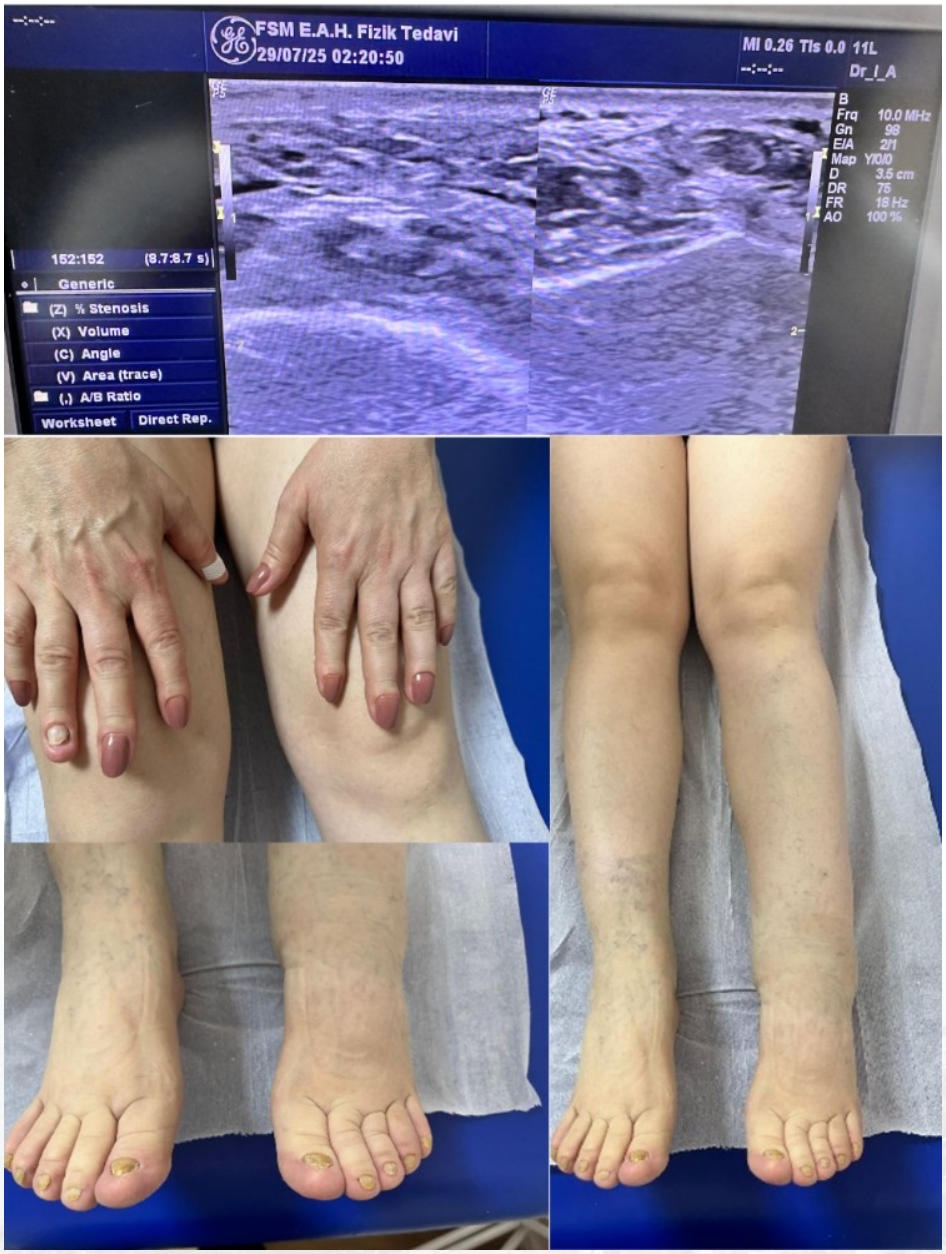
OBJECTIVE: Yellow nail syndrome (YNS) is a rare disorder (OMIM 153300) characterized by the presence of two of the following three features: slow-growing, thickened, dystrophic yellow nails; lymphedema; and respiratory tract involvement. The approximate prevalence is less than 1/1,000,000. The rate of accompanying lymphedema in case series varies between 6% and 78%. Lymphedema characteristics do not differ from those of primary lymphedema. It involves the lower limbs, especially bilateral and below the knee. Condition generally occurs in adults older than 50 years. Respiratory manifestations may include chronic cough, bronchitis, tracheobronchitis, bronchiectasis, chronic sinusitis, recurrent respiratory infections, and pleural effusions. In rare instances, YNS has also been reported as a paraneoplastic manifestation, particularly in association with lung cancer.
CASE: A 50-year-old woman with a history of cerebral aneurysm and allergic rhinitis presented with bilateral leg swelling. There was no trauma, malignancy history. She first developed swelling on the dorsum of the right foot and ankle at the age of 21. Nine years ago, she experienced episodes of cellulitis, one in each lower limb, after which swelling in the left leg became more pronounced. On physical examination there was swelling in both legs and yellow, thickened, and hardened nails. Stemmer sign and pitting was positive in both legs. Right leg volume was 5.846 and left leg volume was 6.366 at the first measurement.To date, no pulmonary involvement has been identified. She had no history of recurrent cough or sinus infections, only allergic rhinitis is diagnosed. Cardiac examination revealed normal heart sounds and no murmur. Respiratory examination was normal. Her familial history revealed that three of five siblings exhibited similar congenital nail changes and one of them has bilaterally lower limb swelling.
In the ultrasound examination of both lower legs (both ankles at the level of lateral malleolus), the thickened border of the bilateral dermoepidermal complex disappeared and hypoechoic lymphatic fluid was observed around the hyperechoic fat tissue in the hypodermis.
RESULT: After a detailed systemic examination and family history, we diagnosed Yellow Nail Syndrome, a rare condition reported in the literature. Although the familial form is rarely described in the literature, our case is a familial condition. In this respect, our case is significant. The patient was specifically informed about the most common accompanying respiratory diseases. Cerebral aneurysm, a rare condition reported in the literature, was present in our patient's history so other rare conditions were also discussed(ocular involvement has been reported: chemosis, corneal micropannus eyelid lymphedema, thickened conjunctiva and anecdotal associations have also been described: anhydrosis, pectus excavatum, eosinophilia–myalgia syndrome, bullous stoma- titis, sarcoidosis and Raynaud's phenomenon, cerebral aneurysm and pancytopenia).
In conclusion, we wanted to draw attention to this genetic syndrome, which is associated with lymphedema and yellow nails, and can also be accompanied by numerous other health problems.

Keywords: lymphedema, yellow nail syndrome, serebral aneurysm

Yellow nail syndrome inspection findings and skin and subcutaneous USG appearance



EP-15

Clinical Application of Personalized ICG-Guided Manual Lymphatic Drainage (MLD) for Activating Compensatory Lymphatic Pathways in Secondary Lymphedema: A Case Series

YEJI KIM, Su-Hong Choi, In Joo Kong, Jin A Yoon

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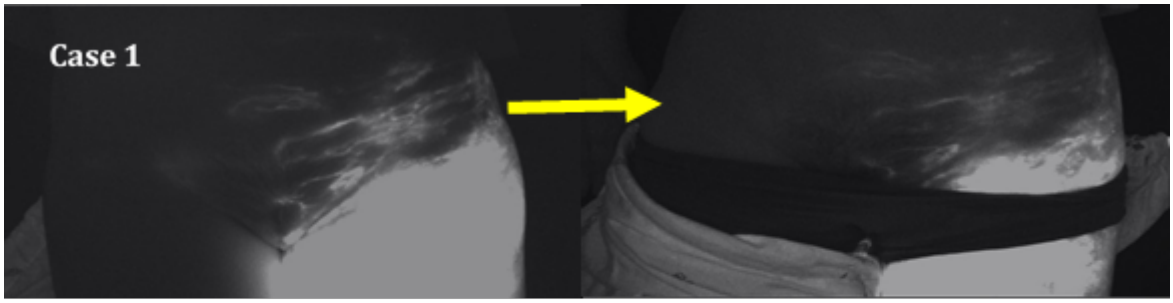
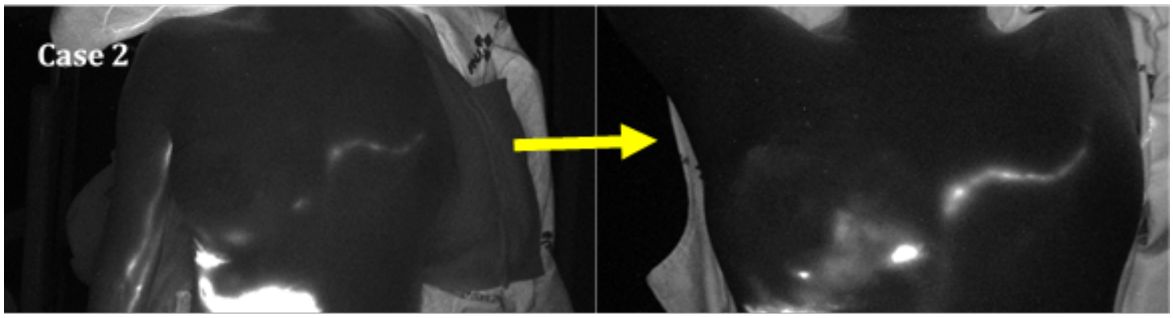
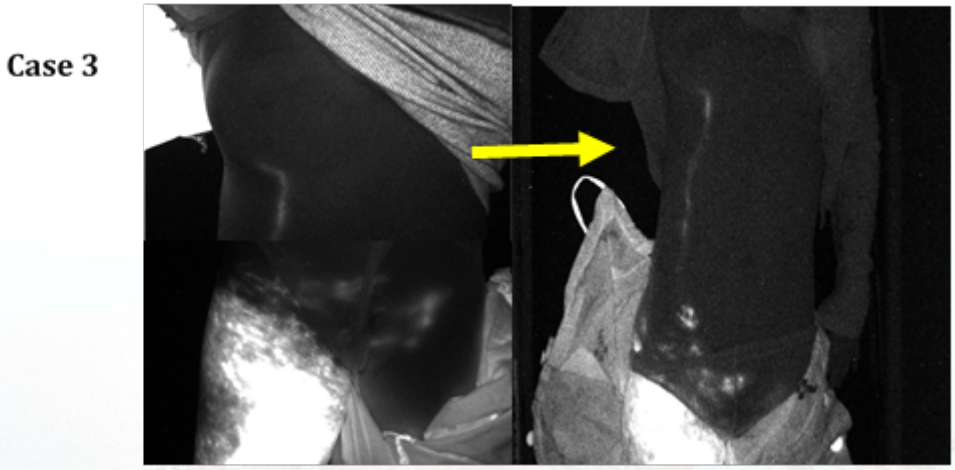
OBJECTIVE: Indocyanine Green (ICG) lymphography is an emerging technique that enables real-time visualization of superficial lymphatic flow. In patients with secondary lymphedema, ICG-guided manual lymphatic drainage (MLD) may facilitate the identification and activation of compensatory lymphatic pathways—alternative routes formed in response to lymphatic obstruction. This study aimed to explore the clinical utility of ICG-guided MLD in visualizing and enhancing compensatory lymphatic pathways and to assess its effectiveness when applied as a personalized therapeutic strategy.
CASE: Three patients with secondary lymphedema that occurred after surgery were enrolled. METHODS: ICG lymphography was performed to identify lymphatic flow patterns, and MLD was performed based on the results. Changes in lymphatic flow before and after MLD and the formation of compensatory lymphatic pathways were analyzed.
RESULT: All three patients showed obstruction in the primary lymphatic drainage pathways. Two of the patients exhibited newly formed compensatory drainage routes toward the contralateral axillary or inguinal lymph nodes, which were further enhanced following ICG-guided MLD. The remaining patient demonstrated redistribution through ipsilateral collateral lymphatic channels. Post-treatment evaluations confirmed improved lymphatic flow and activation of compensatory pathways. In two patients, limb circumference was reduced by 1.5 cm to 7 cm. Bioimpedance analysis (BIA) showed improvements in all patients, with 1kHz LIR reduced to ≤0.177 and 5kHz LIR to ≤0.171. Additionally, all patients reported subjective symptom relief, including reduced swelling, alleviated pressure, and improved comfort and mobility. These findings suggest that the enhancement of compensatory pathways via ICG-guided MLD may facilitate functional lymphatic remodeling.
CONCLUSION: ICG-guided MLD is an effective strategy for identifying and activating compensatory lymphatic pathways in patients with secondary lymphedema. Through real-time visualization of lymphatic flow, it enables the design of patient-specific drainage techniques, moving beyond standardized treatment protocols toward personalized care. This case series highlights the clinical value of ICG lymphography as a dynamic therapeutic guide, not merely a diagnostic tool, and underscores the importance of imaging-based treatment planning in lymphedema management.

Keywords: Indocyanine green lymphography, Secondary lymphedema, Manual Lymphatic Drainage, Compensatory Lymphatic Pathway, Personalized therapeutic approach

Compensatory drainage pathway and enhanced pre(left) and post(right) MLD







Characteristics of patients with for ICG-Guided MLD in Secondary Lymphedema

	Case 1	Case 2	Case 3
Age	62	51	54
Diagnosis	Endometrial Cancer	Breast Cancer	Ovarian Cancer
LN Dissection	Yes	No	Yes
Lymphedema site	Lt. LE	Rt. Breast	Rt. LE
Post Operation periods	8yrs	2yrs	5yrs
Lymphedema duration	3yrs	1yrs	3yrs
ISL Stage	Ⅱa	Ⅱ	Ⅱ
ICG Lymphography Finding			
Dermal Backflow site	Inner Thigh	Upper lateral	Thigh
DB Pattern	Stardust	Linear	Stardust
DB stage	Ⅳ	Ⅲ	Ⅳ
MDACC stage	Ⅳ	Ⅱ	Ⅲ
Final Drainage site	Contralateral inguinal	Contralateral axilla	Ipsilateral axilla
Clinical Data			
Circumference site	AK 10cm	TB	AK 10cm
Change circumference	42 -> 43	91 -> 84	41.5 -> 39

Change Bioelectrical Impedance Analasis (1kHz LIR, 5kHz LIR)	1kHz 0.87 -> 1.04 5kHz 0.87 -> 1.04	1kHz 0.97 -> 0.98 5kHz 0.97 -> 0.99	1kHz 1.11 -> 1.19 5kHz 1.11 -> 1.18
Subjective symptom	“The hardness on the inner and back sides of my thighs was quite severe, but since starting MLD, the area has become much softer. The particularly firm areas became noticeably softer, and my legs felt much lighter. The hardness continued to decrease, and my legs looked slimmer. The swelling in my legs has reduced, and these days, I’m even able to squat."	“My chest and armpits always felt heavy and tight, but after receiving MLD and pectoral muscle relaxation treatments, my chest felt lighter, and it became easier to wear clothes. In daily life, the feeling of pressure has significantly reduced.”	“In the early stages, I had difficulty moving due to a heavy pressure sensation in my legs. After starting treatment with compression stockings and Mobiderm pads, the stiffness gradually eased when moving my legs. Since the middle of the treatment, the swelling and tightness in my legs have decreased, and movement has become much easier.”

EP-16

Diagnostic Challenges in Lipedema: The Expanding Criteria, Risk of Confusion with Lipohypertrophy and Steatopygia, and Lessons from the Saartjie Baartman Case

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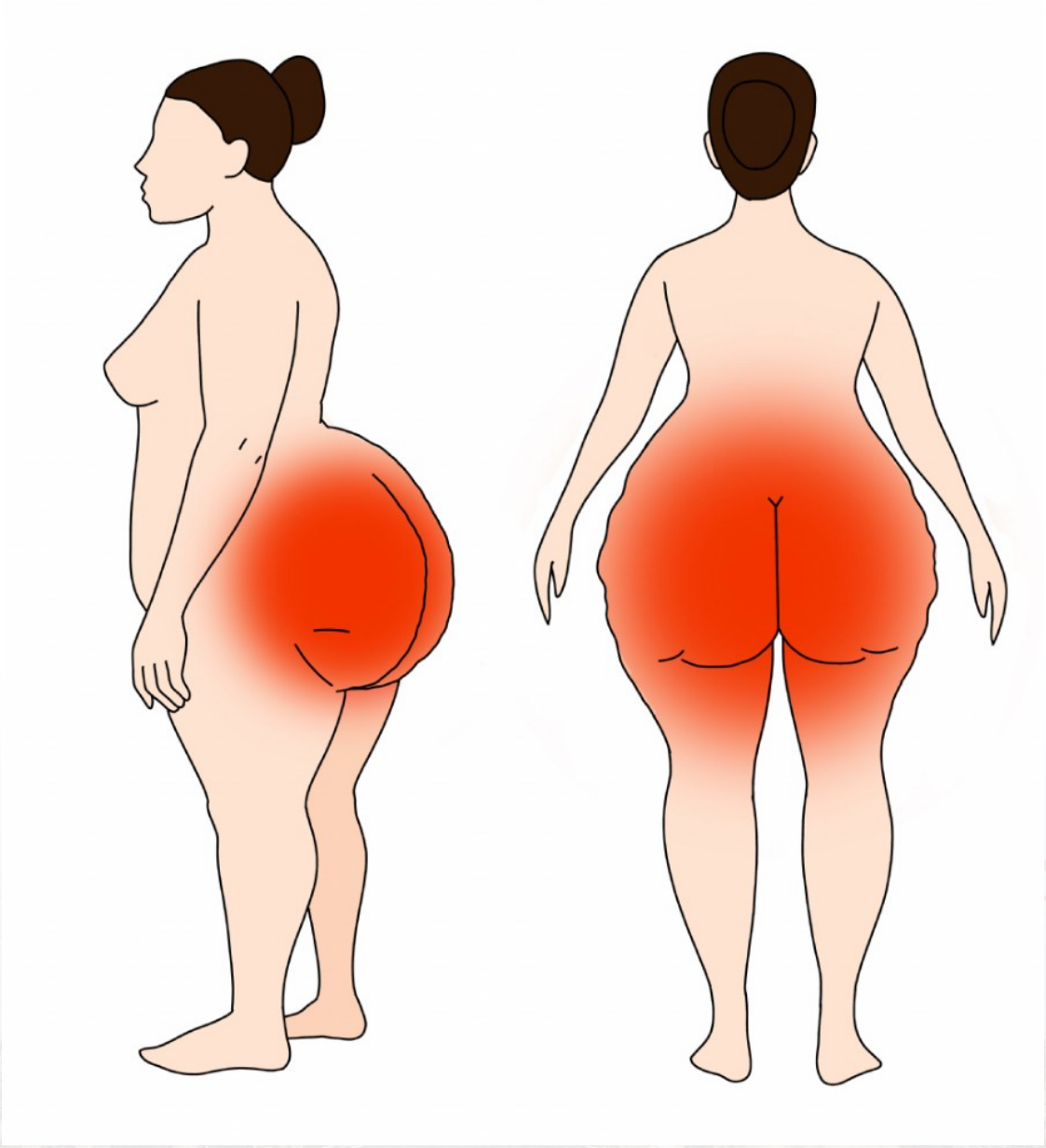
OBJECTIVE: Lipedema is a chronic loose connective tissue disease characterized by symmetric adipose deposition in the lower extremities, frequently accompanied by pain, tenderness, and easy bruising. While European diagnostic criteria emphasize pain as an obligatory feature, the revised American consensus (2019 onward) no longer requires pain as a mandatory criterion. This paradigm shift broadens the spectrum of lipedema diagnosis to include painless phenotypes. However, it also raises the risk of diagnostic confusion with lipohypertrophy—a benign clinical variant—and steatopygia, an ethnically defined morphological trait most notably exemplified by the case of Saartjie Baartman ("Hottentot Venus") in the 19th century.
CASE: This narrative review synthesizes current consensus criteria, pathophysiological insights from the U.S. Standard of Care report, and anthropological-historical perspectives. Comparative analysis was performed to delineate the distinguishing features of lipedema, lipohypertrophy, and steatopygia, with special attention to the implications of removing pain as a mandatory diagnostic marker.
Lipedema: A progressive disorder of loose connective tissue with microangiopathy, fibrosis, and inflammation. Characterized by symmetric fat deposition sparing hands and feet, resistance to diet/exercise, and often accompanied by pain, tenderness, and bruising, although painless forms exist.
Lipohypertrophy: A symmetrical, painless fat excess of the lower extremities, typically stable and clinically benign. Its classification remains debated: some authors consider it a pre-lipedema stage, while others view it as distinct.
Steatopygia: An ethnically determined, non-pathological phenotype marked by prominent gluteofemoral adiposity, classically observed in Khoisan women. The historical misrepresentation of Saartjie Baartman illustrates the ethical dangers of conflating physiological traits with pathology.
The recent U.S. diagnostic criteria shift from symptom- to phenotype-centered evaluation increases the likelihood of misclassification, particularly in diverse ethnic populations.
RESULT: The removal of pain as a mandatory diagnostic criterion in lipedema expands inclusivity but heightens the risk of conflating pathological lipedema with benign or physiological phenotypes such as lipohypertrophy and steatopygia. Accurate differentiation requires integrating phenotype, symptomatology, disease progression, and ethnogenetic context. The Saartjie Baartman case underscores the ethical imperative of avoiding mislabeling physiological diversity as disease. Future research should focus on genetic and anthropological markers to refine diagnostic boundaries and prevent both under- and over-diagnosis in lipedema.

CONCLUTION: The removal of pain as a mandatory diagnostic criterion in lipedema expands inclusivity but heightens the risk of conflating pathological lipedema with benign or physiological phenotypes such as lipohypertrophy and steatopygia. Accurate differentiation requires integrating phenotype, symptomatology, disease progression, and ethnogenetic context. The Saartjie Baartman case underscores the ethical imperative of avoiding mislabeling physiological diversity as disease. Future research should focus on genetic and anthropological markers to refine diagnostic boundaries and prevent both under- and over-diagnosis in lipedema.

Keywords: Lipedema, Lipohypertrophy, Steatopygia, Saartjie Baartman, Ethnic phenotypes, Misdiagnosis

Illustration of Steatopygia



Side and front view

Table 1. Key distinguishing features of lipedema, lipohypertrophy, and steatopygia

Feature	Lipedema	Lipohypertrophy	Steatopygia
Origin	Chronic loose connective tissue disease; inflammation, microangiopathy, fibrosis	Benign clinical variant; sometimes considered pre-lipedema	Ethnic–genetic morphological trait
Symptoms	Pain, tenderness, bruising (mandatory in Europe; optional in U.S.)	Absent	Absent
Course	Progressive; functional impairment, risk of lipo-lymphedema	Stable!!	Stable
Fat distribution	Symmetric fat in hips, thighs, legs; hands/feet spared	Symmetric, cylindrical fat in hips and thighs	Prominent gluteofemoral fat, especially buttocks and upper thighs
Onset	Puberty, pregnancy, menopause	May become apparent with age	Congenital or early childhood
Clinical relevance	Requires diagnosis and treatment (compression, liposuction, etc.)	No treatment needed except cosmetic concerns	Non-pathological, anthropological phenotype

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EP-17

The Effect of Deep Oscillation and Cryo T-Shock as an Adjunct to Decongestive Therapy in Lipedema: A Pilot Study

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OBJECTIVE: This pilot study aimed to evaluate the effects of adding Deep Oscillation and Cryo T-Shock to CDT on pain (VAS; Visual Analog Scale), functional status (LEFS; Lower Extremity Functional Scale), quality of life (LYMQOL- Lymphedema Quality of Life Questionnaire), limb volume, and body mass index (Body Mass Index) in patients with lipedema
CASE: Thirty-one women diagnosed with lipedema were included. The demographic and clinical characteristics were recorded. All participants received CDT in combination with: Deep Oscillation for 25 minutes per leg (Lymphedema mode: 120–150 Hz for 5 minutes, 85 Hz for 10 minutes, 15–40 Hz for 10 minutes), and Cryo T-Shock for 10 minutes per leg, continuous progressive intense mode. The intervention consisted of an intensive 6-day program followed by biannual follow-ups. Assessments were performed before and after treatment, including BMI, pain by VAS, LEFS and LYMQOL instruments, and volumetric measurements as outcome measures.
RESULT: The mean age and BMI of the patients were 46.3 ± 13.2 and 28.9 ± 5.38, respectively. Most of the patients had combined type and type 2 lipedema, followed by combined type 1 and type 3. The majority of them had stage 2 lipedema. The pre and post treatment outcome measures are shown in Table 1.

Keywords: Lipedema, Deep Oscillation, Cryo T-Shock, quality of life, functional status

Table 1. Pre- and Post-Treatment Outcomes

Parameter	Pre-Treatment (Mean ± SD)	Post-Treatment (Mean ± SD)	Δ (Change)	p-value
BMI (Body Mass Index)	28.96 ± 5.38	28.23 ± 5.49	−0.73 ± 0.87	<0.001
VAS (Visual Analog Scale)	7.2 ± 1.6	3.2 ± 1.3	−4.0	<0.001
LEFS (Lower Extremity Functional Scale	45.45 ±13,35	60.45±11,60	+15.0±7.66	<0.001
LYMQOL (Lymphedema Quality of Life Questionnaire)	49.45 ±17,15	34.32 ±10,28	−15.13±11.17	<0.001
Limb Volume(ml) R(Right) L(Left)	10.66±2.28/10.57±2.21	9.79±2.10/9.75±1.95	0.87±0.49/0.82±0.55	<0.001/<0.001

BMI: Body Mass Index, VAS: Visual Analog Scale, LEFS: Lower Extremity Functional Scale, LYMQOL: Lymphedema Quality of Life Questionnaire, R: Right, L: Left

ORAL PRESENTATIONS

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OP-001

Clinical and Demographic Characteristics of Male Patients with Secondary Lymphedema

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OBJECTIVE: Although lymphedema is less frequently observed in males, diagnostic and therapeutic processes in this group are sometimes overlooked, potentially leading to increased morbidity. The primary aim of this study is to identify the clinical and demographic characteristics of adult male patients diagnosed with secondary lymphedema and to determine the etiological factors contributing to the development of lymphedema. The secondary aim is to examine variables associated with a history of cellulitis.
MATERIAL AND METHODS: This retrospective cross-sectional study included 139 male patients diagnosed with secondary lymphedema who applied to the Lymphedema Outpatient Clinic of Bilkent City Hospital between 2020 and 2024. Data recorded included age, body mass index (BMI), lymphedema duration (months), etiology (cancer surgery, orthopedic surgery, phlebolymphedema, lipolymphedema, and other causes), lymphedema localization (upper extremity, lower extremity, unilateral, bilateral, genital), lymphedema stage according to the International Society of Lymphology (ISL), history of cellulitis, and history of complex decongestive therapy (CDT). Patients with and without a history of cellulitis were compared in terms of clinical and demographic variables. Kruskal-Wallis, Mann-Whitney U, and Chi-square tests were used for statistical analysis.
RESULT: The mean age of the patients was 59.75 ± 11.60 years, the mean BMI was 33.09 kg/m² (min: 18.20 – max: 56.81), and the mean duration of lymphedema was 36 months (min: 2 – max: 144). Lymphedema most frequently affected the lower extremity and was unilateral in 48.9% of cases. Bilateral lower extremity involvement was present in 35.3%, unilateral upper extremity in 9.4%, and genital involvement in 6.5% of patients. The most common etiological cause was cancer surgery (43.9%), followed by phlebolymphedema associated with chronic venous insufficiency (30.2%). A total of 25.9% of participants had experienced at least one episode of cellulitis. The incidence of cellulitis was significantly higher in patients with non-cancer-related lymphedema ($p = 0.0008$). The duration of lymphedema was significantly longer in patients with cellulitis ($p = 0.0273$). No statistically significant relationship was found between cellulitis development and BMI, lymphedema stage, or history of CDT.
CONCLUSION: In male patients with secondary lymphedema, the most common etiological factors are cancer surgery and chronic venous insufficiency. Educating these patient groups about lymphedema may increase the likelihood of early diagnosis and, consequently, early treatment. A prolonged duration of lymphedema, particularly in cases unrelated to cancer, is associated with an increased risk of developing cellulitis infections. Therefore, implementing personalized treatment plans in the early stages and ensuring regular follow-up after CDT may be effective in reducing the risk of complications in male lymphedema patients.

Keywords: Male lymphedema, secondary lymphedema, cellulitis

Characteristics of Patients With and Without a History of Cellulitis

Variable	No Cellulitis n(%)	≥1 Episode of Cellulitis n(%)	p-value
Age (years) (median, min–max)	63.0 (20.0–75.0)	59.0 (24.0–75.0)	0.3824
BMI (kg/m²) (median, min–max)	31.9 (18.7–56.4)	35.7 (18.2–56.8)	0.0822
Duration of lymphedema (months) (median, min–max)	36.0 (2.0–120.0)	48.0 (3.0–285.0)	0.0273*
Lymphedema Stage (ISL)	Stage 1: 12 (11.7%) Stage 2: 60 (58.3%) Stage 3: 31 (30.1%)	Stage 1: 2 (5.6%) Stage 2: 18 (50.0%) Stage 3: 16 (44.4%)	0.0886
History of CDT	Yes: 66 (64.1%) No: 37 (35.9%)	Yes: 28 (77.8%) No: 8 (22.2%)	0.1514
History of Cancer Surgery	Yes: 54 (52.4%) No: 49 (47.6%)	Yes: 7 (19.4%) No: 29 (80.6%)	0.0008*
History of Orthopedic Surgery	Yes: 8 (7.8%) No: 95 (92.2%)	Yes: 3 (8.3%) No: 33 (91.7%)	1.0000
Obesity-Related Lymphedema	Yes: 6 (5.8%) No: 97 (94.2%)	Yes: 5 (13.9%) No: 31 (86.1%)	0.1524
CVI-Related Lymphedema	Yes: 28 (27.2%) No: 75 (72.8%)	Yes: 14 (38.9%) No: 22 (61.1%)	0.2096

**Statistical analysis was performed using the Mann-Whitney U test for continuous variables and Fisher's Exact Test for categorical variables. *p<0.05 was considered statistically significant.*

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OP-004

Prospective Surveillance for Penile Cancer-Related Lower Limb Lymphedema

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OBJECTIVE: 1. To determine the incidence of lower limb lymphedema in Indian patients treated for penile cancer with ilioinguinal lymph node dissection, with or without adjuvant radiation therapy, using a prospective surveillance program.
2. To identify early-stage lower limb lymphedema (defined as a volume difference >5% and ≤10%) in Indian patients treated for penile cancer with ilioinguinal lymph node dissection, with or without adjuvant radiation therapy, using the surveillance program.
3. To evaluate the association and clinical relevance of lymphedema-related signs and symptoms in detecting early-stage lower limb lymphedema in Indian patients undergoing ilioinguinal lymph node dissection, with or without adjuvant radiation therapy.
MATERIAL AND METHODS: A 12-month prospective surveillance program was implemented with target recruitment of 100 Indian penile cancer patients scheduled for ilioinguinal lymph node dissection, with or without adjuvant radiation therapy. Baseline bilateral lower limb volume was assessed using circumferential tape measurements prior to dissection. Follow-up assessments occurred at predefined intervals: within 20 days post-surgery, at 4–6 weeks post-surgery, and every three months thereafter for up to one year. At each visit, limb circumference, clinical signs, and patient-reported symptoms of lymphedema were recorded. A percentage volume difference of >5% to ≤10% between limbs was used as the threshold for diagnosing early-stage lymphedema. The program also included structured patient education on recognizing lymphedema signs and symptoms, self-assessment techniques, risk-reduction practices, and recommended exercises.
RESULT: Surveillance data over six months of 33 penile cancer patients with 14 patients treated with ilioinguinal lymph nodes dissection with or without adjuvant radiation therapy, revealed a 42.4% incidence of lower limb lymphedema within the first three months post-surgery. A statistically significant association was found between clinical signs of lymphedema and confirmed lower limb lymphedema ($p < 0.038$). No significant associations were observed between lymphedema incidence and symptoms, number of lymph nodes dissected, radiation therapy, body mass index, limb dominance, or age.
CONCLUSION: This prospective surveillance program successfully identified early-stage lower limb lymphedema in penile cancer patients undergoing ilioinguinal lymph node dissection, with or without adjuvant radiation therapy. The high incidence observed within three months post-surgery and the significant association between clinical signs and lymphedema underscore the importance of early detection. A >5% volume difference threshold is supported for diagnosing early lymphedema. These findings highlight the critical role of structured surveillance programs in timely diagnosis and management. Recruitment is ongoing, aiming for 100 patients over a one-year period.

Keywords: lower limb lymphedema, incidence, penile cancer, ilioinguinal lymph node dissection, prospective surveillance

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OP-005

Impact of Lower Limb Lymphedema on Balance and Functional Status: A Preliminary Clinical Report

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OBJECTIVE: OBJECTIVES: Musculoskeletal conditions often emerge as secondary complications in patients with lymphedema. This study aims to evaluate functional status and balance in patients with lower limb lymphedema (LLL).
MATERIAL AND METHODS: This case-control study compared patients with lower extremity lymphedema to healthy volunteers regarding balance and functional status. The demographic and clinical features of the participants were documented. The Lower Extremity Functional Scale (LEFS) was utilized to evaluate functional status. The Tecnobody PK252 isokinetic balance measurement system, the one-leg standing test, and the functional reach test were evaluated for static and dynamic balance measures.
RESULT: This study recruited 20 LLL patients and 20 healthy individuals. The mean age of the participants was 47.73+11.1 years (patient group 46.1+14.4, control group 47.4+6.61 p:0.706). There was a statistical difference between the two groups in terms of LEFS functional scores.The one-leg standing test and functional reach test results were statistically significantly lower in the patient group (26+22.2 and 64.5+33.2 p<0.001; 17.8+5.03 22.7+5.63 p:0.006). In Tecnobody measurements, stability index, average center of gravity, forward-backward standard deviation, and average track error were determined to be statistically different between the two groups.
CONCLUSION: We detected deteriorations in static and dynamic balance parameters in patients with LLL. We suggest that balance and coordination exercises be added to the exercise programs of patients with LLL.

Keywords: balance, lower limb lymphedema, functional status

OP-006

The need for physios to be trained in lymphology and the importance of specialized mld: proven by 600 case studies

Tim Decock

Dr. Vodderschool Belgium and The Netherlands, Decockliniek Belgium,Lymfehuis Antwerp,Masterclass Lugano

OBJECTIVE: As we started this year in Switserland with the Masterclass Lymphology with Prof. Dr. Campisi, the need for training of physios by the consensus of ISL becomes more and more an international importance. Till now there is an uncontrolled growth of trainings, some with and some without a good mld. Following presentation will show the need for a good mld.
In developed countries, the main cause of lymphedema is widely assumed to be treatment for cancer. Indeed, prevalences of 12-60% have been reported in breast cancer patients and of 28-47% in patients treated for gynecological cancer. However, it appears that about a quarter to a half of affected patients suffer from other forms of lymphedema, eg primary lymphedema and lymphedema associated with poor venous function, trauma, limb dependency or cardiac disease.
Although lymphedema is not a life-threatening disorder, it is a chronic condition that can create considerable disability with recurrent infections in the limb, functional impairment and pain. In addition, research has demonstrated significant psychosocial morbidity, and poorer quality of life.
Even though it may be greatly ameliorated by appropriate management, many patients receive inadequate treatment, are unaware that treatment is available or do not know where to seek help.
Treatment should comprise a holistic and multidisciplinary approach that encompasses all aspects such as assessment by a trained and experienced lymphedema specialist, exercises tailored to the patient needs and functionality, manual lymph drainage, effective thin profile compression therapy and skin care. Although the last years lymph drainage has been considered as not necessary, we are sure that it is an undisputable part of the treatment. 500 therapists have proven that the results before and after one treatment makes a change.
MATERIAL AND METHODS: In Belgium and The Netherlands we follow the consensus of ISL for the training of our physiotherapists to become lymph specialists. Lymph drainage is an important part of edema therapy. Only MLD is not enough for the treatment but treatment without MLD doesn't give the same good results.
Following research will show the need for all the disciplines.
Included: patients with lymph edema with pitting and a positive Stemmer.
Excluded: patients with generalized or lipedema.
Our Care Pathway for community patient consists of:
Phase 0: Diagnosing by the physician (lymphoscintigraphy, fluoroscopy, US,…)
Phase 1: by Physical therapist
1. Measurements of current situation by Perikit or meter
2. Manual lymphdrainage ad modum Vodder for ½ hour.
3. Measurements of current situation by Perikit or meter after treatment.

RESULT: All of the treatments show a positive result between 5 and 75 cl difference before and after a good treatment.
CONCLUSION: Specialized MLD is a part of the treatment. Following results will show that it has to stay that way. Before and after one treatment are big differences in volume. Mld needs to be correct (changes from patient to patient) in every way (pressure, time,.) But only treatment by the physio is not enough. We do need all the other disciplines to succeed.

Keywords: manual lymph drainage, physiotherapy, specialized, training

OP-007

The effects of hydrotherapy on lower extremity volume, quality of life, and functionality in patients diagnosed with unilateral lower extremity lymphedema:Preliminary Results of Randomized controlled, single blinded study

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OBJECTIVE: Aqua lymphatic therapy is an effective treatment method in lymphedema management. However, studies on aqua lymphatic therapy in the literature have primarily focused on patients with upper extremity lymphedema, and there are few randomized controlled trials available. In our study, In our randomized controlled trial, we aimed to evaluate the effects of hydrotherapy on quality of life, daily activity, participation, functional status, and limb volume in patients diagnosed with unilateral lower extremity lymphedema.
MATERIAL AND METHODS: This study is a single-blind randomized controlled trial.Patients, aged 18-75 with primary or secondary unilateral lower extremity lymphedema who have received at least 2 weeks of complex decongestive therapy in the past were included in the study.Medically stable and able to participate in hydrotherapy sessions.Willingness to adhere to the study protocol and provide informed consent. Patients who have had an injury and/or surgery in the last 6 months and conditions where hydrotherapy is contraindicated (active infection, severe fear of water, behavioral problems, shortness of breath at rest, incontinence, known chlorine allergy, open wound, acute systemic illness, epilepsy, tracheostomy, permanent drain, immunodeficiency) were excluded.

The demographic and clinical data of the patients were recorded. Before treatment, limb volume was assessed using the circumference measurement method, quality of life was evaluated with the Lymphedema Quality of Life Questionnaire (LYMQOL), lower extremity functionality was assessed with the Lower Extremity Functional Scale (LEFS), and exercise capacity was measured using the 10-Meter Walk Test. The control group followed a home-based exercise program for 6 weeks, while the intervention group received hydrotherapy in addition to the home exercise program during the same period.Aqua lymphenphatic therapy sessions were administered three times per week over a six-week period. Each session consisted of 30-minute supervised aquatic exercise programs conducted in groups of 5-7 participants. The interventions were performed in a hydrotherapy pool maintained at 130 cm depth with water temperature regulated between 30-33°C. All sessions were supervised by a trained physiotherapist to ensure proper technique and safety.t.
At the end of the treatment, patients were re-evaluated in terms of volume, functionality, quality of life, and exercise capacity. The two groups were compared regarding volume measurement, functionality, and quality of life..
Data were analyzed using descriptive statistics, Wilcoxon signed-rank, Mann-Whitney U, paired and independent t-tests as appropriate.
RESULT: In our study, 24 patients were assessed before treatment, post-treatment, and 6 weeks after therapy. The participants consisted of 20 women (%83,3), with a mean age of 52,3 years and a BMI of 47,5 kg/m².

11 patients were in the aqua therapy group, while 13 were in the control group, with no significant demographic differences between the two groups.(p<0,05)

Statistically in the aqua therapy group, significant improvements were observed in the 10-meter walk test (10MWT) (p<0.001), Lower Extremity Functional Scale (LEFS) (p=0.017), affected limb volume (p=0.037), and emotional part of the Lymphedema Quality of Life Questionnaire (LYMQOL) (p=0.002) between pre- and post-treatment assessments.
CONCLUSION: Our study suggests hydrotherapy enhances volume of affected limb, function and quality of life in patients with unilateral lower limb lymphedema.
Compared to the control group, the aqua therapy group showed significantly greater improvement in functional status and the emotional domain of quality of life.
The study highlights hydrotherapy's potential as a multimodal adjunct, addressing both physical and psychological outcomes in lymphedema care. Further research should optimize protocols and identify ideal candidates for aquatic therapy.

Keywords: Aquatic therapy,Hydrotherapy, Lower Extremity Functional Scale (LEFS),Lymphedema Quality of Life (LYMQOL),lymphedema rehabilitation, Unilateral lower extremity lymphedema

OP-008

The Effects of Hospital-Based Aerobic Exercise Therapy on Exercise Capacity, Body Composition, Functional Level, and Quality of Life in Patients with Primary Lower Extremity Lymphedema: A Prospective Randomized Controlled Single-Blind Study

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OBJECTIVE: This study aims to evaluate the effectiveness of aerobic exercise therapy in managing lymphedema, a progressive condition affecting the lymphatic system, and its effects on patients' exercise capacity, body composition, and quality of life, using a hospital-based supervised personalised protocol.
MATERIAL AND METHODS: We analyzed 29 patients with lower extremity lymphedema and divided them into two groups: a hospital-based exercise group (Group 1, n=14) and a home-based exercise group (Group 2, n=15). Group 1 received aerobic exercise therapy on a treadmill at 50-60% exercise intensity based on CPET test results, while Group 2 received walking training at an RPE intensity of 12-13 on the Modified Borg scale (40 minutes per day, 5 days a week, for 4 weeks for both groups). All patients were evaluated before treatment, at weeks 4 and 16.
We assessed 30-Second Sit-to-Stand Test (30s-CST), 6-Minute Walk Test (6MWT), lower extremity circumference and volume measurement, bioimpedance parameters, Lower Extremity Functional Scale (LEFS), Lymphedema Life Impact Scale (LLIC), Hospital Anxiety and Depression Scale (HADS), and Numerical Rating Scale (NRS).
RESULT: There was no significant difference between the two groups in terms of age, gender, and disease duration. Although slight increases in VO_2max, metabolic equivalents, and resting cardiovascular parameters were observed in both groups, the effects of group, time, and interaction were not statistically significant. 30s-CST results showed similar results between the two groups, with no significant increases observed over time (p=0.079). While post-hoc analysis revealed a significant difference between two groups at week 16, no significant within-group changes were detected over time (GLM time effect: p = 0.150); however, the observed improvements particularly in the Group 1 may still be considered clinically relevant. We found a significant group effect (GLM, group p=0.002) at 6MWT, with Group 1 showing greater walking distances than Group 2 at both week 4 and 16, but the time effect (p=0.150) and group x time interaction (p=0.701) were not significant (Figure 1). We found no significant differences in lymphedema circumference and volume measurements over time or between groups (except left metatarsophalangeal joint; p=0.001) were observed between groups, but these differences are not generalizable and do not suggest a significant treatment effect.
Intergroup differences in body weight, body mass index, muscle mass, body fat percentage, lean mass, waist-to-hip ratio, total body fluid, extracellular fluid, edema index, and basal metabolic rate were not significant (p>0.05). LEFS scores increased over time in both groups, but no significant differences were found between the groups or in the time × group interaction (p>0.05). LLIC total score analysis revealed significant group (p=0.012) and time (p<0.001) effects, with Group 1 experiencing a significant reduction in total scores, while Group 2 experienced a more limited decrease. We found a significant group effect on the total HADS score (p<0.001), with a decreasing trend in Group 1 scores at 16 weeks. However, no significant group, time, or interaction effects were observed in the HADS - Anxiety Subscale scores (p>0.05). The time effect on NRS scores significantly

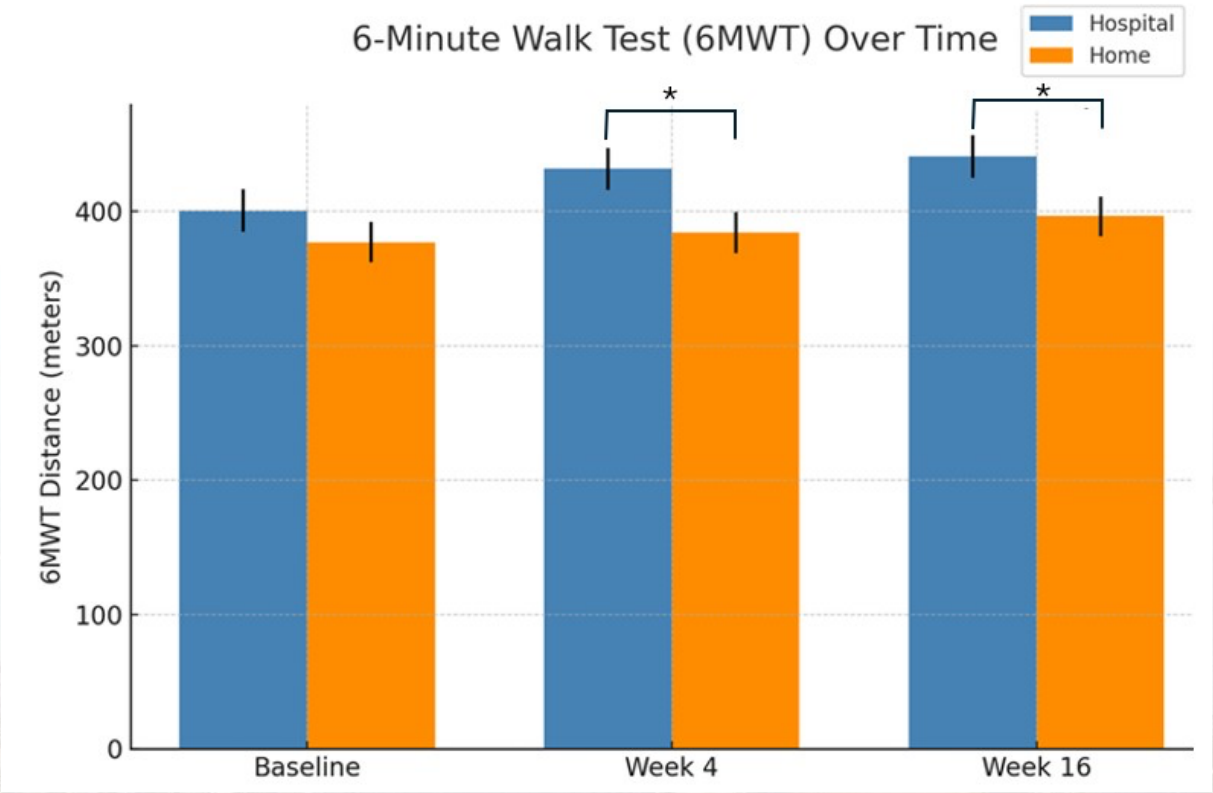
decreased ($p<0.001$) in both groups over the follow-up period, but the intergroup difference and interaction were not significant.

CONCLUSION: Exercise programs improve physiological parameters in individuals with primary lower extremity lymphedema, but hospital-based exercise leads to more significant functional status and quality of life gains, suggesting structured, supervised exercise programs are preferred for managing primary lymphedema.

One of the strengths of the study is that it is based on a comprehensive follow-up protocol supported by functional tests in addition to objective physiological parameters. However, the limited sample size and short-term follow-up period restrict the generalizability of the study's findings. However, larger-sample studies evaluating long-term outcomes are needed.

Keywords: Aerobic exercise, functional capacity, primary lower limp lymphedema, quality of life, supervised rehabilitation

Figure1. Changes in 6-Minute Walk Test (6MWT) Distance Over Time



OP-009

A Replicable Model for Clinical Care, Research, and Public Health in Developing Nations

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OBJECTIVE: Lymphedema is a major public health issue in India, driven by lymphatic filariasis and increasing breast cancer-related lymphedema. Challenges include a hot climate, low healthcare professional awareness, and limited access to affordable, quality compression products. The Centre of Excellence (CoE) for Lymphatic Disease, led by Dr. S.B. Gogia and Ms. Arun Rekha Gogia, was established to address these critical unmet needs through an integrated approach.1
MATERIAL AND METHODS: We conducted two pivotal randomized controlled trials (RCTs) to address context-specific challenges in lymphedema management. The MOBILITY RCT evaluated the safety and efficacy of the Mobiderm® compression bandage system for 50 BCRL patients at AIIMS, New Delhi, comparing it against a locally available ortho cotton wool soft pad. A second RCT compared the efficacy and patient experience of KOB short stretch bandages with locally used cotton crepe bandages in 60 participants with lower limb lymphedema. Along side we also use long term retrospective data from our CoE as well as telehealth monitored camps managed by us in Filaria endemic areas.
RESULT: In the MOBILITY RCT, both groups showed significant limb volume reduction, but the Mobiderm group demonstrated a statistically greater reduction and a significantly greater decrease in pain. However, a higher incidence of lymphangitis was observed in the Mobiderm group (60%) compared to the control group (44%). For the KOB study, while both bandage types were equally effective in reducing limb volume and improving mobility, the KOB group reported a better quality of life and less bandage slippage. The local bandages required more frequent re-bandaging due to a significant drop in sub-bandage pressure.
Retrospective data
The Centre's work extends to systemic solutions, including an innovative Complete Decongestive Therapy (CDT) program for community-level lymphedema treatment in India. Developed by Dr. S.B. Gogia and Ms. Arun Rekha Gogia, this program integrates group therapy and self-management, making it motivational and practical for large populations with limited and expensive medical facilities. This include a newly patented Hybrid type (Sequential cycle initiation and Single Chambered Performance) of Intermittent Pneumatic Compression machine, which has been indigenously developed to overcome the high cost and logistical issues of imported pumps, designed both hospital and home use. The Centre also focuses on sourcing local products for compression, such as bandages and stockings.
The emphasis on group care done at AIIMS, New Delhi and especially more so in camps run by local voluntary but trained Lymphedema care counsellors in endemic areas have resulted in comparable and appreciable outcomes to our own CoE,
CONCLUSION: The Centre's work presents a compelling holistic lymphedema management model for developing countries. RCT findings highlight the value of quality compression materials for patient satisfaction and adherence, alongside the need for vigilance with new therapies. Indigenous

innovations like the SEQUEL® system offer a pathway to affordable, accessible care for broader populations. This integrated model of clinical research, indigenous innovation, and public health outreach provides a sustainable and scalable framework for other resource-constrained regions.

Keywords: group care, IPC, Filariasis, AIIMS

OP-012

The Effect of taVNS on Quality of Life in Individuals with Unilateral Upper Extremity Lymphedema

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OBJECTIVE: Lymphedema is a chronic condition characterized by the accumulation of lymphatic fluid in tissues, which significantly impairs patients' quality of life. This study aimed to evaluate the effects of transcutaneous auricular vagus nerve stimulation (taVNS) on quality of life in individuals with unilateral upper extremity lymphedema.
MATERIAL AND METHODS: This study included 27 voluntary participants diagnosed with Stage 2 or 3 unilateral lymphedema and receiving treatment at Gaziosmanpaşa Training and Research Hospital. All participants met the predefined inclusion and exclusion criteria. They were randomly assigned to one of three groups: a group receiving Complex Decongestive Therapy (CDT) alone (n=9), a group receiving CDT combined with transcutaneous auricular vagus nerve stimulation (taVNS) (n=9), and a group receiving CDT combined with sham taVNS (n=9). Assessments were conducted at baseline and after the treatment period. Quality of life and arm-related symptoms were assessed using the Lymphedema Functioning, Disability, and Health Questionnaire (Lymph-ICF), a validated and lymphedema-specific measurement tool. The Lymph-ICF evaluates several domains including physical function, symptom severity, emotional well-being, and social participation.
RESULT: The three groups were found to be homogeneous in terms of sociodemographic and clinical characteristics. In within-group analyses, statistically significant improvement was observed only in the CDT group. The mean Lymph-ICF score in this group decreased from 72.64 to 67.67 following treatment ($p=0.03$), indicating improved functional capacity. Similarly, the group receiving CDT combined with taVNS showed a significant reduction in scores, from 74.13 to 63.46 ($p=0.04$). Effect size analysis suggested that both CDT and taVNS had a moderate impact on functional capacity. In contrast, the sham taVNS group did not show any significant changes between pre- and post-treatment scores ($p=0.83$). Between-group comparisons revealed no statistically significant differences in total Lymph-ICF scores either before or after treatment. However, a significant improvement in physical function was found only in the CDT group ($p=0.026$), and post-treatment comparisons among groups showed a significant difference in this domain ($p=0.001$). Although some between-group differences were observed in other subdomains, time-related changes generally did not reach statistical significance.
CONCLUSION: In conclusion, taVNS demonstrated beneficial effects on specific subdomains of quality of life in individuals with upper extremity lymphedema. Notably, improvements in physical and emotional functioning highlight the potential value of taVNS as a complementary intervention. Further

studies are warranted to explore these effects in more detail. The findings suggest that taVNS may serve as an effective adjunct to complex decongestive therapy.

Keywords: Upper extremity lymphedema, Transcutaneous auricular vagus nerve stimulation, Quality of life, Complex decongestive therapy, Functionality

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OP-013

Characteristics influence performance of self-management in female cancer survivors with secondary lymphedema

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OBJECTIVE: OBJECTIVE: Selfmanagement is part of the treatment for women with secondary lymphoedema presupposed to achieve the aim with combined decongestive therapy and to prevent progress of lymphoedema. The purpose of our study was to analyse possible characteristics may influence selfmanagement in female cancer survivors with secondary lymphedema.
MATERIAL AND METHODS: MATERIAL-METHODS: We conducted a cross-sectional study, invited 109 patients and 83 were included. Frequency of selfmanagement and twentythree possible characteristics were analysed in relation to the outcomes, “do selfmanagement at home”, “do selfmanagement at work”, “can take care of their lymphoedema” and “selfmanagement helps”.
RESULT: RESULT: Fifty-eight percent of the women performed selfmanagement every day, but only half of the study group thought that selfmanagement helped. Women with low-well-being (OR=4.5, CI 1.7-11.7), not accepting their body (OR=3.9, CI 1.0-15.3) and ethnicities other than Swedish (OR=5.3, CI 1.1-25.6) were observed to engage less in selfmanagement for their lymphedema
CONCLUSION: CONCLUSION: Among female cancer survivor’s women with secondary lymphoedema, fifty eight percent performed selfmanagement every day at home, although half of all women reported that selfmanagement did not help. We must observe and support the female cancer survivors with low well-being, women who reported difficulties to accept their body and women with other ethnicities, culture and language who may be at risk for not taking care of them self with selfmanagement and prevent progress of lymphedema.

Keywords: Selfmanagement, self-care, secondary lymphedema

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OP-014

Secondary benign leg- and genital lymphedema and lymphedema of the lower trunk

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OBJECTIVE: It must be stated at the outset that the terms "edema" and "lymphedema" refer to two completely different entities:
Edema is an interstitial, low-protein fluid accumulation as a symptom of various underlying diseases (cardiac, nephrogenic, phlebostatic, oncotic).
Lymphedema, on the other hand, is not "edema" but rather a separate type of chronic, inflammatory disease of the interstitium, less frequently resulting from a primary (congenital) disturbance of lymphatic drainage, but much more frequently resulting from secondary (acquired) damage to the lymphatic drainage system.
MATERIAL AND METHODS: In the context of oncological therapy, the iatrogenic interruption of the physiological lymphatic drainage pathways occurs through inguinal, iliac, and pelvic lymphadenectomy, as well as through radiotherapy, as is necessary for urological-oncological, as well as the very common gynecological-oncological therapies. The term "secondary benign lymphedema" thus describes the cause (secondary) through the oncological measures with the curative goal (benign). "Secondary malignant lymphedema," on the other hand, describes a tumor-related blockage of lymphatic drainage (lymphangiosis carcinomatosa, lymphonodal tumor infiltration).
Since lymphedema is a chronic condition prone to progression, even in "stable" lymphedema, if left untreated, swelling and fibrosis will continuously increase over time. This is due to a mechanical insufficiency of the lymphatic system. The transport capacity of the lymphatic vessels is too low to absorb the resulting lymphatic load. As a result, protein-rich fluid accumulates in the tissue, leading to the fibrosclerotic remodeling processes typical of lymphedema.
RESULT: The primary goal of lymphedema therapy is to reduce edema or volume and fibrosis (hardening of the connective tissue). Training our patients in self-treatment (self-bandaging, skin care, decongestive exercises, compression therapy) protects against late complications and improves quality of life.
Inpatient-treatment is necessary for patients with severe lymphedema of the limbs (stages II and III) and genitals, as well as malignant lymphedema, which often requires concomitant palliative therapy. For post-oncological inpatient rehabilitation, both oncological rehabilitation centers and, to a lesser extent, lymphological rehabilitation facilities are available. The service profile of purely oncological rehabilitation (psycho-oncological) differs significantly from that of organ- and symptom-specific lymphological rehabilitation.
CONCLUSION: Especially for those urological and gynecological patients who develop lymphedema early on after oncological surgery and radiotherapy treatments, the current care provided by oncology rehabilitation facilities is often inadequate. This patient group suffers from severe organic distress, with pronounced disability and stigma due to secondary lymphedema; lymphological rehabilitation with its specific range of services is urgently indicated in this case!

Keywords: oncological rehabilitation, iatrogenic interruption, lymphadenectomy, radiotherapy, lymphangiosis carcinomatosa, lymphonodal tumor infiltration.

OP-015

A novel intervention approach of Solid Fascial Lymphedema in Morbihan Disease: A Rare Case Report

Priyank Jain, Anita Rebecca Sundrasekaran, Mohammed Shafi

Hamad Medical Corporation

OBJECTIVE: To present a rare case of Morbihan disease with persistent solid facial lymphedema managed using a novel, conservative physiotherapeutic approach integrating Modified Complete Decongestive Therapy (CDT) and Kinesio taping, and to highlight its long-term impact on both physical and psychological outcomes.
CASE: A 35-year-old male with a 4-year history of unresolved solid facial swelling, diagnosed with Morbihan disease.
RESULT: Progressive reduction in facial circumference was observed on the left side from 86.8 cm at baseline to 80.0 cm and right side from 84 cm at baseline to 79.5 cm at 6 months. AAI scores markedly improved from 28/40 at baseline to 3/40 at one year, indicating significant psychological recovery. The patient reported enhanced body image, improved self-confidence, and resumed social participation. Photographic comparisons supported these findings, with clear visual reductions in solid facial edema.

Keywords: Morbihan disease, solid facial lymphedema, complete decongestive therapy, Kinesio taping, case report

Result IMAGE.jpeg

Result after management

OP-016

A case of seconder lymphedema following trauma

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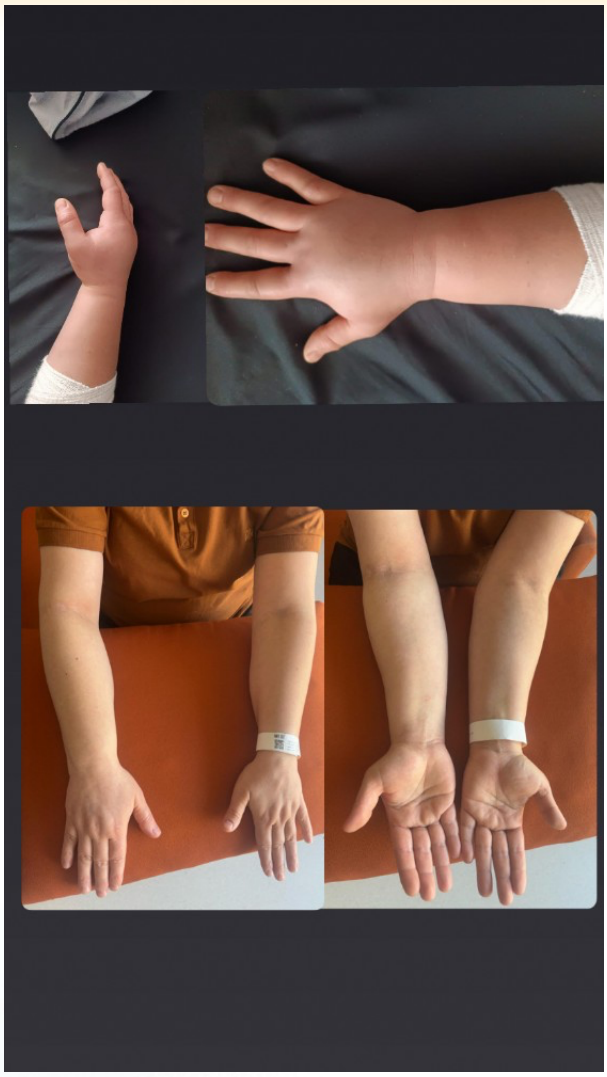
OBJECTIVE: To present a rare case of secondary lymphedema in the upper extremity developed after a minor trauma, confirmed by lymphoscintigraphy in the absence of any detectable internal injury.
CASE: A 38-year-old female presented with right elbow and shoulder pain, swelling, and weakness after a minor trauma. Physical examination revealed stage 1 lymphedema. Lymphoscintigraphy showed delayed lymphatic drainage and collateral flow in the right forearm. The patient underwent 25 sessions of complex decongestive therapy including manual lymph drainage, bandaging, exercise, and physical modalities. Edema reduced significantly post-treatment.
RESULT: Post-treatment volume difference between limbs decreased from 162 mL to 74 mL. Pain improved following ultrasound-guided injection. This is the first case in the literature of upper extremity secondary lymphedema confirmed by lymphoscintigraphy following minor trauma. The case emphasizes the need to consider lymphedema in trauma patients even when imaging reveals no internal damage.

Keywords: Seconder lymphedema,Minor trauma,Lymphoscintigraphy,upper extremity edema

Figure 1



Comparison of the affected limb before and after complex decongestive therapy,demonstrating reduction in edema volume

OP-018

A rare syndrome in a case with lymphedema of three extremities: scimitar syndrome

Aslı Turan, Gökçe Doğrayıcı, Sibel Ünsal Delialioğlu, Meltem Dalyan

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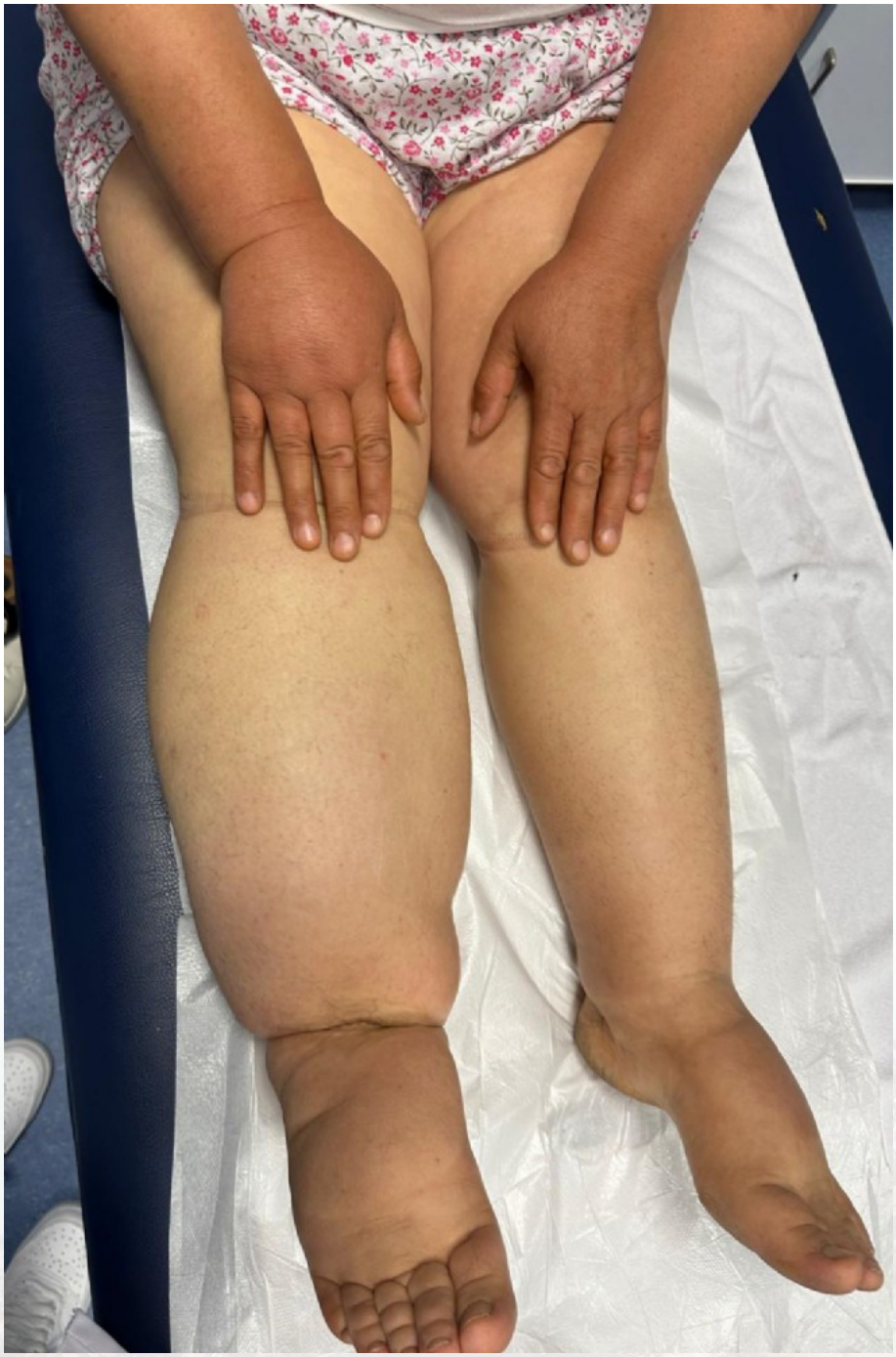
OBJECTIVE: Scimitar syndrome is a rare congenital heart anomaly that results in abnormalpulmonary venous return. Normally, oxygenated blood from the right lung is transported to the left atrium via the right pulmonary vein. However, in Scimitar syndrome, the oxygenated blood from the right lung drains into the inferior vena cava (IVC) or the right atrium through an aberrant pulmonary vein. The radiologic appearance of this dilated vein descending along the right border of the heart toward the diaphragm resembles a Turkish curved sword (scimitar), hence the term Scimitar sign. There is no direct association between Scimitar syndrome and lymphedema. However, the purpose of this case report is to highlight the potential risk of lymphedema development due to right heart failure, pulmonary hypertension, and possible lymphatic drainage disorders caused by the disease.
CASE: A 42-year-old female patient presented with swelling in the right upper extremity and both lower extremities. Her medical history included right breast cancer 18 years ago, for which she underwent surgery followed by radiotherapy and chemotherapy. Two years prior, she had undergone right salpingo-oophorectomy and bilateral sacral neurectomy due to a right adnexal mass. Histopathological examination was consistent with endometrioma, and annual follow-up was recommended due to its
benign nature. The patient had also been operated on for Scimitar syndrome four years ago, and since then had experienced persistent swelling in both lower limbs—more pronounced on the right side. On physical examination, Stage I lymphedema was observed in the right upper extremity and Stage II lymphedema in both lower extremities, more prominent on the right. Bilateral positive Stemmer's sign and pitting edema were present. Bilateral lower extremity Doppler ultrasonography and lymphoscintigraphy were performed. Doppler ultrasound revealed no pathological findings, whereas lymphoscintigraphy demonstrated severe lymphatic drainage dysfunction in the right lower extremity compatible with Stage III, and mild dysfunction in the left lower extremity compatible with Stage I. The patient was enrolled in a structured physiotherapy program consisting of 10 sessions of complete decongestive therapy (CDT) combined with kinesio taping. Treatment was applied sequentially: first to the right lower extremity, then to the left lower extremity, and finally to the right upper extremity. Pre- and post-treatment measurements of all three extremities were recorded to evaluate treatment outcomes.
RESULT: Post-treatment measurements demonstrated a significant reduction in swelling across all three extremities. The combination of complete decongestive therapy and kinesio taping was found to be effective in the management of lymphedema associated with Scimitar syndrome

CONCLUSION: Although there is no direct association between Scimitar syndrome and lymphedema, it should be considered that lymphatic drainage may also be affected due to right heart overload and impaired venous return. Consequently, the risk of lymphedema may be increased in patients with this condition

Keywords: Lymphedema, Scimitar Syndrome, lymphatic malformation

image of the patient



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OP-019

Acceleration of lymphedema: fracture in the extremity with breast cancer-related lymphedema

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OBJECTIVE: One of the most important causes of lymphedema in developed countries is secondary lymphedema associated with malignancy and its treatment. Breast cancer-associated lymphedema can be seen in some patients after lymph node dissection, chemotherapy and radiotherapy. Fractures in an extremity with lymphedema may also lead to progression of this condition. In this case report, a case of breast cancer-associated lymphedema that progressed after humerus and radius fractures and the treatment process will be discussed.
CASE: A 59-year-old female patient applied to outpatient clinic with complaints of swelling, pain, and limited movement in her right upper extremity. It was learned that the patient had a history of mastectomy, chemotherapy, and radiotherapy due to breast cancer 15 years ago. The swelling in her right upper extremity started 8 months ago and progressed. Complete decongestive therapy (CDT) was planned for postmastectomy lymphedema. However, the patient could not attend this treatment due to personal reasons. During this period, she continued self-massage and skin care. She had a traffic accident 1 month ago and had proximal humerus and distal radius fractures in the same extremity. The swelling in the patient's arm, which underwent open reduction and internal fixation, had progressed further (Figure 1). The patient was admitted to our department for both lymphedema and fracture rehabilitation. 21 sessions of manual lymphatic drainage and multilayer bandaging were performed. While the patient's arm was bandaged, passive, active-assistive, and active range of motion exercises were performed in that order. Strengthening exercises were also shown for the current range of motion of the joint. Cold application and transcutaneous electrical nerve stimulation were applied as physical therapy agents. A custom-made pressure garment was made for the right upper extremity. At the first month outpatient clinic check-up after discharge, it was observed that the patient was able to use her arm and that there was improvement in peripheral measurements compared to before treatment (Table 1). Treatment was continued with a pressure garment during the day (Figure 2) and bandaging at night.
RESULT: Lymphedema may develop in the fractured extremity. The mechanism of this is still not fully understood (1). It has been shown that rapidly progressive lymphedema develops in extremities with a history of previous fractures after a sentinel lymph node biopsy performed for breast cancer (2). Lymphedema making fracture healing difficult also leads to a vicious cycle (3). In addition, decreased bone mineral density in the lymphedematous extremity may also increase the tendency to fracture (4). In our case, the development of fracture led to the progression of lymphedema, and one of the reasons facilitating the development of this double fracture may be the decrease in bone mineral density in the lymphedematous extremity. In cases of fracture and lymphedema together, it is possible to reduce extremity volume with CDT (5). Fracture may lead to the development of lymphedema or progression of lymphedema, and extremity lymphedema treatment can be performed with CDT. In addition, being able to do exercises while multilayered bandaging will make fracture rehabilitation easier.

Keywords: breast cancer-related lymphedema, complete decongestive therapy, fracture

Figure 1-2

Pre-treatment and post-treatment right upper extremity

Table 1: Pre-treatment and post-treatment peripheral measurements, joint range of motion measurements

	Before treatment	1st month	2nd
Metacarpal circumference (cm)(right/left)	23.1/20.3	22.2/20.5	21.6/21
Wrist circumference (cm)	21.5/15,4	20.3/15.7	20.5/16.5
Below the elbow at 10 cm (cm)	26/20.3	23.8/20.4	23.5/21.3
Elbow circumference (cm)	30.7/23.2	28.6/23.6	26.4/23.3
Above the elbow at 10 cm (cm)	29.3/24.1	24.5/24.8	24.2/25.8
Shoulder flexion (right)	60°	90°	100°
Shoulder abduction (right)	45°	70°	90°
Wrist flexion (right)	20°	30°	60°
Wrist extension (right)	20°	30°	50°
Radial deviation/ulnar deviation (right)	neutral	10°/10°	10°/20°

OP-020

Stewart-Treves Syndrome: a rare complication of chronic lymphedema

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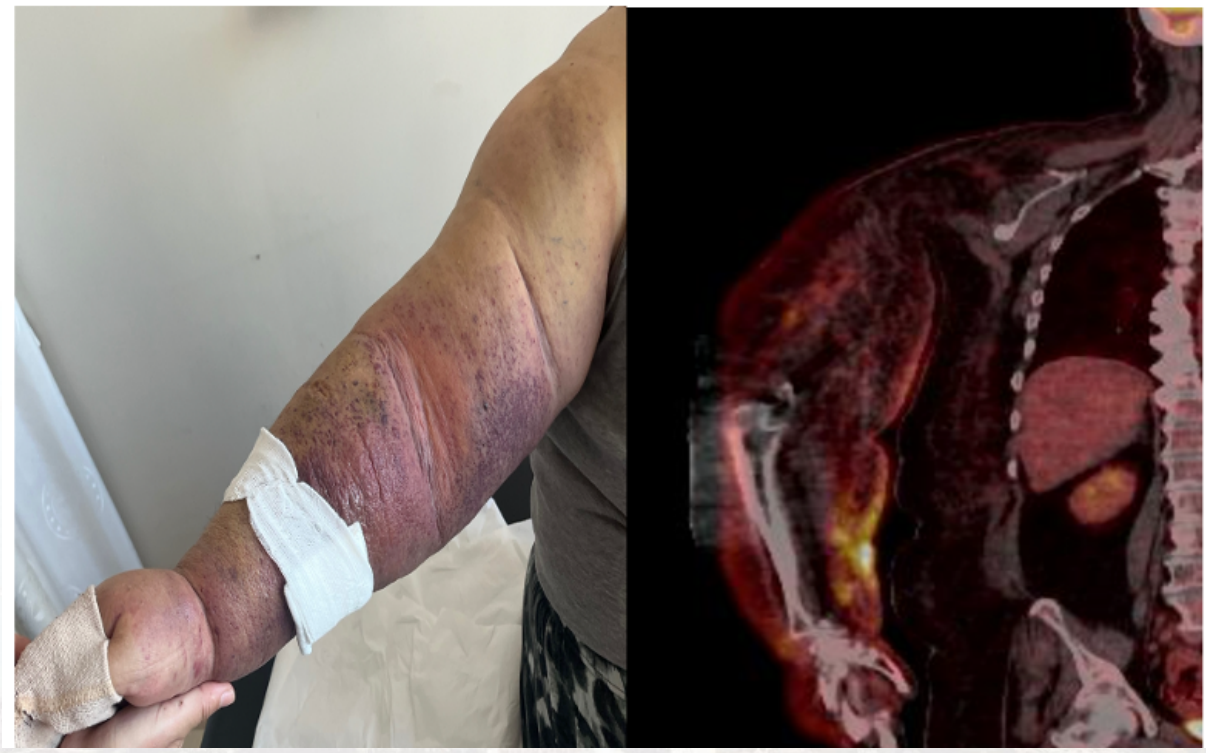
OBJECTIVE: Stewart-Treves Syndrome (STS), as a skin angiosarcoma, is rare longterm complication of lymphedema. STS is mostly seen after breast cancer related lymphedema (BCRL) patients that undergone radical mastectomy, axillary dissection and irradiation. Radical mastectomized patients 5 years after surgery have the incidence of 0.07-0.45% for STS. However there is a decrement in prevalence after common application of sentinel lymph node detection (SLND), STS has poor prognosis in the meaning of surveillance. (1,2).
Here is reported a 67 years old woman with BRCL developed STS in the right upper extremity.
CASE: Patient R.K. applied to the lymphedema outpatient clinic of physical medicine and rehabilitation department by the complaint of swelling and bruising of right forearm. She was 67 years old, unemployed, married and had 2 children. From the point of chronic comorbid diseases, she was diabetic, under medication for hypertension and hyperlipidemia. She had surgery for umbilical herniation and cholecystectomy one year ago.
Detailed history gave us the knowledge of right breast medullary carcinoma diagnosis at 2014. Immunohistochemistry results showed c-erbB-2 positivity and 70%of Ki67 proliferation index. Staging was T2N1M0 (stage 2) according to the positive signs. Swelling of the right upper extremity began 1 year after breast-conserving surgery and axillary dissection of lymphatics which was 20 in number. She undergone the pneumatic compression 9 years ago in the past for once. Until last 5 months she didn't have a complaint of swelling with pain, limitation in the range of motion of the shoulder joint and blocking the activities in daily living. Along with pain and increment in swelling also she noticed the empurpling area on the medial forearm. She described the apparent onset of bruisement after a low-grade crash to the door inside the house.
During physical examination extremity volumes were calculated according to tape measurement; 2897 ml for right, 1746 ml for left extremity with a volume difference of 65,9% corresponding (International Society of Lymphology) ISL-stage 3. Stemmer sign was positive, skin was fibrotic and hard with an obvious purple, vascular area on the medial forearm. Previous measurements or ISL stage is unknown since she wasn't under follow-up of our clinic. Ultrasonographic evaluation of soft tissues, venous and arterial texture defined subcutaneous edema, hypoechoic lesion which was suggested to be investigated histopathologically. Pathology process defined the Stewart-Treves syndrome accurately. Oncological aspect required nuclear imaging modality, positron emission tomography (PET) and resulted with hypermetabolic activity pointing malignant formation at right forearm, axilla and breast. She was referred to the surgery by the plan of wide resection of the mass if possible.
RESULT: The Stewart-Treves Syndrome is first reported by Dr. Fred W. Stewart and Dr. Norman Treves at 1948. They described 6 cases of angiosarcomas at site of BCRL (1). Longstanding lymphedema patients, mostly women at between 65–70 years are affected commonly by this rare and aggressive angiosarcoma. Cutaneous lymphangiosarcomas account for nearly 5% of all angiosarcomas on the extremity with chronic lymphedema (2,3).

Although imaging methods assist for diagnosis, skin biopsy has the role of definitive diagnostic tool. Early surgical intervention as amputation or wide local resection as far as possible is recommended, elsewise palliative chemotherapy is practicable. Prognosis is poor when radical surgery is not performed unfortunately chemotherapy and radiation therapy are not additive to improve surveillance significantly (3,4).

Consequently lymphedema survivors should be closely examined starting 5 years from the onset, keeping in mind for associated malignancies. The need of awareness and specialized training among clinicians and physiotherapists dealing with lymphedema also suggested to improve early management. One of the recommended survey is affect of complete decongestive therapy (CDT) on the prevalance of STS (5,6).

Keywords: breast cancer related lymphedema, lymphangiosarcoma, chronic lymphedema

Figure -1



picture of patient's right arm and hypermetabolic activity shown in PET imaging

OP-021

The role of comression garments in keeping control on lymphedema - how to improve results of maintenance phase

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OBJECTIVE: Lymphedema is a chronic disease requiring long-term, multidimensional management and sustained patient adherence. It is important not only to remove excess fluid and tissue volume (that can be achieved with conservative – CDT, and surgical methods), but also to maintain the treatment results to prevent the oedema from recurring (which is often more challenging than initially eliminating the oedema). Compression garments (CG) play a critical role in maintaining treatment outcomes by providing sustained resistance against interstitial fluid accumulation.
However, improper garment measurement, selection, or fitting can undermine long-term results. Poorly fitting or uncomfortable garments reduce patient compliance, while inadequate compression fails to prevent oedema recurrence. Despite the critical role of compression, in many regions, garment selection and fitting are performed by non-medical personnel, with little or absent long-term supervision by lymphology specialists. This lack of professional oversight can lead to a “yo-yo effect,” where patients experience initial volume reduction during the decongestion phase but gradually relapse, necessitating repeated CDT cycles. This study aimed to identify the most common compression-related issues in the maintenance phase and propose strategies to optimise long-term oedema control.
CASE: A total of 150 patients with upper or lower limb lymphedema were observed over three years. Of these, 85 patients underwent regular follow-up every six months, while 65 were reviewed sporadically. The evaluation included detailed analysis of compression therapy variables during the maintenance phase: garment type (e.g. flat-knit/round-knit, standard/custom-made, single/multi-layer, etc.), who made measurements, renewal frequency, garment adjustments, patient-reported discomfort, reasons for non-compliance, etc.
Particular attention was paid to the professional background of the person responsible for measurement and fitting, as well as follow-up supervision. Patients compliant with wearing correctly fitted garments renewed at manufacturer-recommended intervals (typically every six months) were compared to those with irregular or suboptimal compression use.
Findings indicated that the most significant determinant of long-term oedema stability was professional oversight by an experienced lymphology-trained clinician—often the treating physician/physiotherapist—responsible for all aspects of CG prescription parameters, fitting, and follow-up. In our cohort, 55 patients who consistently adhered to properly fitted and maintained compression therapy that was chosen and supervised by a lymphedema specialist did not require a repeat of the first CDT phase over the entire observation period.
The most common weaknesses in compression management included:
• Garment measurement performed by non-specialists without consideration of disease-specific factors (swelling characteristics, fibrosis, skin condition, etc.) and oedema relapse in previous garments

• Lack of structured long-term follow-up to assess garment performance after initial fitting.
• Patient discomfort due to design or measurements flaws, leading to reduced compliance.
• Infrequent garment renewal, resulting in loss of compression efficacy.

RESULT: Optimal maintenance of lymphedema treatment outcomes requires that CG parameters selection, measurement, and supervision be managed by a lymphology-trained professional. This ensures that garment parameters are tailored to the patient's individual needs—accounting for swelling patterns, fibrosis severity, skin condition, complications, comorbidities, tolerance levels, and functional requirements (e.g., day/night use, postoperative support).

Professional oversight should include:

• Accurate measurement with allowance for disease-specific adjustments (e.g., added layers, modified compression class, comfort zones, reduction of circumferences in problematic areas, etc.).
• Supervised first fitting to teach donning/doffing, assess comfort, and check for manufacturing defects.
• A follow-up within 2–7 days to measure limb volume, evaluate pitting, and confirm effective compression with possibility to adjust the garment
• Timely garment replacement, typically every six months, with adjustments as needed.

This structured, specialist-led approach reduces the risk of oedema recurrence, thereby minimising the need for repeated CDT cycles. In our observations, patients managed with this protocol maintained stable limb volume over years, underscoring the essential role of expert-guided compression therapy in the long-term management of lymphedema.

Keywords: compression garment, compression strategy, measurements, compliance

OP-022

"A Case of Lymphedema Tarda Following Paraplegia"

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OBJECTIVE: Diagnosing and managing patients undergoing rehabilitation after spinal cord injuries (SCIs) can be particularly challenging. These challenges stem from the severity of the initial trauma, complications that arise during the subacute and chronic phases, and the diagnostic difficulties caused by common sensory impairments in this population. Lower limb edema is frequently observed in these individuals and may result from factors such as prolonged immobility, venous congestion, or lymphatic stasis.

SCI leads to not only motor and sensory impairments but also a wide spectrum of autonomic disturbances that often persist into the chronic phase. As a result, the long-term function of multiple organs and tissues is adversely affected, significantly diminishing the quality of life for individuals living with chronic SCI.
Chronic SCI is characterized by dysregulation of molecular and cellular homeostasis within the skin. This imbalance is closely associated with elevated microvascular permeability, which facilitates the extravasation of plasma-derived elements, including platelets, into the dermal interstitium. Such alterations may contribute to impaired skin integrity and delayed tissue repair mechanisms observed in individuals with chronic SCI.Chronic SCI is characterized by dysregulation of molecular and cellular homeostasis within the skin. This imbalance is closely associated with elevated microvascular permeability, which facilitates the extravasation of plasma-derived elements, including platelets, into the dermal interstitium. Such alterations may contribute to impaired skin integrity and delayed tissue repair mechanisms observed in individuals with chronic SCI
In this study, we present a case of primary lymphedema—lymphedema tarda—that developed following a spinal cord injury.
CASE: A 58-year-old male patient presented to our clinic with complaints of bilateral lower extremity edema. He had been living with paraplegia since a traffic accident in 1999. The patient had been followed at an external center with a diagnosis of lymphedema due to bilateral lower extremity edema that had been present for the past 10 years. He was admitted to our clinic with a preliminary diagnosis of lymphedema.
On physical examination, the patient was ambulatory at wheelchair level. Neurological level was determined as L1, ASIA Impairment Scale A, indicating complete paraplegia. While the patient had full muscle strength in the bilateral upper extremities as well as in the bilateral hip flexors and knee extensors, there was no active movement (0/5) in the ankle dorsiflexors, long toe extensors, and ankle plantar flexors. Bilateral hip abductor muscle strength was graded as 3/5. Deep anal pressure sensation and voluntary anal contraction were absent
Bilateral lower extremity pitting edema was observed, more prominent on the left side. The patient had a positive Stemmer’s sign and was evaluated as having lymphedema compatible with stage 2 on the left and stage 1–2 on the right.

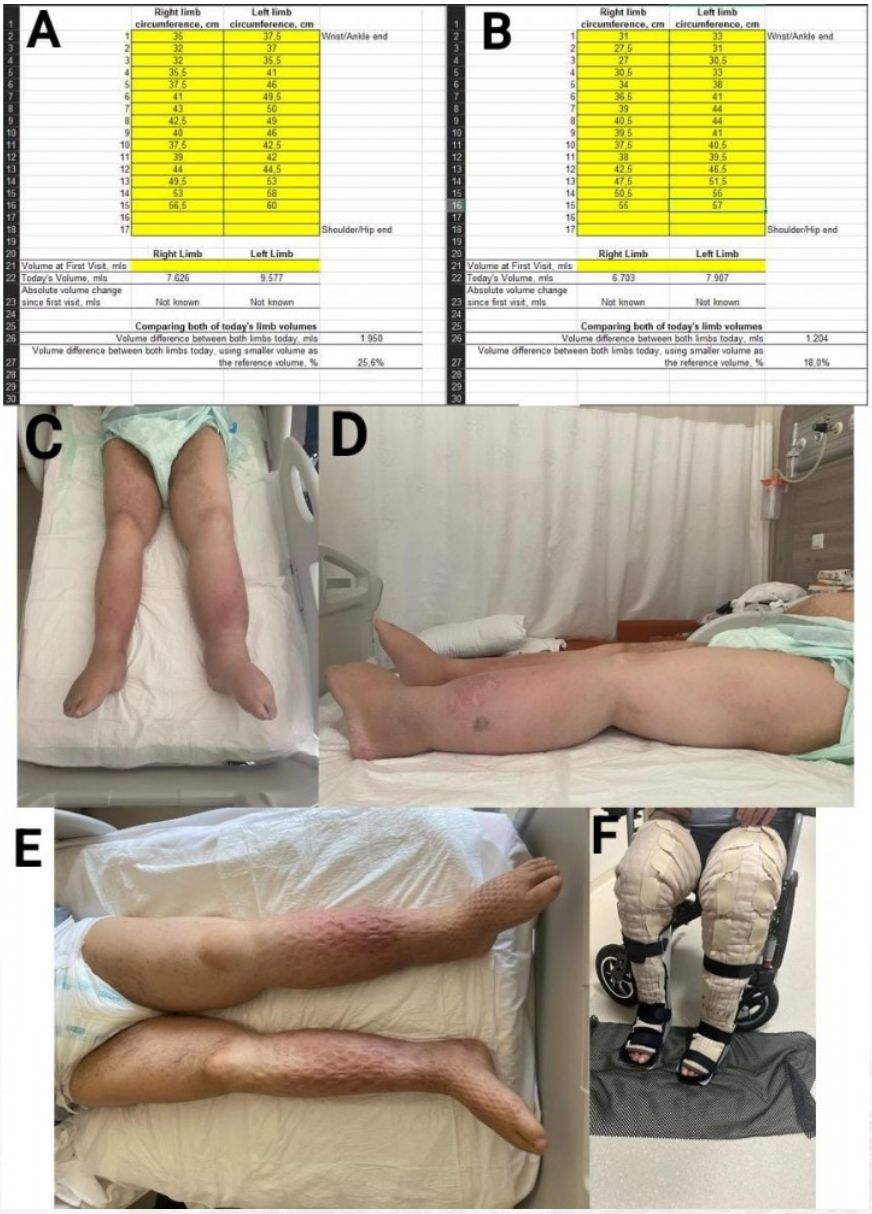
Complex decongestive therapy (CDT) was planned for the patient's lower extremity edema, along with neurological rehabilitation for paraplegia. Upon review of the patient's file, it was noted that there was

no existing lymphoscintigraphy; therefore, lymphoscintigraphy was scheduled.

The lymphoscintigraphy report revealed significantly delayed lymphatic flow in both lower extremities., minimal activity uptake was observed in the bilateral popliteal, inguinal, and external iliac regions. These findings are consistent with near complete bilateral lower extremity lymphatic vessel obstruction. Based on this report, the patient continued treatment with a diagnosis of both primer and seconder lymphedema.
The patient underwent 10 sessions of CDT and neurological rehabilitation. The rehabilitation program included skin care, manual lymphatic drainage, multi-layer bandaging, cardiopulmonary exercise training, balance and coordination exercises, as well as progressive ambulation training."
RESULT: Following the treatment, Mobiderm® Autofit Thigh High Stocking(THUASNE- France) compression garments were prescribed to maintain edema control. The patient discharged with compression garments and Ambulates indoors with a walker.

Keywords: spinal cord injury, primer lymphedema, lympedema tarda

Before and after treatment results



A

	Right limb circumference, cm	Left limb circumference, cm	
1	35	37.5	Wrist/Ankle end
2	32	37	
3	32	35.5	
4	36.5	41	
5	37.5	46	
6	41	49.5	
7	43	50	
8	42.5	49	
9	40	46	
10	37.5	42.5	
11	39	42	
12	44	44.5	
13	49.5	53	
14	53	58	
15	56.5	60	
16			
17			Shoulder/Hip end

	Right Limb	Left Limb	
Volume at First Visit, mls			
Today's Volume, mls	7.626	9.577	
Absolute volume change since first visit, mls	Not known	Not known	
Comparing both of today's limb volumes			
Volume difference between both limbs today, mls			1.950
Volume difference between both limbs today, using smaller volume as the reference volume, %			25,6%

B

	Right limb circumference, cm	Left limb circumference, cm	
1	31	33	Wrist/Ankle end
2	27.5	31	
3	27	30.5	
4	30.5	33	
5	34	38	
6	36.5	41	
7	39	44	
8	40.5	44	
9	39.5	41	
10	37.5	40.5	
11	38	39.5	
12	42.5	46.5	
13	47.5	51.5	
14	50.5	55	
15	55	57	
16			
17			Shoulder/Hip end

	Right Limb	Left Limb	
Volume at First Visit, mls			
Today's Volume, mls	6.703	7.907	
Absolute volume change since first visit, mls	Not known	Not known	
Comparing both of today's limb volumes			
Volume difference between both limbs today, mls			1.204
Volume difference between both limbs today, using smaller volume as the reference volume, %			18,0%

A before,B after treatment,Volumetric analysis of the lower extremities C and D before treatment lower extremities E and F after treatment extremities

OP-023

Case Report: Bilateral Lower Extremity And Genital Primary Lymphedema Coexisting With IgA Nephropathy

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OBJECTIVE: Primary lymphedema is a chronic condition characterized by the accumulation of protein-rich interstitial fluid resulting from congenital maldevelopment or dysplasia of the lymphatic system, leading to impaired lymphatic drainage. It may manifest at birth, during puberty, or in adulthood. Primary lymphedema may occur as an isolated clinical entity or in association with various syndromic disorders. In this case report, we present a 36-year-old male patient diagnosed with primary lymphedema involving the genital region and bilateral lower extremities, coexisting with IgA nephropathy, who was managed conservatively in our physical medicine and rehabilitation clinic.
CASE: A 36-year-old male presented to our clinic with swelling in both lower extremities and the scrotum. His history revealed bilateral lower extremity swelling noticed since the age of two, progressively worsening over time, and recurrent episodes of cellulitis. Physical examination revealed significant skin dryness, hyperpigmentation, subcutaneous fibrosis, non-pitting edema in both lower extremities and the scrotum, and positive Stemmer's sign on the dorsum of the both feet (Fig. 1). Laboratory tests, echocardiography, and Doppler ultrasonography revealed no pathological findings explaining the bilateral swelling, except for mildly elevated creatinine levels. The patient's medical history was notable for immune complex-mediated glomerulonephritis characterized by mesangial deposition of IgA and C3, diagnosed in 2018 following an upper respiratory tract infection and subsequent deterioration in renal function. Lymphoscintigraphy revealed absent lymphatic drainage in both lower extremities over a 4-hour follow-up period, and no visualization of pelvic or inguinal lymph nodes. These findings supported the diagnosis of primary lymphedema.
There was no significant family history of lymphedema. Due to the coexistence of IgA nephropathy and primary lymphedema, a 78-gene* nephrotic syndrome panel was analyzed. Complete decongestive therapy was planned for the patient’s bilateral lower extremity and scrotal lymphedema. A rehabilitation program consisting of 30 sessions including skin care, manual lymphatic drainage, multilayer bandaging, range of motion exercises, strengthening, and respiratory exercises was implemented. Treatment resulted in minimal volume reduction in both lower limbs. The patient was discharged with appropriately fitted compression garments for continued use in the lower extremities and genital area.
RESULT: Primary lymphedema has been reported in association with various syndromes and numerous gene mutations. In this context, a literature review was conducted to investigate the coexistence of primary lymphedema and renal pathologies. While certain familial cases have demonstrated the concurrent presence of lymphedema-distichiasis syndrome and congenital renal anomalies, pathogenic mutations have not always been identified beyond established candidate genes such as FOXC2. Similarly, co-occurrence of hereditary lymphedema (e.g., Meige disease) and IgA nephropathy has been observed in isolated familial clusters, although these reports frequently lack genetic confirmation.
To the best of current knowledge, the present case represents the first reported instance of congenital lymphedema followed by the development of biopsy-proven IgA nephropathy. The nephrotic syndrome panel, including 78 genes, did not reveal any pathogenic or likely pathogenic variants. Genetic testing for FOXC2, associated with lymphedema-distichiasis syndrome, and SOX18, implicated in

hypotrichosis-lymphedema-telangiectasia syndrome, was not performed due to the absence of corresponding phenotypic features.
This case underscores the importance of further clinical reporting and molecular investigations to better characterize the intersection of primary lymphedema and glomerular diseases such as IgA nephropathy. Expanded case documentation and detailed genotypic analyses may provide valuable insights into shared pathogenic mechanisms and contribute to the development of targeted diagnostic and therapeutic strategies.

Keywords: Primary Lymphedema, IgA Nephropathy, Congenital Lymphedema, Scrotal Lymphedema, Case report.

(fig.1)

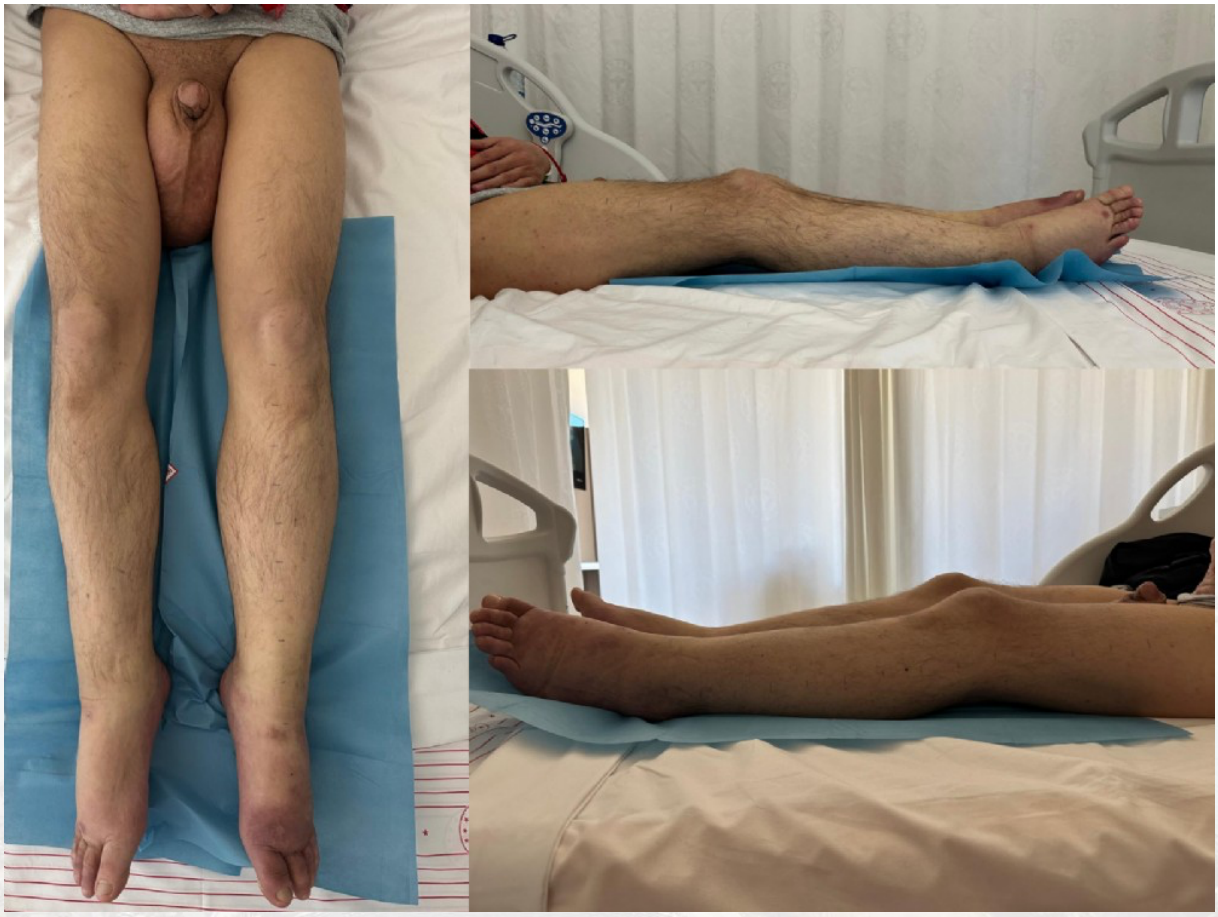

Fig. 1: Bilateral lower extremity and scrotal swelling accompanied by more prominent skin changes in the left lower extremity.

OP-024

Multidisciplinary Management of Vulvar Lymphangioma Circumscriptum in an Adolescent with Congenital Lymphedema: A Rare Case Report

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OBJECTIVE: Lymphangioma circumscriptum (LC) is a rare benign malformation of thelymphatic system. Vulvar involvement is uncommon, especially in the pediatric and adolescent population (1). Malignant transformation can rarely be seen in chronic LC (2). When associated with congenital lymphedema, diagnosis and management become more complex, requiring coordinated multidisciplinary care.
CASE: We present a 16-year-old female with bilateral lower extremity swelling since infancy and vulvar lesions noticed at age 14. Her medical history included neonatal chylothorax surgery and pulmonary stenosis. Physical examination revealed Stage 2 lymphedema in both legs and verrucous vesicular lesions on the labia majora and minora (Figure1a,b). Lymphoscintigraphy confirmed abnormal lymphatic drainage on the left side. A multidisciplinary team involving physical medicine and rehabilitation, plastic surgery, and dermatology collaborated on the management plan. The patient underwent complex decongestive therapy, compression, and individualized exercise protocols to manage lymphedema. She was then referred to plastic surgery, where she underwent edge labioplasty with clitoral hood reduction. Histopathology confirmed the LC diagnosis with no malignancy. The patient declined referral to medical genetics. During two years of follow-up, no recurrence or complications were observed (Figure2).
RESULT: Vulvar LC in adolescents with congenital lymphedema is exceptionally rare. Successful management depends on a multidisciplinary, patient-centered approach that integrates medical, rehabilitative, and surgical strategies. Early intervention can prevent complications and improve long-term outcomes.

Keywords: Vulvar Lymphangioma Circumscriptum, Congenital Lymphedema, Genital Lymphedema

Figure 1a,1b,2

Figure 1a

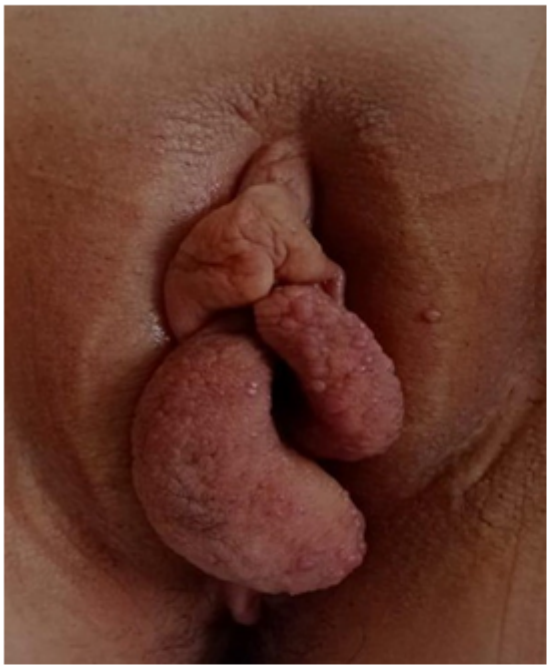


Figure 1b

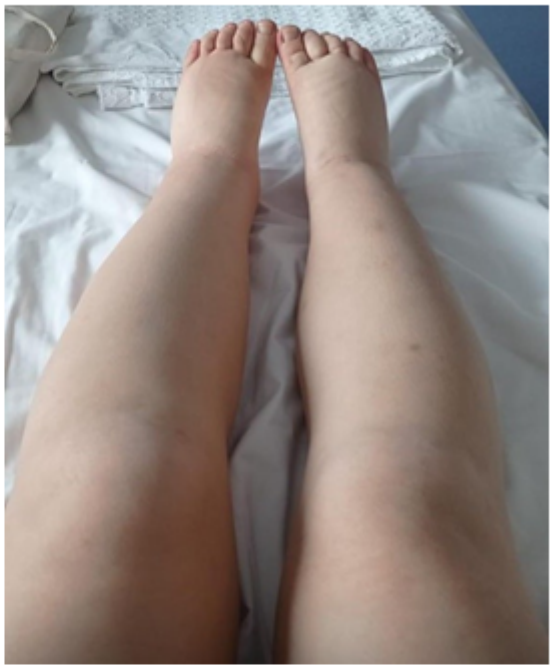
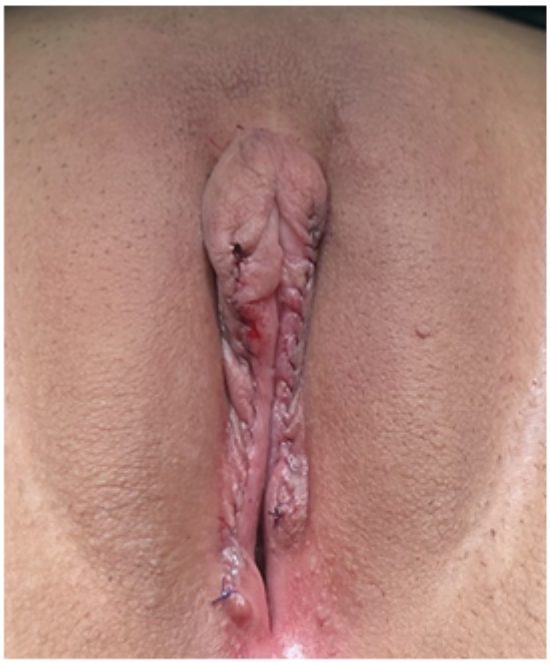


Figure 2



Vulvar Lymphangioma Circumscriptum, Stage 2 lymphedema in both legs, Edge labioplasty with clitoral hood reduction

OP-025

Head and Neck Lymphedema After Larynx Cancer Treatment; A Case report

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OBJECTIVE: Head and neck lymphedema is a common complication following the treatment of head and neck cancers and can significantly impact patients' quality of life. It typically occurs after interventions such as extensive neck dissection and radiotherapy, which damage the lymphatic drainage pathways. Studies have reported that over 90% of patients undergoing treatment for head and neck cancer may develop lymphedema to some degree. The resulting edema is not merely a cosmetic issue; when it affects structures such as the lips, tongue, pharynx, eyes, and neck, it can significantly impair essential functions including communication, swallowing, breathing, and vision over the long term. Consequently, patients' quality of life may be significantly compromised. If left untreated, head and neck lymphedema can lead to the development of fibrosis due to chronic inflammation. Fibrotic changes have been observed in more than half of affected patients. Accordingly, the early recognition and effective management of head and neck lymphedema are of paramount importance for preserving both functional capacity and psychosocial well-being. In the present case report, we describe a patient who developed head and neck lymphedema following a total laryngectomy procedure.
CASE: A 42-year-old male patient underwent a total laryngectomy and bilateral neck dissection one year ago following a diagnosis of laryngeal cancer. In the postoperative period, the patient developed marked swelling in the bilateral facial and cervical regions and was referred to our outpatient clinic with complaints of facial swelling. The patient had no known comorbidities in his medical history, but he had a history of tobacco use. On physical examination, inspection revealed visible and palpable swelling in both facial regions, along with firmness in the neck. The patient had a permanent tracheostomy and was breathing through the tracheostomy stoma. No abnormalities were detected in the patient's laboratory findings. A total of 121 lymph nodes had been dissected from the patient. The patient was hospitalized in our department with a diagnosis of head and neck lymphedema. During this period, a Complex Decongestive Therapy (CDT) protocol was implemented. As part of the CDT program, daily manual lymphatic drainage massage was performed, kinesiology taping was applied to enhance lymphatic circulation, and compression therapy was provided using a customized cervical and facial compression pad ('night pad') during nighttime hours. In addition, the patient was guided through a set of exercises tailored for the head and neck region, and recommendations were provided regarding appropriate skin care. No complications were observed during the course of treatment. By the end of the 15-session treatment period, a clinically observable reduction in edema of the facial and cervical

regions was achieved.

RESULT: Head and neck lymphedema is a serious complication that can lead to respiratory, nutritional, and communication difficulties. Kinesiology taping and nocturnal compression garments represent key components of compression-based interventions in the management of head and neck lymphedema. With this case presentation, we aimed to highlight the importance of individualized modifications to Complex Decongestive Therapy (CDT) based on the localization of edema.

Keywords: Head and neck lymphedema,kinesio taping,quality of life

OP-026

Concomitant lymphedema praecox and skeletal deformity: a case report

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OBJECTIVE: *Lymphedema is a progressive, chronic condition characterized by the accumulation of protein-rich lymphatic fluid in the interstitial tissue due to congenital or acquired insufficiency of systemic lymphatic drainage. Primary lymphedema arises from developmental malformations of the lymphatic system and is subclassified by age of onset into congenital, lymphedema praecox, and lymphedema tarda, whereas secondary lymphedema develops following infection, malignancy treatment, or trauma. Lymphedema praecox, the most common primary form, typically manifests around puberty, predominantly affecting the lower extremities, with higher incidence in females. Genetic mutations, including FOXC2, FLT4 (VEGFR-3), SOX18, and the HGF/MET pathway, as well as hormonal influences, particularly estrogen, contribute to its pathogenesis. In this presentation, we aim to report and discuss a pediatric case of stage 2 lymphedema with concomitant congenital spinal anomalies, highlighting clinical features, imaging findings, and the physical therapy management approach.*
CASE: *A 14-year-old female presented to the physical therapy outpatient clinic with progressive bilateral lower limb edema, fatigue, and restricted mobility, with symptom onset reported at age 8. There was no relevant family history. Physical examination revealed firm, fibrotic edema more pronounced on the right side, predominantly below the knees, accompanied by hyperkeratotic skin changes. Extremity measurements are presented in Table 1. A pes planus deformity was noted in the right foot. Manual muscle testing demonstrated preserved strength in both upper and lower extremities, and deep tendon reflexes were normoactive. Adam's forward bending test was positive, revealing a right thoracic hump.Radiographic evaluation identified thoracic scoliosis with a Cobb angle of 11° (Figure 3) and an incidental T12 hemivertebra. Subsequent thoracic and lumbar MRI confirmed a butterfly vertebra at T12 on both axial and sagittal sequences (Figures 1 and 2). Laboratory studies revealed mild anemia (hemoglobin 10 g/dL) and thrombocytopenia (platelet count 89,000/mm³), while liver and renal function tests were within normal limits. Lymphoscintigraphy demonstrated bilateral grade II lower limb lymphedema. The patient was commenced on an outpatient course of complex decongestive therapy (CDT), encompassing manual lymphatic drainage, multi-layer compression bandaging, targeted exercises, and skin care. Stage 2 lymphedema is characterized by chronic edema, fibrotic tissue, and cutaneous alterations, with an increased risk of infection and a comparatively limited therapeutic response relative to earlier stages. The delayed diagnosis likely contributed to disease progression and morbidity. The coexistence of hemivertebra and mild scoliosis may suggest an underlying congenital lymphatic dysplasia syndrome, emphasizing the necessity for comprehensive musculoskeletal and lymphatic evaluation in pediatric patients presenting with advanced lymphedema.*
RESULT: *In conclusion, pediatric patients presenting with lymphedema should undergo comprehensive musculoskeletal assessment to detect concurrent congenital deformities. The incidental detection of vertebral anomalies in this case highlights the importance of considering systemic lymphatic dysplasia. Early recognition and initiation of CDT are critical for preventing progression and complications. While conservative management remains the cornerstone of treatment, advanced cases may require surgical interventions such as lymphovenous anastomosis or*

vascularized lymph node transfer. This case emphasizes the need for multidisciplinary evaluation, careful follow-up, and timely intervention to optimize functional outcomes and quality of life. The natural progression of untreated lymphedema to stage 2, demonstrated here, underscores the clinical significance of early diagnosis (see Table 1; Figures 1–3).

Keywords: Lymphedema, Hemivertebra, Scoliosis, Pediatrics, Rehabilitation

Figure-1-2-3: Axial and sagittal T2-weighted MRI demonstrating a butterfly vertebra at the T12 level and scoliosis X-ray

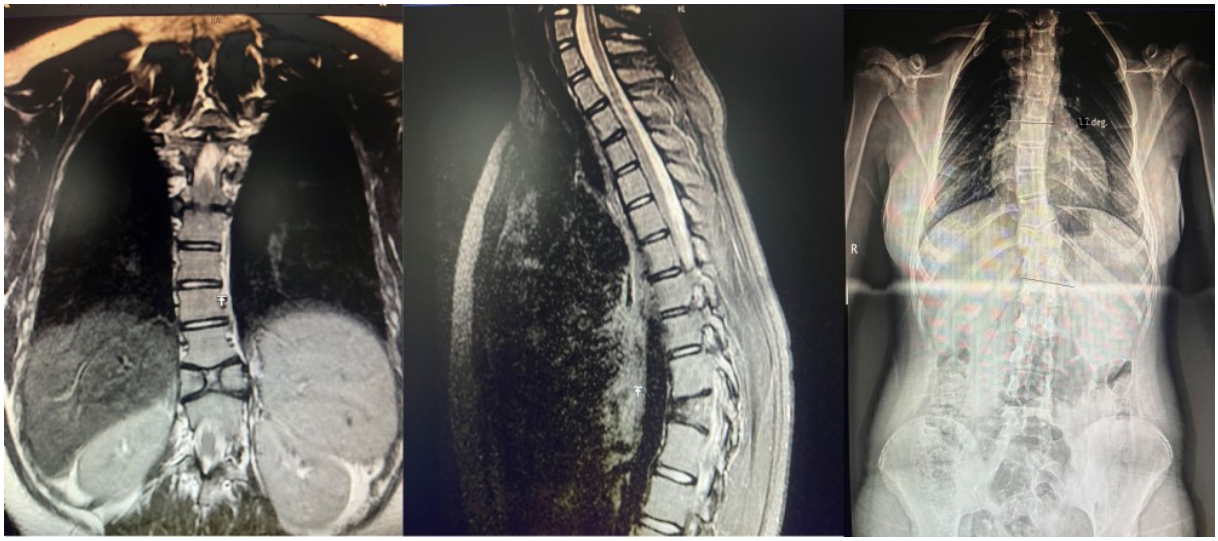

Table 1: Extremity circumference and volume measurements

Measurement Point	Right	Left
Metatarsophalangeal joint	25	24
Midfoot	26	25.5
Malleolar level of ankle	27	27
+4 cm	29	28
+8 cm	31	30
+12 cm	32.5	32
+16 cm	34	33.5
+20 cm	35	34
+24 cm	36.5	35
+28 cm	37.5	36.5
+32 cm	39	38
+36 cm	41	39
+40 cm	42.5	41
+44 cm	43	43
+48 cm	45	45
+52 cm	47	47
Volume (ml)	5.833	5.579

OP-028

Management of facial lymphedema in morbihan disease: a case report of complete decongestive therapy and kinesio taping

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OBJECTIVE: Morbihan disease (MD) is a rare and poorly understood dermatologic condition characterized by persistent, non-painful erythematous edema primarily affecting the central and upper face. It often results in chronic facial swelling and may cause visual disturbances due to periorbital involvement. This report aims to present the effectiveness of complete decongestive therapy (CDT) combined with kinesio taping in treating facial lymphedema associated with MD.
CASE: A 20-year-old male patient presented with a one-year history of bilateral facial swelling. Initial treatment with antibiotics, corticosteroids, NSAIDs, and antihistamines yielded no improvement. MRI showed lymphoid hyperplasia, and the patient was referred with a preliminary diagnosis of Morbihan disease. On physical examination, painless erythematous edema was observed, alongside papular acne lesions. Baseline facial and neck measurements were recorded at multiple anatomical landmarks. The patient underwent 10 sessions of CDT combined with kinesio taping. After treatment, facial and neck measurements were repeated to assess changes.
RESULT: Post-treatment measurements demonstrated a significant reduction in facial and neck circumferences. The distance from the tragus to the mental protuberance decreased from 14.5 cm to 13.5 cm on the right and from 13.5 cm to 13.0 cm on the left. The distance between the mandibular angles reduced from 19.0 cm to 16.5 cm. Neck circumference measurements also showed improvement (Table 1). Clinically, the patient exhibited decreased bilateral erythematous edema and improved facial contour. The combination of CDT and kinesio taping proved effective in managing facial lymphedema related to Morbihan disease.
In conclusion, although no standardized treatment protocol exists for Morbihan disease, this case suggests
that complete decongestive therapy combined with kinesio taping may be a safe and effective conservative treatment for chronic facial lymphedema. Further studies with larger patient populations are needed to validate these findings.

Keywords: morbihan disease, facial lymphedema, complete decongestive therapy, kinesio taping

Clinical images before and after treatment.

Pre- and post-treatment measurements of the patient.

Composite Facial Measurements	Before Treatment (Right)	After Treatment (Right)	Before Treatment (Left)	After Treatment (Left)
1. Tragus to the mental protuberance	14.5	13.5	13.5	13.0
2. Tragus to the corner of the mouth	10.0	9.5	10.0	10.0
3. Mandibular angle to the nasal ala	11.1	11.0	11.5	11.5
4. Mandibular angle to the inner canthus of the eye	13.0	12.6	12.8	12.5
5. Mandibular angle to the outer canthus of the eye	9.9	9.7	10.2	10.0
6. Inner canthus of the eye to the mental protuberance	11.0	10.8	11.0	11.0
7. Mandibular angle to the mental protuberance	11.0	11.0	11.8	11.0
Composite Neck Measurements	Before Treatment (cm)	After Treatment (cm)		
1. Upper neck	39.0	39.0		
2. Middle neck	38.0	38.0		
3. Lower neck	39.0	37.5		
Additional Measurements	Before Treatment (cm)	After Treatment (cm)		
1. Tragus to tragus	27.0	25.0		
2. Distance between mandibular angles	19.0	16.5		
3. Vertical circumference	63.0	61.5		
4. Diagonal circumference	67.0	65.0		

OP-029

The Role of Ozone Therapy in Managing Advanced Stage Lymphedema: A Case Report

Kerim Demirsöz, Başak Mansız Kaplan, Ayşegül Yaman, ŞEYMA ÖZMEN

Ankara Etlik City Hospital Phsical Medicine and Rehabilitation Hospital

OBJECTIVE: To present a rare case of advanced stage bilateral lower extremity lymphedema successfully managed with complete decongestive therapy (CDT) in combination with adjunctive ozone therapy, and to highlight the potential role of ozone therapy in reducing edema, controlling recurrent cellulitis, and enhancing clinical outcomes in lymphedema rehabilitation.
CASE: Case Presentation:

A 58-year-old male patient presented to the clinic on June 24, 2024, with complaints of bilateral swelling in the lower extremities. The swelling is present since 2017. The patient had no history of swelling or redness in his legs before 2017. Following the swelling, the patient experienced several episodes of cellulitis in both legs and received multiple rounds of antibiotics. His past medical history included childhood brain trauma, schizophrenia, hypercholesterolemia, benign prostatic hyperplasia, and a 1999 lumbar vertebra stabilization surgery.

The Stemmer sign was positive, and the patient was diagnosed with stage 3 lymphedema. Lymphoscintigraphy supported our diagnosis.

The patient was treated with complete decongestive therapy (CDT) consisting of multilayer bandaging (Mobiderm, France) and lymphatic drainage exercises five days a week for 6 weeks, recieved 20 treatment sessions in total. The patient also received 1x500mg gentamicin treatment intravenously for 10 days. Additionally, ozone therapy was administered twice a week for a total of 10 sessions. By the end of the treatment, the swelling in the patient's lower extremities had significantly decreased, and the patient became ambulatory with the help of crutches. Pain subsided, infection was controlled, and edema was successfully managed. Post-treatment measurements showed a reduction in the circumference of the lower extremities. The patient was provided with a custom-made knee-high compression garment (Mobiderm Intimate Shorts, France) and was discharged.

In the literature, one of the commonly used treatment methods for lymphedema is complete decongestive therapy (CDT). Furthermore, CDT has the potential to reduce the recurrence of cellulitis episodes [7]. We could not apply manuel lymphatic drainage to our patient due to lack of skin integrity. Compression bandages with a sponge structure drew the outflow created by lymphorrhea. This helped us in starting pressure treatment earlier during the cellulitis.

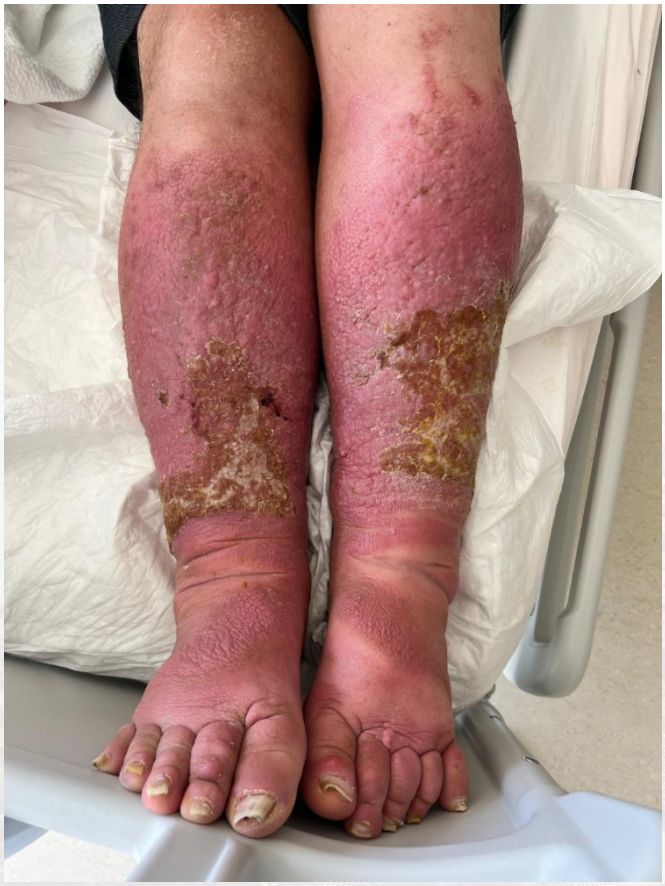
In this case, the use of ozone therapy alongside CDT contributed to the reduction in edema, ensuring skin integrity, faster recovery and treatment of cellulitis. Ozone therapy, with its powerful antioxidant properties and ability to enhance microcirculation, has begun to be used in the treatment of lymphedema. In a study on breast cancer-related lymphedema, patients who received ozone therapy in addition to CDT showed greater improvements in skin thickness and limb circumference than those who received only CDT [8]. Ozone therapy's positive effects may accelerate edema resolution by improving oxygenation in tissues.

Although the literature on ozone therapy is limited, current findings suggest that this therapy may serve as a promising adjunct in managing lymphedema. However, larger-scale randomized controlled trials are needed to assess the long-term efficacy and safety of ozone therapy. However, due to its rapid effect on tissue wound healing, we recommend that it can be added to routine lymphedema rehabilitation for rapid treatment response, especially in advanced stage patients with lymphorrhea and cellulite. Moreover, providing personalized treatment plans to patients to improve long-term adherence to CDT could lead to better clinical outcomes.

RESULT: This case demonstrates the effectiveness of ozone therapy in treating a rare case of lymphedema. The combination of multilayer bandaging and lymphatic drainage exercises (collectively known as CDT) with ozone therapy resulted in significant clinical improvement. Ozone therapy may serve as a promising adjunctive treatment option for lymphedema and cellulitis. Early diagnosis and timely intervention are critical to preventing complications and improving the quality of life for patients.

Keywords: lymphedema, ozone, lymphorrhea

Before Treatment



OP-030

Upper Extremity Lymphedema Following Complex Regional Pain Syndrome: A Case Report

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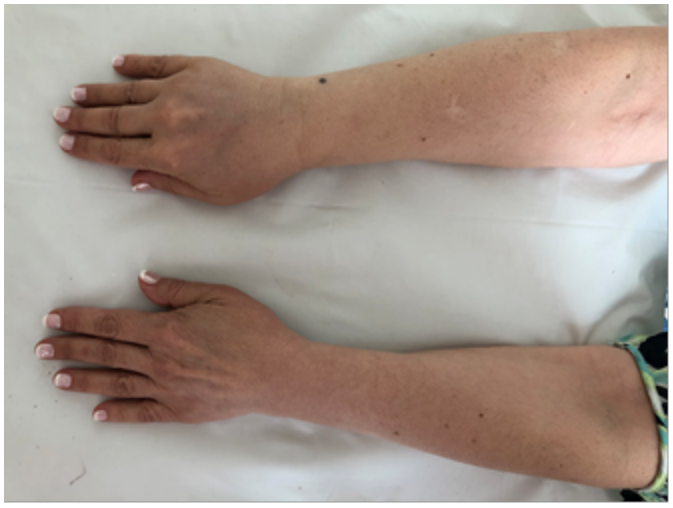
OBJECTIVE: Complex Regional Pain Syndrome (CRPS) is a condition characterized by the presence of regional pain and sensory, motor, sudomotor, vasomotor and trophic findings that are disproportionate to the usual course of the predisposing trauma or lesion.1 Lymphedema is a condition characterized by the abnormal accumulation of protein-rich interstitial fluid, consequent to lymphatic dysfunction, and swelling in the affected extremity.2
We aimed to present a rare case in which unilateral upper extremity lymphedema developed shortly after the diagnosis with Complex Regional Pain Syndrome (CPRS).
CASE: A 60-year-old female presented with an acute-onset burning and stinging continuous pain (Visual Analogue Scale 70/100 mm), hyperalgesia in a glove pattern, hyperemia and localized edema in her right wrist and hand. There were no remarkable signs or symptoms of infection or rheumatological etiology. She had a medical history of having surgery for breast cancer in her right breast in 2008. Physical examination showed relatively minimal decreased range of motion of right wrist accompanied by pain. The grip strength was found to be reduced. The electromyography (EMG) and nerve conduction velocity (NCV) results were normal. The right hand-wrist X-ray showed patchy osteopenia.
Following the diagnosis of CRPS according to the Budapest Criteria, the patient was given occupational therapy and 40 mg of oral prednisone for five days. The CRPS symptoms gradually resolved with treatment within six weeks of the follow-up. Two weeks after nearly full recovery, a slowly progressive pitting edema with aching pain developed in the patient's right forearm and hand. (Fig.1) No findings of skin thickening, ulceration or cellulitis were observed. There was no history of trauma or evidence of new-onset malignancy. There was also no history of travelling to areas endemic for filariasis or family history of primary lymphedema. Recent mammography was reported as BI-RADS 1. The lymph node examination was normal. The circumferential measurement showed a difference of 2.4 cm around the wrist and a difference of 3.1 cm 10 cm below the olecranon. The arm was spared. Stemmer's sign was found to be positive. The patient refused to undergo a lymphoscintigraphy.
The patient was diagnosed for International Society of Lymphology (ISL) stage 2 upper extremity lymphedema. In a three-month follow-up, manual lymphatic drainage, limb elevation, exercise and compression therapy resulted in the regression of swelling and pain.
RESULT: Since the discovery of neurotransmitter and neuropeptide communications within the lymph nodes supporting vascular and lymphatic homeostasis, awareness of the coordination between the autonomic nervous system and the lymphatic system has grown among researchers. 3,4
Hong et al. reported a case report of secondary lower-extremity lymphedema that occurred concurrently with CRPS type 1.5 Both conditions were successfully managed with spinal cord stimulation (SCS), which refers to the relationship between autonomic nervous and lymphatic systems. To our knowledge, this is the first case in the literature to demonstrate a possible relationship between CRPS and lymphedema in the upper extremities.
It may be instructive for future studies to consider the possible relationship between CRPS and

lymphedema, given that both conditions have been attributed to immune mechanisms and genetic factors in their etiology.

Keywords: complex regional pain syndrome, reflex sympathetic dystrophy, lymphedema, lymphatic dysfunction, Sudeck

Figure 1



The difference in circumference of the forearm and hand at the onset of lymphedema.

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OP-031

Thoracic Duct Atresia with Subsequent Peripheral Lymphatic Insufficiency. Case reports.

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OBJECTIVE: Epidemiological context and diagnostic challenges
Epidemiological data on the incidence of atresia or hypoplasia of the thoracic duct and/or lumbar lymphatic trunks are not available, and these malformations are generally regarded as rare. A key unresolved issue, however, is whether developmental anomalies of the lymphatic system are in fact underdiagnosed—either due to insufficient differential diagnostic evaluation of peripheral edema, or owing to the limited availability of appropriate imaging techniques. In men, the most common peripheral manifestations of primary lymphatic insufficiency include lower-limb lymphedema and scrotal lymphedema.
CASE: Clinical considerations relevant to differential diagnosis
1. Primary lymphatic insufficiency of the lower limbs is usually recognized only after the onset of clinically apparent edema. Optimal diagnostic work-up requires systematic exclusion of other etiologies of leg edema, such as venous disease, heart failure, renal dysfunction, pharmacological causes, or less common conditions. The diagnosis of lymphatic insufficiency as the underlying cause of swelling (lymphedema) is most often confirmed by standard bipedal lymphoscintigraphy of the lower extremities.
2. In men with normally descended testes, hydrocele testis (accumulation of serous fluid within the tunica vaginalis) is most commonly attributed to trauma, inflammatory processes of the scrotum, or infectious causes, including sexually transmitted infections.
RESULT: Differential diagnostic considerations
Based on two case reports, we propose a differential diagnostic framework for clinical scenarios where a history of bilateral hydrocele in childhood (treated surgically) is followed, after several years, by the development of peripheral lymphedema of the lower extremities and/or scrotum. In such cases, the combination of previous bilateral hydrocele with subsequent peripheral edema should raise careful consideration of a congenital developmental defect of the major lymphatic trunks—the thoracic duct and/or lumbar lymphatic trunks. The method of choice in these circumstances is transnodal contrast MR lymphography, which enables definitive assessment of whether the underlying developmental defect is limited to the peripheral lymphatic vessels or also involves the central lymphatic trunks (abdominal and thoracic).

Keywords: Thoracic Duct Atresia, Bilateral hydrocele, Transnodal contrast MR lymphography

OP-032

Prevention of Upper Limb Lymphedema Post-Mastectomy

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Lymph clinic in Egypt

OBJECTIVE: To explore effective strategies for preventing upper limb lymphedema in post-mastectomy patients, emphasizing self-care, family support, and therapeutic interventions.
MATERIAL AND METHODS: Preventative strategies include:

1. Self-Manual Lymphatic Drainage (MLD): Patients are trained to perform MLD to stimulate lymphatic flow, focusing on proximal lymph nodes and the affected arm.

2. Compression Therapy: Use of circular or flat-knit arm sleeves to maintain consistent pressure, particularly during physical activities or long periods of immobility.

3. Exercise and Activity: Early initiation of gentle arm exercises, progressing to full mobility exercises in later stages, encourages circulation and lymphatic function.

4. Skin Care: Regular moisturizing and hygiene practices to prevent infections and maintain skin integrity.

5. Nutrition and Hydration: A balanced, low-sodium diet rich in anti-inflammatory foods and adequate hydration to support overall lymphatic health.
6. Family Involvement: Education for family members on assisting with self-bandaging, skin care, and exercise routines, along with providing emotional and practical support.
RESULT: Proactive implementation of these measures significantly reduces the risk of developing lymphedema in post-mastectomy patients. Patients experience improved mobility, fewer complications, and enhanced quality of life.
CONCLUSION: A comprehensive, multidisciplinary approach is essential for preventing upper limb lymphedema post-mastectomy. Empowering patients with self-care techniques, involving family support, and emphasizing lifestyle adjustments ensures optimal long-term outcomes.

Keywords: Upper Limb Lymphedema, Prevention, Mastectomy, Manual Lymphatic Drainage, Compression Therapy, Nutrition

OP-033

"Postmastectomy lymphedema: a cross-sectional analysis of its impact on upper extremity function and quality of life"

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OBJECTIVE: Upper extremity lymphedema is a disease that significantly affects quality of life and functionality. In this study, it was aimed to evaluate upper extremity functions and quality of life of patients with postmastectomy lymphedema and to examine the relationships between these two variables and the demographic and clinical characteristics of the patients.
MATERIAL AND METHODS: The study included 100 female patients diagnosed with postmastectomy lymphedema. Demographic and disease-related clinical characteristics of the patients were recorded. The severity of symptoms such as pain, tightness, and feeling of heaviness in the lymphedematous upper extremity was evaluated using the Visual Analog Scale (VAS). Hand grip strength was measured with a Jamar dynamometer. The Quick Disabilities of the Arm, Shoulder, and Hand (Quick-DASH) questionnaire was used to evaluate upper extremity function, and the LYMQOL-ARM questionnaire, specifically designed for lymphedema patients, was used to evaluate quality of life.
RESULT: The mean age of the participants was 59.15±11.09 years. Among the 100 patients with a mean BMI of 30.23±5.64 kg/m², 40% were obese. Modified radical mastectomy was performed in 76% of the patients; 90% received chemotherapy, and 86% received radiotherapy. 93% of the patients were right-handed, and lymphedema developed on the dominant side in 51% of them. The median duration of lymphedema was 71.68 months (range: 3–264 months). The mean volume difference was 607.29±488.40 ml (range: 33–2495 ml), and 49% of the patients had moderate and severe lymphedema (volume difference of 20–40% and >40%, respectively). The mean Quick-DASH score was 32.50±19.96, and the mean LYMQOL-ARM scores were as follows: function (1.89±0.57), appearance (2.07±0.69), symptoms (2.14±0.49), emotions (2.10±1.20), and overall score (6.67±1.02). A positive correlation was found between the volume difference between the two upper extremities and the Quick-DASH score, LYMQOL-ARM function, appearance and symptom subscale scores, and the VAS scores of tightness and heaviness felt in the arm. Conversely, a negative correlation was observed between the general LYMQOL-ARM score and grip strength of the lymphedematous extremity. Regression analysis revealed that increased volume difference adversely affected the Quick-DASH and LYMQOL-ARM function, appearance, and symptom subscale scores. In addition, a positive correlation was found between Quick-DASH scores and LYMQOL-ARM function, appearance, and symptom subscales and age, BMI, and upper extremity pain, tightness, and heaviness VAS scores. Moreover, pain, tightness, and heaviness VAS scores were also significantly associated with Quick-DASH and LYMQOL-ARM scores. Lymphedema duration showed a positive correlation with Quick-DASH and LYMQOL-ARM function and appearance subscale scores, and a negative correlation with the general LYMQOL-ARM score.

CONCLUSION: This study shows that as the volume difference between the two upper extremities increases in postmastectomy lymphedema, there is an increase in functional impairment and symptom burden, and a decrease in hand grip strength and overall quality of life. In addition, factors such as advanced age, high BMI, and long duration of lymphedema were found to be associated with greater functional loss and reduced quality of life. Furthermore, as the severity of pain, tightness, and heaviness in the lymphedematous arm increases, upper extremity functions and quality of life are also negatively affected. Early diagnosis and effective management of postmastectomy lymphedema are very important in terms of preserving upper extremity function and quality of life.

Keywords: postmastectomy lymphedema, quality of life, upper extremity functions

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OP-034

Relationship between lymphedema stage and sleep quality, mood, and ody Image in breast cancer-related lymphedema

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OBJECTIVE: Breast cancer–related lymphedema (BCRL) is a significant complication that occurs in approximately one out of every five patients with breast cancer. It is well known that BCRL negatively affects psychological well-being, sleep quality, and body image. However, these complications of BCRL may often be overlooked in routine clinical practice. Clinicians should adopt a holistic approach in treating these patients, addressing both physical and psychosocial impairments together. The aim of this study was to evaluate sleep quality, mood, body image, and appearance-related anxiety in patients with BCRL and to determine their relationship with lymphedema stages.
MATERIAL AND METHODS: The study included 60 female patients over the age of 18 with breast cancer–related lymphedema (BCRL). Patients were divided into two groups according to the International Society of Lymphology staging system: stage 1 and stage 2 lymphedema. Demographic and clinical characteristics of the patients were recorded. The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality. The Rosenberg Self-Esteem Scale (RSES) was administered to evaluate self-esteem, and the Social Appearance Anxiety Scale (SAAS) was used to assess body image. Mood status was evaluated using the Hospital Anxiety and Depression Scale (HADS).
RESULT: The study included 32 patients with stage 1 lymphedema and 28 patients with stage 2 lymphedema. Demographic and clinical characteristics of the participants are summarized in Table 1, and between-group comparisons are presented in Table 2. Among the demographic variables, differences were observed only in lymphedema duration and range of motion (ROM) limitation. The longer disease duration in stage 2 lymphedema likely reflects the natural course of the condition and may also contribute to ROM limitation due to increased interstitial fibrosis, tissue stiffness, and edema. No statistically significant differences were found between stage 1 and stage 2 lymphedema groups in anxiety (HADS-A), depression (HADS-D), or sleep quality (PSQI) scores ($p > 0.05$). In contrast, patients with stage 2 lymphedema demonstrated higher social appearance anxiety (SAAS) and lower self-esteem (RSES) compared with those in stage 1 ($p = 0.017$ and $p = 0.041$, respectively).
CONCLUSION: In patients with BCRL, in addition to frequently observed physical complications such as edema, pain, and functional impairment, mood disturbances, decreased sleep quality, appearance-related concerns, and body image disorders also negatively affect quality of life. In the present study, social appearance anxiety and self-esteem levels were found to be significantly worse in the stage 2 lymphedema group compared with the stage 1 group. However, no significant differences were observed between the groups in terms of sleep quality, depression, or anxiety scores. Early initiation of treatment in patients with lymphedema is critical for preventing both physical and psychosocial complications. As the stage of lymphedema progresses, the risk of deterioration in social appearance anxiety and self-esteem may increase; therefore, clinicians should routinely evaluate the psychosocial status of patients with BCRL and, when necessary, incorporate appropriate multidisciplinary interventions into the treatment protocol.

Keywords: BRCL, lymphedema, Mood, Sleep, Body image

Table 1: Comparison of Demographic and Clinical Characteristics Between Stage 1 and Stage 2 Lymphedema Patients

	Stage 1 (n=32)	Stage 2 (n=28)	p
Age (Median (IQR) / mean ±SD)	58 (15) / 57,37 + 8,43	55,5 (12) / 57,35 + 7,64	0,95
BMI (Median (IQR) / mean ± SD)	30 (4,8) / 30,42 + 5,41	31,2 (5,7) / 30,9 + 3,54	0,257
Marital status (n(%))			0,64
Married	26 (%81,3)	24 (%85,7)	
Unmarried	6 (%18,8)	4 (%14,3)	
Occuptaion (n(%))			0,89
Employed	2 (%6,3)	2 (%7,1)	
Unemployed	30 (%93,8)	26 (%92,9)	
Education (n(%))			1
Below primary school	16 (%50)	14 (%50)	
Primary school and above	16 (%50)	14 (%50)	
Dominant side (n(%))			0,301
Right	30 (%93,8)	24 (%85,7)	
Left	2 (%6,3)	4 (%14,3)	
Affected side (n(%))			0,352
Right	22 (%68,8)	16 (%57,1)	
Left	10 (%31,3)	12 (%42,9)	
Duration of lymphedema (n(%))			**0,038**
Less than 1 year	20 (%62,5)	10 (%35,7)	
1 year or more	12 (%37,5)	18 (%64,3)	
Pain (n(%))			0,33
Present	12 (%37,5)	14 (%50)	
Absent	20 (%62,5)	14 (%50)	
ROM limitation (n(%))			**0,008**
Present	4 (%12,5)	12 (%42,9)	
Absent	28 (%87,5)	16 (%57,1)	
Axillary web syndrome (n(%))			0,124
Present	0 (%0)	2 (%7,1)	
Absent	32 (%100)	26 (%92,9)	
Lymphangitis (n(%))			**0,021**
Present	2 (%6,3)	8 (%28,6)	
Absent	30 (%93,8)	20 (%71,4)	
Cellulitis (n(%))			0,121
Present	4 (%12,5)	8 (%28,6)	
Absent	28 (%87,5)	20 (%71,4)	

Mann Whitney u

TABLE 2: Comparison of Anxiety, Depression, Sleep Quality, Social Appearance Anxiety, and Self-Esteem Scores Between Stage 1 and Stage 2 Lymphedema Patients

Variables	Stage 1 (n=32) Median (IQR) / mean ± SD	Stage 2 (n=28) Median (IQR) / mean ± SD	P
HADS A	7,5 (8,75) /8,5 + 4,45	10 (5) /9,35 + 4,46	0,42
HADS D	8 (3,5) / 7,25 + 2,34	8,5 (7) / 7,64 + 4,46	0,61
PSQI	4,5 (5,75) /4,93 + 2,95	5 (5) / 6,21 + 4,14	0,37
SAAS	23 (19) / 30,5 + 12,87	25 (35) / 39,07 + 18,29	0,017
RSES	25 (3,75) /24,25 + 4,85	20,5 (18,25) / 19,5 + 8,29	0,041

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OP-035

Effectiveness of Complete Decongestive Therapy in Malignant Lymphedema: A Case Report

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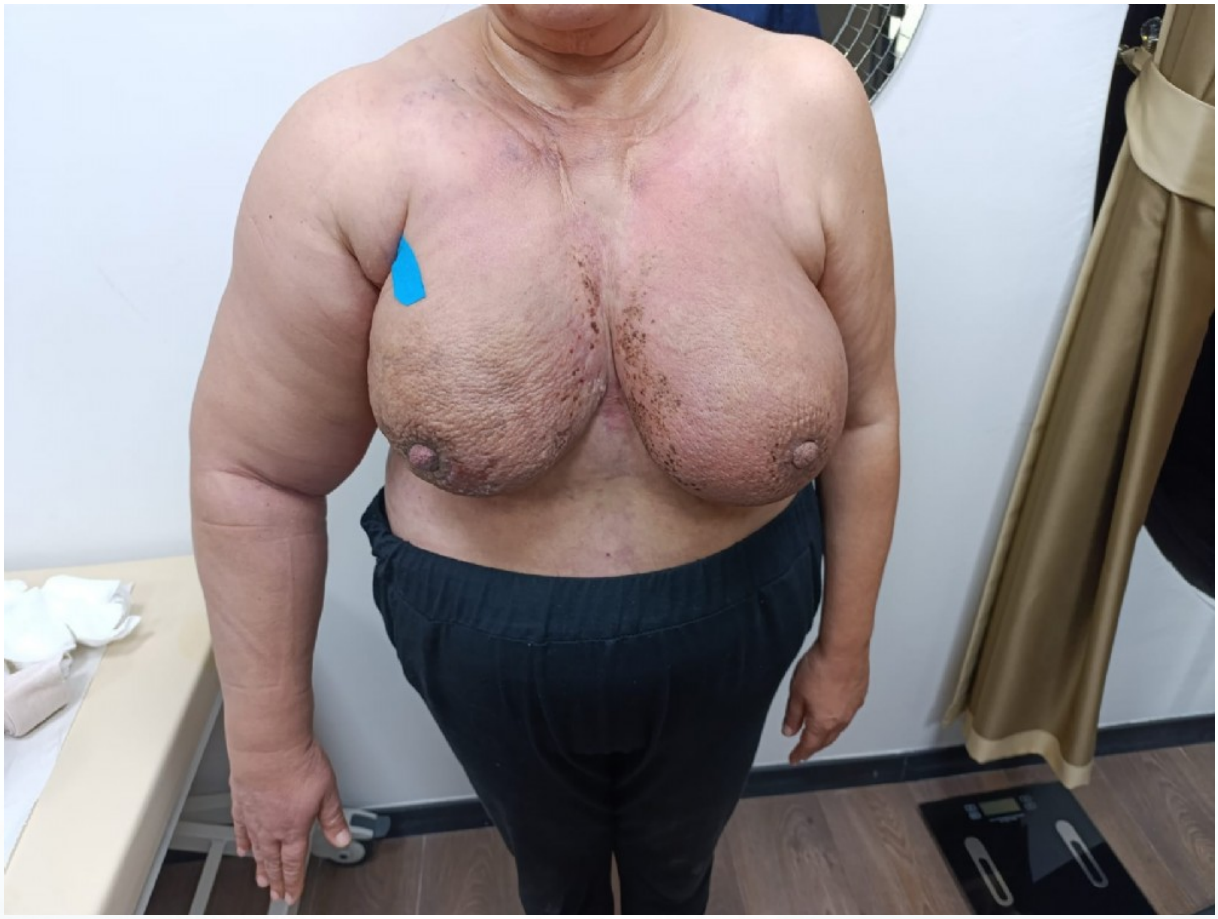
OBJECTIVE: To evaluate the effectiveness of multilayer bandaging and manual lymphatic drainage (MLD) as part of complex decongestive therapy (CDT) in a selected, appropriate case of malignant lymphedema (ML).
A review of the literature shows that secondary lymphedema of the upper extremity can develop in 40–70% of patients diagnosed with breast cancer. In these patients, conservative treatments (multilayer bandaging, MLD, and deep oscillation) and, when necessary, surgical methods can be successfully applied. However, in some patients, upper extremity lymphedema may be progressive and malignant. Such cases are resistant to treatment and are often accompanied by skin metastases, restricted limb mobility, pain, and lymphorrhea. Since CDT is generally not recommended in malignant lymphedema, treatment is often avoided in these patients. This may negatively affect their quality of life, causing pain and movement limitations.
CASE: A 55-year-old female patient presented with a 7-month history of swelling and deformity in the right arm. Her medical history revealed that she had been diagnosed with ductal breast carcinoma three years earlier but had declined oncological treatments. On physical examination, increased temperature, hyperemia, and pigmented sclerotic changes due to previous wounds were observed in both breasts. According to the International Society of Lymphology (ISL) classification, the right upper extremity was evaluated as stage 3 lymphedema. Fibrosis and discoloration were present in the surrounding tissues, and fullness was noted in the right supraclavicular region. The patient had a history of Hashimoto's disease and previous deep vein thrombosis in the right upper extremity deep venous system, for which medical treatment had been initiated. Her body mass index (BMI) was 37.6 kg/m². Laboratory findings were as follows: CRP: 6.3 g/L, TSH: 5.09 IU/mL, and Ca 15.3: 227 IU/mL. Ultrasonographic examination of both breasts and the right upper extremity venous system revealed bilateral breast masses, bilateral axillary lymphadenopathies, and thrombosis in the right radial-ulnar and brachial veins. The patient, evaluated as having malignant lymphedema, underwent five sessions of multilayer bandaging, manual lymphatic drainage (MLD), and deep oscillation within the scope of complex decongestive therapy (CDT), along with self-care education. Following treatment, a significant reduction was observed in the volume of the right upper extremity and right breast. An increase in Q-DASH and LYMQOL scores compared to pre-treatment was determined. Pain and mobility limitations decreased, and improvements were achieved in daily living activities. No significant side effects related to CDT were observed.
RESULT: In selected appropriate cases of malignant lymphedema, CDT can be used to reduce limb volume, improve daily living activities, and enhance functionality. Although the number of studies on this subject in the literature is increasing, further research with larger sample sizes and longer follow-up periods is needed to confirm its effectiveness.

Keywords: Breast cancer, CDT in active cancer, complex decongestive therapy, malignant lymphedema

After Treatment



OP-036

Rehabilitation Outcomes Of Patients With Axillary Web Syndrome From Ankara City Hospital

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OBJECTIVE: To determine the clinical demographic characteristics of patients with Axillary Web Syndrome (AWS) followed in the Lympheodema and Cancer Rehabilitation Unit and to evaluate their rehabilitation outcomes.
MATERIAL AND METHODS: Clinical and demographic datas of patients diagnosed with AWS were recorded. Patients' VAS scores were recorded before and after the rehabilitation program. Shoulder flexion and abduction PROM were measured with a goniometer. Nonsteroidal antiinflamtuar drug was started for pain. Myofacial release, cord manipulation, and soft tissue manipulation were performed for AWS, and shoulder abduction and flexion ROM stretching exercises were performed. Patients were given a home exercise program consisting of self-stretching exercises.
RESULT: All 13 patients included in the study were female. The mean age of the patients was 55.91±6.99 years. The etiological cause was breast surgery in all patients. The mean duration of AWS was 4.83±1.26 weeks. Reasons for admission to the hospital were pain and shoulder movement limitation in 55% of patients, pain alone in 25%, and shoulder movement limitation alone in 15%. When the pre-rehabilitation VAS values and shoulder flexion and abduction PROM were compared with the post-rehabilitation VAS values, the difference was found to be statistically significant (p=0.001) (Table 1).
CONCLUSION: AWS is a complication that occurs in the early period after breast surgery. It negatively impacts the patient's quality of life by causing pain and limited shoulder movement. Patients with AWS benefit from individualized rehabilitation programs.

Keywords: Axillary Web Syndrome, Rehabilitation, Pain

pre-rehabilitation and post-rehabilitation VAS values and shoulder flexion and abduction PROM values

	Pre-Rehabilitatin	Post-Rehabilitation	p
VAS	6.16±1.26	1.41±0.99	0.001
Shoulder Flexion PROM	100±14.92	160.42±16.57	0.001
Shoulder Abduction PROM	97.50±12.15	157.08±17.11	0.001

OP-037

Multidomain Recovery and High-Responder Profiles Following Resistance Exercise Intensities in Breast Cancer-Related Lymphedema

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OBJECTIVE: To compare the multidomain recovery effects of high- versus low-intensity resistance exercise combined with complex decongestive therapy in women with breast cancer-related lymphedema, and to identify predictors of high responsiveness.
MATERIAL AND METHODS: Thirty-six women with stage 2 unilateral upper extremity breast cancer-related lymphedema (BCRL) were randomly assigned to either a high-intensity resistance exercise group (HIRE, 80% of one-repetition maximum \[1RM]) combined with complex decongestive therapy (CDT) or a low-intensity resistance exercise group (LIRE, 30% 1RM) combined with CDT. Both interventions were delivered over 8 weeks, three sessions per week. Outcome measures included functional status (Disabilities of the Arm, Shoulder and Hand \[DASH]), psychosocial status (EORTC QLQ-C30 emotional and social subscales, LYMQOL, and ICF-BCRL), edema volume (percentage change in excess volume \[PCEV]), and muscle strength (grip strength measured with a dynamometer). Clinical meaningfulness was assessed by determining the proportion of participants achieving the minimal clinically important difference (MCID; ≥5-point change in DASH or EORTC scores). A composite multidomain recovery score was calculated as the sum of z-scores for percentage changes in muscle strength, PCEV, and quality of life. High responder profiles were defined as participants achieving ≥25% increase in grip strength. Statistical analyses included paired t-tests, independent t-tests, Pearson correlations, chi-square tests, and ANOVA.
RESULT: Both functional capacity and psychosocial well-being improved significantly over the 8-week intervention. Mean DASH scores decreased by 8.5 points ($p < 0.001$), while emotional and social functioning scores increased by 1.7 ($p = 0.019$) and 1.6 ($p = 0.021$) points, respectively. Clinically meaningful improvements (≥MCID) in DASH were achieved by 83% of HIRE and 78% of LIRE participants, and in QoL by 72% and 67%, respectively. Participants achieving MCID-level gains demonstrated greater edema reduction compared to those below the threshold (–2.0 ± 0.7 cm vs –1.4 ± 0.6 cm, $p = 0.029$). Across all participants, muscle strength increased by 4.2 ± 2.1 kg, PCEV decreased by 5.4 ± 2.6%, and LYMQOL scores improved by 6.2 ± 3.0 points (all $p < 0.001$). Strength gains were positively correlated with QoL improvements ($r = 0.482$, $p = 0.008$), but edema reduction was not significantly correlated with other domains. Between-group analysis revealed greater strength gains in HIRE (+4.8 ± 2.0 kg) compared to LIRE (+3.6 ± 2.1 kg, $p = 0.041$), while edema reduction and QoL change were comparable. Composite multidomain recovery scores were significantly higher in HIRE (2.45 ± 0.58 vs 1.98 ± 0.61, $p = 0.038$). High responder rates (≥25% strength gain) were greater in HIRE (72%) than LIRE (44%, $p = 0.041$). Baseline predictors of high responsiveness included lower initial grip strength (15.2 ± 3.1 kg vs 17.1 ± 3.3 kg, $p = 0.038$) and lower BMI (24.6 ± 2.4 vs 26.2 ± 3.0 kg/m², $p = 0.044$). High responders also experienced significantly greater edema reduction (–6.1 ±

2.1% vs –4.4 ± 1.8%, p = 0.027).
CONCLUSION: Both high- and low-intensity resistance exercise combined with CDT significantly improved functional, psychosocial, and edema-related outcomes in women with stage 2 BCRL. High-intensity protocols produced superior muscle strength gains, higher multidomain recovery scores, and a greater proportion of high responders. Clinically meaningful improvements were associated with greater edema reduction. Lower baseline grip strength and BMI predicted greater responsiveness, underscoring the need for individualized exercise prescriptions to optimize recovery in BCRL.

Keywords: Breast cancer-related lymphedema,Resistance exercise intensity, Multidomain recovery

Table 7. Composite Multidomain Recovery Score

Group	Score (Mean ± SD)	Between-Group p-value
HIRE	2.45 ± 0.58	0.038
LIRE	1.98 ± 0.61	—

The composite multidomain recovery score, reflecting the sum of z-scores for muscle strength improvement, percentage change in excess volume (PCEV) reduction, and quality of life enhancement, was significantly higher in the HIRE group compared to the LIRE group (p = 0.038). (p-values represent between-group comparisons. Within-group changes were not tested in this composite measure).

OP-038

Evaluation of sympathetic nervous system findings and their relatıonship with symptoms in patients with breast cancer related lymphedema

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OBJECTIVE: The aim of this study was to evaluate the sympathetic nervous system, small fiber functions and autonomic symptoms in patients with breast cancer related lymphedema and to investigate the relationship between these findings and patients' symptoms
MATERIAL AND METHODS: A total of 52 patients with lymphedema and 27 healthy controls were included. Demographic and clinical data were recorded. Bilateral upper extremities of the control group were evaluated, yielding 52 upper limb data sets. SSR and CSP were electrophysiologically measured in both groups. Lymphedematous and unaffected arms of the patient group were compared with each other and with the upper extremity data of the control group. Intra- and inter-observer reliability of electrophysiological measurements was assessed. Autonomic symptoms were evaluated using the COMPASS-31 scale, while the functional status and daily life impact were assessed with the Lymphedema Life Impact Scale (LLIS). Pain, heaviness, and tightness in the affected limb were rated using a numerical rating scale, and their relationship with neurophysiological parameters was analyzed.
RESULT: There was no significant difference in sociodemographic characteristics between the patient and control groups. SSR latency was significantly prolonged and amplitude was significantly reduced in the lymphedematous arms compared to the unaffected arms ($p<0.001$ and $p=0.008$, respectively). No difference was found in CSP latency ($p=0.777$), whereas CSP duration was significantly shorter in the unaffected arm ($p<0.001$). Compared to controls, SSR latency was longer and amplitude lower in the lymphedematous arms ($p<0.001$ and $p=0.008$, respectively). SSR latency was also higher in the unaffected arms compared to controls ($p=0.023$), while amplitude showed no significant difference ($p=0.414$). Based on the Youden Index, a cut-off value of 1471.0 ms for SSR latency yielded a sensitivity of 59.6% and specificity of 100.0%. CSP latency was significantly longer in both arms of the patient group compared to controls ($p=0.036$ and $p=0.024$), and CSP duration was significantly reduced in the unaffected arm ($p<0.001$). No significant correlation was found between SSR/CSP parameters and COMPASS-31 or LLIS scores. However, the patient group had significantly higher scores in the secretomotor, vasomotor, and bladder domains of the COMPASS-31 compared to controls. In addition, statistically significant correlations were found between the COMPASS-31 total score and the pain, tension and heaviness sensation described by the patients in the secretomotor and pupillomotor subscales.
CONCLUSION: This study reveals both sympathetic dysfunction and small fiber-related neurophysiological alterations in breast cancer-related upper extremity lymphedema. These findings suggest that lymphedema is not merely a mechanical disorder, but a complex condition with neurophysiological involvement. The results highlight the importance of assessing autonomic dysfunction in clinical evaluation and suggest that therapies targeting the sympathetic nervous system may be valuable in management and prognosis.

Keywords: Lymphedema, electrophysiology, sympathetic system, small fiber neuropathy, autonomic findings

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OP-039

Supraclavicular Lymphatic Pathway Changes with Upper Extremity Lymphedema Progression

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OBJECTIVE: Supra/ subclavicular lymphatic pathway plays an important role in upper extremity lymphedema (UEL) management. However, little is known on relationship between the lymphatic pathway and pathophysiological UEL severity. This study aimed to clarify enhancement positivity of the superficial supra/ subclavicular lymph node (S-SCLN) in UEL according to pathophysiological severity stage based on indocyanine green (ICG) lymphography findings.
CASE: Medical records of breast cancer survivors who underwent ICG lymphography were reviewed. Enhancement of the SCLN was evaluated at a plateau phase on ICG lymphography. Positive rates of the S-SCLN enhancement and enhanced flows into the SCLN were evaluated according to ICG lymphography stage.
RESULT: One-hundred eighty limbs were included. ICG lymphography stage included stage 0 in 107 (59.4%) limbs, stage I in 13 (7.2%) limbs, stage II in 16 (8.9%) limbs, stage III in 28 (15.6%) limbs stage IV in 16 (8.9%) limbs. Positive rate of the S-SCLN enhancement was 47.7%/61.5%/93.8%/64.3%/ and 50.0% in ICG stage 0/I/II/III and IV, respectively (P = 0.0095). Positive rate of enhanced pathway into the S-SCLN was 21.6%/25.0%/53.3%/33.3%/25.0% in ICG stage 0/I/II/III and IV, respectively (P = 0.20); all cases showed the superficial lymphatic pathway along the deltopectoral crease into the S-SCLN.
CONCLUSIONS:
S-SCLN enhancement and Deltopectoral superficial lymphatic pathway was frequently seen in mild-moderate UEL cases, indicating importance of the pathway as a collateral lymphatic pathway preventing UEL progression.

Keywords: Lymphedema, supermicrosurgery, indocyanine green, lymphography, anatomy, manual lymph drainage.

OP-040

A New Pathophysiological Window in Lymphedema: A Pictorial Assay with Nailfold Capillaroscopy

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OBJECTIVE: Lymphedema is a chronic disorder characterized by an impairment in lymphatic circulation and is a clinical condition that can be frequently observed after breast cancer treatment. Although lymphatic system involvement is primarily seen in lymphedema, it is also known to accompany microcirculation disorders at systemic and capillary levels. Nailfold capillaroscopy, which is frequently used in patients with scleroderma, stands out for its objective evaluation of the capillary system. In this study, it was planned to perform capillarospic evaluation in lymphedema patients, based on the lack of information in the literature demonstrating the effect at the capillary level in lymphedema.
MATERIAL AND METHODS: Within the scope of the study, microcirculation disorders were investigated with the help of nailfold capillaroscopy in the affected and healthy extremities of patients who were diagnosed with lymphedema in the upper extremities after breast cancer treatment. The patients were recruited from the Physical Medicine and Rehabilitation Clinic at a tertiary center.
RESULT: Preliminary results of an ongoing study present capillaroscopic findings in six patients with breast cancer treatment-related lymphedema. Evaluations were performed on the third or fourth digits of both the affected and healthy extremities. All patients had hemorrhage in the affected extremity, with tortuosity in two patients, decreased capillary density in three patients, elongation in one patient, and neoangiogenesis in two patients. None of the above findings were noted in the healthy extremity.
CONCLUSION: Preliminary results from the study indicate that microcirculatory disorders detectable by nailfold capillaroscopy occur in patients with breast cancer treatment-related lymphedema. The fact that these findings are only observed in the affected extremity suggests that the involvement is specific to lymphedema and is independent of any systemic involvement, including oncological disease. More definitive conclusions will be possible as more patients are evaluated in this ongoing study. This approach is believed to generate new pathophysiological insights and contribute to the development of advanced treatment methods in lymphedema patients.

Keywords: breast cancer, capillaroscopy, lymphedema

OP-041

Immunohistochemical Study Using anti-podoplanin and anti-CD31 Antibodies on Advanced Colorectal Adenocarcinoma

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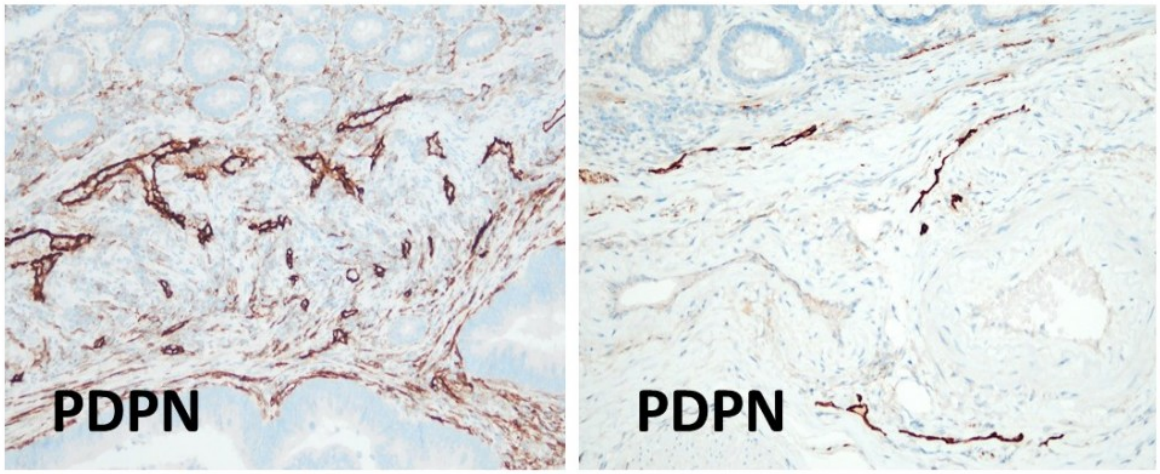
OBJECTIVE: We presented a study on distribution of podoplanin expression in polypoid neoplastic and non-neoplastic colorectal lesions at ISL meeting held in Genoa and ESL meeting in Istanbul. Now we present the results of the similar study applied on advanced colorectal adenocarcinoma.
MATERIAL AND METHODS: Thirty surgically resected materials from human cases of advanced colorectal adenocarcinoma were studied.
Immunohistochemistry using anti-podoplanin antibody (D2-40, Dako M3619) and anti-CD31 antibody (Dako M0823) was performed on the paraffin sections of the resected materials. The distribution densities of the lymphatic vessels depicted by podoplanin and blood vessels by CD31 in cancer stroma (CS) and non-cancerous submucosa (NCS) were measured by point interception method. We compared the vascular densities of CS and NCS and statistically analyzed. The expression patterns and intensities of podoplanin in cancer stroma of the advanced colorectal adenocarcinomas were observed and classified.
RESULT: The lymphatic vessel densities in CS were higher than those of NCS ($P>0.01$). Although there was no significant difference between the blood vascular densities of the CS and NCS, there was statistically significant increase in blood capillary densities of CS compared to those of NCS ($P>0.01$). Regarding the patterns and intensities of podoplanin expression in the stroma of advanced colorectal adenocarcinoma, we classified them into three categories, Grade 1 (weak expression generally), Grade 2 (moderate expression with intensive expression in upper portions and weak expression in deeper portions), and Grade 3 (intensive expression in upper portions through deeper portions).
CONCLUSION: In advanced colorectal adenocarcinoma, the densities of lymphatic vessels and blood capillaries in CS are higher than those in NCS. The patterns and intensities of podoplanin expression of advanced colorectal adenocarcinoma can be classified into three categories, i.e., Grade 1-3.

Keywords: podoplanin, CD31, colorectal adenocarcinoma, vascular density

podoplanin positive vessel density

podoplanin positive vessel density



Cancer stroma (CS)

non-cancerous submucosa (NCS)

OP-042

Effects of Aromatase Inhibitors on Quantitative Ultrasonographic Tendon Parameters and Balance Function in Breast Cancer Patients

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OBJECTIVE: This study aimed to investigate whether balance disorders are associated with the use of aromatase inhibitors (AIs) in breast cancer patients. If such a relationship exists, we further aimed to explore whether it is linked to tendon changes or AI-induced arthralgia, and whether these factors contribute to balance impairments.
MATERIAL AND METHODS: Seventy-six breast cancer patients who met the inclusion and exclusion criteria and presented to our hospital's oncology clinic between October 2023 and May 2024 were included. Patients were divided into two groups based on AI use. Tendon measurements (thickness, cross-sectional area, and echogenicity) of the Achilles, quadriceps, and patellar tendons were assessed using ultrasonography.

Balance was evaluated using the Fall Risk Test (FRT), Limits of Stability (LOS), and Postural Stability Test (PST) via the Biodex Balance System. The Tinetti Gait and Balance Scale (TGBS) and Timed Up and Go Test (TUG) were also applied. Pain was assessed with the Brief Pain Inventory (BPI), while functional status and quality of life were evaluated using the EORTC QLQ-C30, EORTC QLQ-BR23, and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Fear of falling was measured with the Falls Efficacy Scale (FES).
RESULT: No significant differences were found between the groups in demographic and clinical characteristics. However, the AI group performed significantly worse on the FRT, TUG, and TGBS ($p<0.05$). This group also had significantly increased echogenicity, cross-sectional area, and thickness in the quadriceps, patellar, and Achilles tendons.

BPI-1, BPI-2, and WOMAC scores were significantly higher in the AI group, indicating more pain and functional limitations. In EORTC QLQ-C30 and QLQ-BR23 results, functional scores were lower and symptom scores were higher in the AI group.

Significant correlations were found between tendon parameters and balance performance. Specifically, quadriceps tendon echogenicity, cross-sectional area, and thickness; patellar tendon echogenicity and thickness; and Achilles tendon cross-sectional area and thickness were positively correlated with TUG scores. Additionally, TUG scores were significantly associated with BPI-1 and BPI-2 scores.

Regarding the relationship between tendon changes and pain, quadriceps tendon thickness and area, patellar tendon echogenicity, and Achilles tendon thickness and area were positively correlated with both BPI-1 and BPI-2.

In multivariate linear regression analysis, only the pain score (KAE) was found to be a significant causal factor associated with balance, particularly the TUG test.

CONCLUSION: In breast cancer patients using aromatase inhibitors, balance test scores were significantly poorer, pain levels were higher, and tendon structural changes were more pronounced ($p<0.05$). There was a clear association between tendon parameters and both pain and balance. However, regression analysis revealed that only pain scores were causally related to impaired balance as measured by the TUG test.

Keywords: Aromatase inhibitors, postural balance, arthralgia, patellar tendon, achilles tendon

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OP-044

A Comparative Analysis of Qualitative and Quantitative Findings in Lymphoscintigraphy for the Grading of Lymphedema

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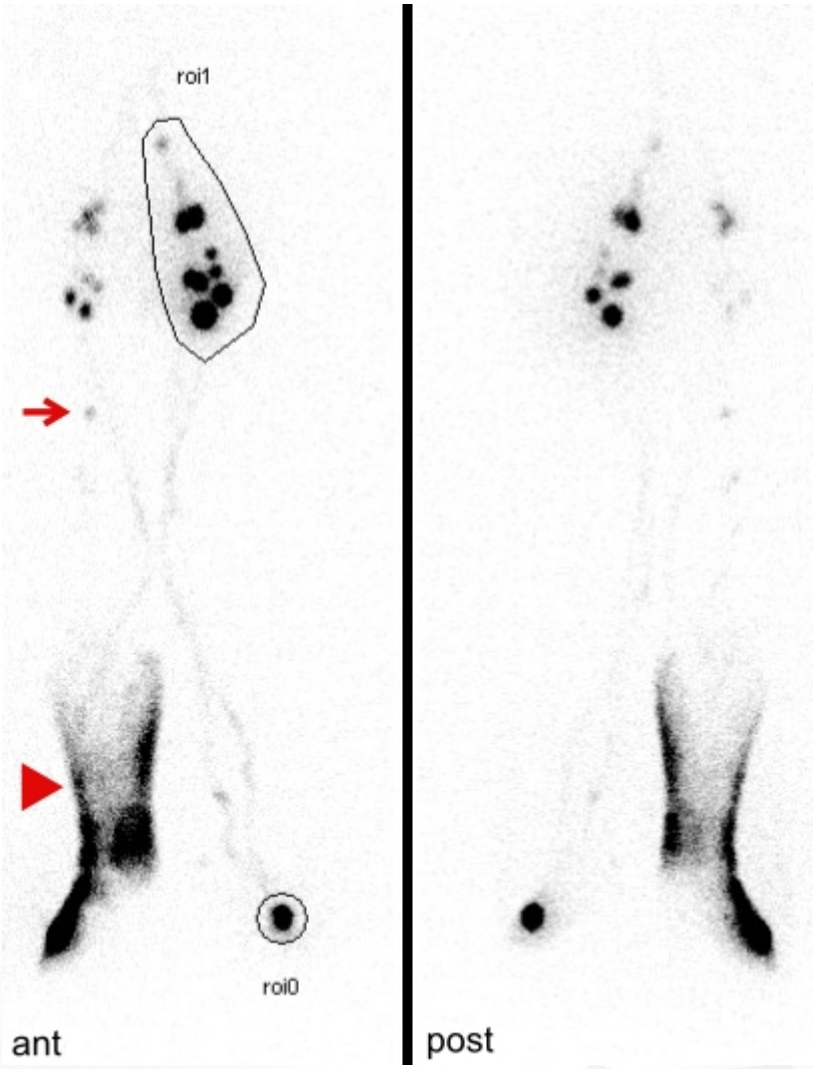
OBJECTIVE: Lymphoscintigraphy is the primary imaging technique used to assess the function of the lymphatic system and confirm a diagnosis of lymphedema. Various qualitative grading systems are utilized to diagnose lymphedema. Additionally, quantitative methods have recently been introduced to provide a more objective insight into interpretation. This study aims to compare the effectiveness of qualitative and quantitative parameters for interpreting lymphoscintigraphy.
MATERIAL AND METHODS: Lymphoscintigraphic imaging was conducted on both lower extremities in a large cohort of adult patients with a preliminary diagnosis of lymphedema, and the results were assessed. Qualitatively, the presence of lymphatic flow in dynamic images for each lower extremity, main lymphatic flow, the presence and number of collaterals, the presence and number of in-transit lymph nodes, and the appearance of dermal backflow were visually evaluated using images obtained at the 1st and 3rd hour after bipedal radiocolloid injection. Additionally, the regions of interest were marked at the injection site and inguinofemoral lymph nodes on the 1st-hour images for each lower extremity, and the percentages of radiotracer passing through were calculated. Furthermore, according to the Taiwan lymphoscintigraphy staging system, the findings are classified as normal lymphatic flow, partial obstruction, or total obstruction.
RESULT: The study included 350 patients (F/M:290/60, median age: 52, range: 18–89). Out of a total of 450 extremities evaluated, 425 exhibited normal lymphatic flow (60.7%), 217 had partial obstruction (31%), and 58 experienced total obstruction (8.3%). In extremities with normal lymphatic flow, the Transit rate in dynamic images was 60.7%, normal main lymphatic flow was 93.2%, collateral observation was 43.3%, in-transit lymph nodes presence was 7.1%, and dermal-backflow was 2.8%. For partial obstruction, the transit rate in dynamic images was 34.1%, normal main lymphatic flow detection was 39.6%, collateral detection was 27.2%, in-transit lymph nodes presence was 35.5%, and dermal backflow findings were 40.6%. In total obstruction, the transit rate in dynamic images was 5.2%, normal main lymphatic flow detection was 0%, collateral detection was 0%, in-transit lymph nodes presence was 4%, and dermal backflow findings were 39.6%. In quantitative analysis, the median lymphatic passage rate was 32.6% for normal lymphatic flow, 8% for partial obstruction, and 0% for total obstruction.
CONCLUSION: Quantitative and qualitative parameters should be combined to diagnose lymphedema accurately and appropriately grade lymphatic obstruction. In lymphoscintigraphy reports, it is essential to include details regarding dynamic transit, main lymphatic flow, collateral flow, in-transit lymph nodes, and dermal backflow, along with the percentage of the quantitative radiotracer transit. This information is crucial for grading lymphatic obstruction and managing patient care.

Keywords: lymphoscintigraphy, lymphedema, lower extremity, quantitative analysis

Qualitative and semiquantitative analysis



Examples of qualitatively assessed parameters include an in-transit lymph node (marked by a red arrow) and dermal backflow (indicated by a red arrowhead). The quantitative transit percentage is determined by calculating regions of interest (ROIs) over the inguinofemoral lymph nodes and the injection site. The percentage transit is computed using a practical and applicable formula: Transit % = $ROI_1 / (ROI_1 + ROI_0) \times 100$.

Comparison of Qualitative and Quantitative Findings

%	Normal Lymphatic Drainage	Partial Obstruction	Total Obstruction
Dynamic Flow	60.7	34.1	5.2
Main Lymphatic Flow	93.2	39.6	0
Collateral Ducts	43.3	27.2	0
In-transit Lymph Node	7.1	35.5	4
Dermal Backflow	2.8	40.6	39.6
Quantitative Passage Ratio	32.6	8	0

In accordance with the Taiwan lymphoscintigraphy classification, the table presents the distribution of qualitative parameters—normal lymphatic flow, partial obstruction, and total obstruction—observed in the evaluated extremities, along with the mean values of the quantitative transit percentages.

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OP-046

Ultrasonographic Evaluation of Soft Tissues in Patients with Lower Extremity Edema

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OBJECTIVE: Lymphedema and lipedema are important causes of lower extremity edema. The mechanical load, perfusion disturbances, and inflammatory processes associated with chronic edema may predispose individuals to the development of soft tissue pathologies. The aim of this study was to evaluate the frequency of lower extremity tendinopathy and to examine the relationship between tendon thickness and edema volume, as well as their effects on quality of life and functional status.
MATERIAL AND METHODS: This prospective case-control study, conducted between October 2024 and April 2025, included 53 patients with clinically diagnosed lower extremity edema and 55 age- and sex-matched healthy controls. All participants underwent circumference measurements and musculoskeletal ultrasonography (Figure 1), which included evaluation of the patellar tendon, plantar fascia, Achilles tendon, peroneus longus tendon, and tibialis posterior tendon. Clinical assessments comprised the Visual Analog Scale (VAS), the Lower Extremity Functional Scale (LEFS), and the Lymphedema Quality of Life Scale (LYMQOL-Leg).
RESULT: Significantly greater thicknesses of the plantar fascia, Achilles tendon, peroneus longus tendon, and tibialis posterior tendon were observed in the edema group ($p < 0.05$). A positive correlation was identified between edema volume and thickness of the Achilles tendon and plantar fascia. The incidence of plantar fasciitis and Achilles tendinopathy was significantly higher in the edema group compared with the control group. These findings were associated with reduced quality of life scores and functional status ($p < 0.05$).
CONCLUSION: Lower extremity edema is not limited to fluid accumulation but may also lead to morphological changes in tendon structures and consequent loss of function. Musculoskeletal ultrasonography appears to be an effective tool for both diagnosis and follow-up in these patients.

Keywords: Pain, Lymphedema, Lipedema, Plantar Fasciitis, Tendinopathy, Ultrasonography

Figure 1

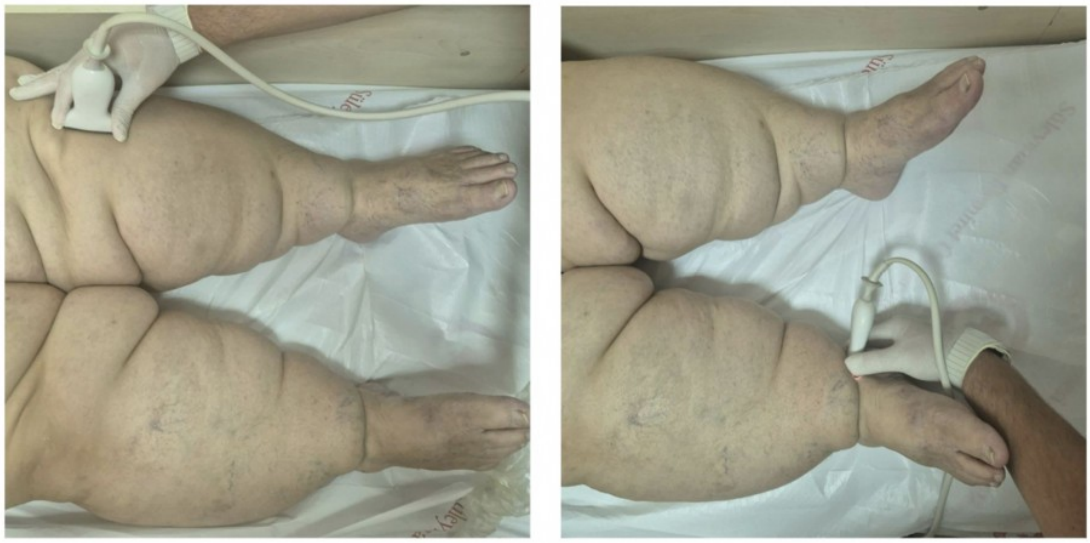

Figure legends: Figure 1. Representative probe placement for lower extremity tendon ultrasonography.

OP-051

A Giant Postoperative Lymphatic Mass in the Groin: A Rare Case of Massive Localized Lymphedema in a Non-Obese Patient

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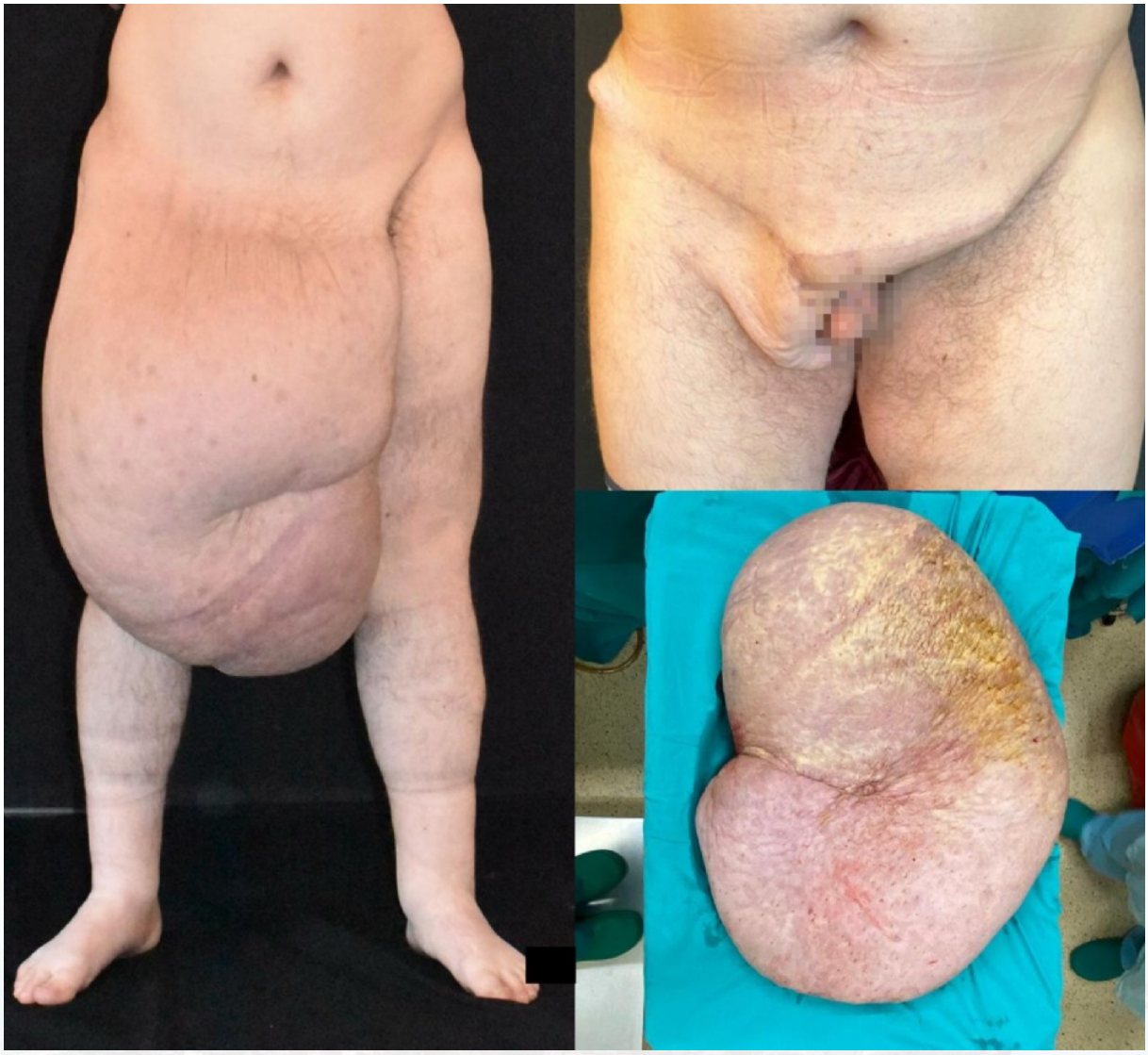
OBJECTIVE: Massive Localized Lymphedema (MLL) is a rare, benign, yet progressive lymphatic disorder, typically seen in morbidly obese patients, particularly in the medial thigh, and may cause functional impairment in advanced stages. In this report, we present a rare case of giant MLL that developed postoperatively in the groin of a non-obese patient—an occurrence not previously reported in the literature.
CASE: A 42-year-old male patient was evaluated due to severe mobility restriction, difficulty performing daily activities, and a significant decline in quality of life caused by a progressively enlarging giant soft tissue mass (60×50×40 cm) in the right groin, extending from the inguinal region to the knee over approximately 10 years.
His childhood medical history included a swelling of the left thigh at age 3 and thoracotomy for chylothorax at the age of 9. At the age 32 (10 years prior to current evaluation) the patient had undergone a right inguinal incision for testicular biopsy and sperm retrieval due to infertility. Following this procedure, a progressively enlarging mass developed in the right groin. Although initially managed with conservative physical therapy and compression bandaging, the lesion became unresponsive to treatment and eventually reached massive proportions. The mass affected the patient's daily life and activities. He also experienced several episodes of cellulitis and infections requiring hospitalization.
The patient was diagnosed with giant MLL, and surgical excision was planned. An en bloc excision was performed via an elliptical incision at the stalk of the approximately 20-kg mass. Two ectatic lymphatic vessels (7 mm in diameter) with active lymphatic leakage were identified during dissection and were repaired using an imbrication technique to prevent further leakage. In addition, the right testis and spermatic cord were identified and preserved. The resulting defect at the resection base was closed primarily, as preoperatively planned.
RESULT: No postoperative complications occurred. During a four-year follow-up period, there was no evidence of recurrence of mass or lymphatic leakage. The patient experienced a marked improvement in mobility and overall quality of life after the surgery.
This case demonstrates that MLL is not solely associated with morbid obesity; but congenital lymphatic dysplasia and iatrogenic factors such as previous surgeries may also contribute to its development. Delayed diagnosis and treatment of MLL carry risks including skin ulceration, recurrent infections, and even the development of angiosarcoma in approximately 13% of cases. Therefore, early evaluation and timely surgical intervention are crucial, not only to achieve functional improvement but also to prevent angiosarcoma, which carries an estimated mortality rate of around 9%.

Keywords: Massive localized lymphedema, lymphatic obstruction, angiosarcoma, secondary lymphedema, reconstructive surgery, lymphatic reconstruction

MLL of groin



MLL of the groin: Preoperative and postoperative views. Excised lymphatic mass.

OP-055

Surgical treatment of extra-truncular lymphatic malformation and of lymphatic complications

Francesco Boccardo, Gregorio Santori, Beatrice Fedre, Sara Dessalvi, Franco De Cian

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OBJECTIVE: The authors report their clinical experience in the assessment and treatment of lymphatic extra-truncular malformations. These disorders highly jeopardize the quality of life of patients and they represent quite a difficult clinical condition both from the diagnostic and the therapeutic points of view.
CASE: 10 cases of supraclavicular lymphangiomas, 30 of inguinal lymphoceles and 5 of axillary lymphangiomas are reported. The diagnostic assessment included lymphatic scintigraphy, SPECT-CT, lymphangio-MR and CT. The surgical operation consisted in exeresis of the malformation combined with LYMPHA technique for the prevention of secondary lymphedema of the corresponding extremities. The follow-up period varied from 6 to 48 months.
RESULT: There was no relapse of the malformation and no edema appeared at the corresponding extremity. Only 1 case of a huge axillary lymphangioma had a temporary slight edema of upper extremity, that solved spontaneously without any further treatment. There had been a remarkable improvement of the disability caused by the malformation and patients could get back to working activities and sports.
An accurate diagnostic assessment of lymphatic extra-truncular malformations is indispensable for a correct therapeutic strategy and to decrease post-operative complications.

Keywords: lymphatic complications, lymphatic malformations, prevention, treatment.

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OP-056

Pain and Associated Factors in Patients with Lipedema: A Cross-Sectional Controlled Study

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OBJECTIVE: Lipedema is a chronic and progressive adipose tissue disorder predominantly affecting women, characterized by bilateral and symmetrical fat deposition in the lower extremities, often accompanied by pain, swelling, and impaired quality of life (1,2). While cosmetic concerns are commonly addressed, the role of pain and its clinical correlates are under-investigated (1,3). This study aimed to evaluate pain presence and intensity, neuropathic components, and related factors in individuals diagnosed with lipedema.
MATERIAL AND METHODS: This cross-sectional and descriptive study included 20 women diagnosed with lipedema and 20 age-matched healthy female controls. Participants were assessed at a tertiary physical medicine and rehabilitation outpatient clinic. Demographic data (age, BMI, comorbidities) and laboratory values (vitamin D, B12) were recorded. Pain was evaluated using the Visual Analog Scale (VAS), the Leeds Assessment of Neuropathic Symptoms and Signs (LANSS), and the Douleur Neuropathique 4 (DN4) questionnaire. Quality of life was measured with the SF-12 Physical and Mental Component Scores. Disease stage was recorded for patients with lipedema.
RESULT: Descriptive and comparative data are presented in Table 1. Among the 20 patients diagnosed with lipedema, 5 (25%) were classified as stage 1, 7 (35%) as stage 2, and 8 (40%) as stage 3 based on clinical evaluation. VAS scores, LANSS, and DN4 were positively correlated with each other ($p < 0.05$). A significant negative correlation was found between VAS scores and SF-12 physical score ($r = -0.613$, $p = 0.004$), indicating lower physical quality of life in patients with higher pain levels. Vitamin B12 levels were significantly lower in the lipedema group compared to controls ($p = 0.022$).No statistically significant difference was found between the groups in terms of vitamin D levels ($p = 0.070$), although median levels were lower in the lipedema group. According to Kruskal-Wallis analysis, there was a statistically significant difference in SF-12 physical scores among disease stages ($p = 0.011$)(Table 2). Post-hoc pairwise comparisons revealed that stage 3 patients had significantly lower physical quality of life scores compared to stage 1 patients ($p = 0.005$).
CONCLUSION: Pain in lipedema patients is not only prevalent but also associated with a neuropathic component and significantly impacts physical quality of life. Advanced disease stages are linked with lower functional capacity. Furthermore, vitamin B12 deficiency may play a role in the symptom burden. These findings highlight the importance of multidimensional assessment—including pain and quality of life—in the management of lipedema. Early diagnosis and stage-specific interventions may improve outcomes.

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Keywords: lipedema, pain, neuropathic pain, management

1

Variable	Lipedema (n=20)	Control (n=20)	p-value
Age (years), mean ± SD	38.2 ± 8.6	36.9 ± 7.3	0.432
BMI (kg/m²), mean ± SD	31.4 ± 4.7	25.8 ± 3.9	<0.01*
Vitamin D (ng/mL), median (IQR)	10.6 (9.0–11.4)	13.0 (11.0–17.2)	0.070
Vitamin B12 (pg/mL), mean ± SD	301.6 ± 120.4	384.9 ± 100.0	0.022*
Pain (VAS), median (IQR)	8.3 (6.0–9.0)	NA: Not applicable – pain scores not evaluated in control group	—
LANSS, median (IQR)	13.3 (10.0–16.0)	NA: Not applicable – pain scores not evaluated in control group	—
DN4, median (IQR)	10.7 (9.0–13.0)	NA: Not applicable – pain scores not evaluated in control group	—
SF-12 Physical, mean ± SD SF-12 Mental, mean ± SD	8.1 ± 3.2 10.3 ± 3.1	17.6 ± 2.9 13.9 ± 2.5	<0.01* 0.065

Table1: Demographic, Clinical, and Laboratory Characteristics of Participants

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OP-057

Is Lipedema Pain Neuropathic? A Study Proposal

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OBJECTIVE: Lipedema is a chronic, progressive condition characterized by the abnormal accumulation of fat in the lower extremities, often accompanied by pain, tenderness, and swelling. Despite its increasing recognition, the underlying mechanisms of pain in lipedema remain poorly understood. While the pain in lipedema has been attributed to several factors, its classification as neuropathic pain remains a subject of debate. This study aims to explore whether pain in individuals with lipedema is of a neuropathic origin, contributing to a more accurate diagnosis and targeted management strategies. The aim of the study is to determine if the pain experienced by individuals with lipedema is neuropathic in nature, using clinical assessments and neurophysiological tools to examine sensory function and nerve involvement.
MATERIAL AND METHODS: This will be a prospective observational study enrolling adult women diagnosed with lipedema. Participants will undergo detailed clinical evaluation, including pain assessment using standardized questionnaires (e.g., DN4, Leeds Assessment of Neuropathic Symptoms and Signs). Neurophysiological assessments, such as quantitative sensory testing (QST), will be performed to measure thresholds of pain perception, cold, heat, and mechanical sensitivity. Additionally, skin biopsies may be taken for histological analysis to identify signs of nerve damage or abnormal nerve fiber density. Control groups will include age-matched women with chronic pain conditions without lipedema.
RESULT: We hypothesize that a subset of lipedema patients will demonstrate neuropathic characteristics in their pain profile, including heightened sensitivity to certain stimuli and abnormal nerve function, distinguishing them from other chronic pain syndromes. These findings could provide novel insights into the pathophysiology of lipedema and support the need for tailored pain management strategies, including neuropathic pain treatments.
CONCLUSION: This study could redefine the understanding of lipedema pain, highlighting its potential neuropathic components. Identifying neuropathic pain characteristics in lipedema may lead to more effective treatment options, improving patient quality of life and providing a foundation for future research in this underexplored area.

Keywords: Lipedema, neuropathic pain, chronic pain, sensory testing, neurophysiology

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OP-058

Understanding the Diagnostic Journey and Unmet Needs in Lipedema: A Patient-Centered Perspective

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OBJECTIVE: Lipedema is a frequently misdiagnosed condition, often mistaken for obesity or other adipose tissue disorders. Patients typically endure long diagnostic delays and consult multiple healthcare professionals before receiving a correct diagnosis.
Objective of this study investigate the diagnostic journey, misdiagnoses, and satisfaction with healthcare services among women with lipedema.
MATERIAL AND METHODS: A descriptive observational study was conducted with 30 women diagnosed with lipedema. Data on age of onset, time to diagnosis, number of physicians consulted, initial misdiagnoses, and the type of professional who provided the correct diagnosis were collected via structured interview forms. Satisfaction with current healthcare services was assessed using the PSQ-18.
RESULT: Most patients experienced a significant delay (~8 years) before obtaining a correct diagnosis and consulted several physicians. Misdiagnosis was highly prevalent, especially with obesity and fibromyalgia.
General practitioners were the most common first contact, often failing to identify lipedema, which contributed to delayed diagnosis
Patients reported moderate levels of satisfaction, particularly lower scores for accessibility and financial concerns related to lipedema management.

The mean diagnostic delay was 7.9 ± 3.4 years, and participants consulted an average of 4.8 physicians before diagnosis. 83.3% of patients received at least one misdiagnosis, most commonly obesity (70%) and fibromyalgia (40%). The most frequent first consulted professionals were general practitioners (43.3%). PSQ-18 scores indicated moderate satisfaction, with the lowest scores reported in accessibility and financial domains.
CONCLUSION: Lipedema patients often face substantial delays and misdiagnoses before achieving an accurate diagnosis, leading to unnecessary treatments and increased healthcare burden. There is an urgent need to improve physician awareness and care accessibility to enhance early diagnosis and patient satisfaction.

Keywords: Lipedema, Diagnosed, Patient Satisfaction

Healthcare Satisfaction (PSQ-18 Scores)

PSQ-18 Subscale	Mean ± SD
General satisfaction	3.2 ± 0.9
Communication	3.6 ± 0.7
Time spent with doctor	3.0 ± 1.0
Accessibility & convenience	2.9 ± 1.1
Financial aspects	2.6 ± 1.2

Patients reported moderate levels of satisfaction, particularly lower scores for accessibility and financial concerns related to lipedema management.

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OP-059

Pain Phenotypes in Women with Lipedema: A Cross-Sectional Analysis of Symptom Subtypes and Clinical Associations

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OBJECTIVE: Pain is a hallmark symptom of lipedema, yet its qualitative characteristics and phenotypes remain underexplored. Identifying pain subtypes may enhance personalized treatment strategies and deepen clinical understanding of disease heterogeneity.
The aim of this study characterize the predominant pain phenotypes in women with lipedema and evaluate their association with clinical stage, BMI, and pain severity.
MATERIAL AND METHODS: A cross-sectional study was conducted with 30 women diagnosed with lipedema (Stage 1–3). Pain profiles were assessed using the Short-Form McGill Pain Questionnaire (SF-MPQ) and Visual Analog Scale (VAS). Demographic and clinical data including BMI and lipedema stage were collected. Correlations with pain severity and quality of life (QoL; via FACT-B emotional subscore) were also analyzed
RESULT: Tenderness and heavy-type pain are the most common phenotypes among lipedema patients.
Burning and stabbing pain types were associated with higher pain intensity and BMI ($p<0.05$)
Burning-type pain was more common in Stage 2 lipedema, whereas stabbing pain was more frequent in advanced stages
Higher pain intensity was significantly correlated with poorer emotional well-being ($p=0.034$).
CONCLUSION: Pain in lipedema is not homogeneous. Tenderness, dull, and burning pain are most prevalent, and burning/stabbing types are associated with higher BMI and pain intensity. Moreover, higher pain levels negatively impact emotional quality of life. Phenotype-based symptom evaluation may provide a better framework for individualized therapeutic planning in lipedema.

Keywords: Lipedema, Quality of life, Pain

Average VAS Score and BMI by Dominant Pain Phenotype

Dominant Pain Type	Mean VAS Score (± SD)	BMI (± SD	p-value (VAS)	p-value (BMI)
Burning	7.4 ± 1.2	29.5 ± 2.1	0.008*	0.043*
Dull/Heavy	6.2 ± 1.1	27.8 ± 1.7	—	—
Stabbing	6.9 ± 1.3	30.1 ± 2.4	0.049*	0.031*

Burning and stabbing pain types were associated with higher pain intensity and BMI ($p<0.05$).

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Burning and stabbing pain types were associated with higher pain intensity and BMI ($p<0.05$).

OP-060

Understanding Lipedema Patient Preferences: A Guide to Personalized Treatment Planning

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OBJECTIVE: To explore the treatment preferences of women with lipedema and to investigate how clinical characteristics such as disease stage and body mass index (BMI) influence willingness to adopt conservative and invasive therapeutic options.
MATERIAL AND METHODS: Thirty women diagnosed with lipedema were included. Participants completed a structured questionnaire assessing willingness to try different therapies on a 5-point Likert scale (0 = not willing, 4 = very willing). Treatments included compression garments, exercise, liposuction, diet, manual lymphatic drainage (MLD), and pharmacologic options. Clinical and demographic data (age, BMI, lipedema stage) were collected. Group comparisons were made using one-way ANOVA and Pearson correlations.
RESULT: Patients were most open to lifestyle and conservative interventions (exercise, MLD, diet), whereas more invasive or pharmacological treatments were met with lower enthusiasm
Advanced-stage patients showed significantly greater willingness toward liposuction, suggesting disease burden influences receptiveness to invasive methods
Higher BMI was significantly associated with greater willingness to use compression garments and undergo liposuction
CONCLUSION: Lipedema patients primarily prefer conservative and non-invasive interventions. However, higher disease stage and BMI are associated with increased openness to surgical options such as liposuction. Understanding patient attitudes is critical for individualized treatment planning and adherence improvement.

Keywords: Lipedema, Treatment preferences, Personalized therapy

Mean Willingness Scores for Each Treatment

Treatment Modality	Mean Score ± SD
Exercise	3.6 ± 0.5
Manual Lymphatic Drainage	3.4 ± 0.7
Diet	3.2 ± 0.6
Compression Garments	3.0 ± 1.1
Liposuction	2.3 ± 1.4
Pharmacological Treatment	1.9 ± 1.2

Patients were most open to lifestyle and conservative interventions (exercise, MLD, diet), whereas more invasive or pharmacological treatments were met with lower enthusiasm.

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OP-061

The Effect of Holistic Treatment on Lower Extremity Skin Stiffness in Lipedema: A Case Series

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OBJECTIVE: This study was designed to investigate the effectiveness of a holistic treatment approach—consisting of Low-Intensity Extracorporeal Shock Wave Therapy (LiESWT), manual lymphatic drainage, intermittent pneumatic compression, and lifestyle recommendations—on lower extremity skin stiffness in patients with lipedema.
CASE: A total of 5 female patients diagnosed with lipedema (Age: 46±12.46 years, Weight: 76±13.09 kg, Body Mass Index: 28.04±3.31 kg/m²) were included in the study. The patients underwent a total of 10 sessions—administered twice weekly—consisting of LiESWT, manual lymphatic drainage, and intermittent pneumatic compression therapy applied to the lower extremities. LiESWT was delivered using the Modus ESWT® Focused Shockwave Therapy device (İnceler Medikal, Ankara), with 6000 impulses at a rate of 4 impulses per second applied along the extremities—on the anterior region in one session and the posterior region in the next. An average energy density of 0.23 mJ/mm² was used for the thigh and 0.18 mJ/mm² for the lower leg. This was followed by approximately 30 minutes of manual lymphatic drainage and 20 minutes of intermittent pneumatic compression. At the start of the treatment, patients were provided with lifestyle recommendations suitable for managing lipedema. To evaluate the effect of the treatment on lower extremity skin stiffness, measurements were taken using a SkinFibroMeter on four designated points on both the anterior and posterior surfaces of the lower extremities, prior to treatment and after the 10 sessions.
RESULT: As a result of the study, a significant reduction in skin stiffness was observed at all measurement points following the treatment ($p<0.05$). The measurement results are presented in Table 1.

Keywords: Lipedema, Low-Intensity Extracorporeal Shock Wave Therapy, Manual Lymphatic Drainage, Skin Stiffness, Modus ESWT® Focused Shockwave Therapy

Skin Hardness Assessment in Patients Over Time (Newton)

	Pretreatment Mean±SD	Post-Treatment Mean±SD	p Value
A-Right 1st Point	0.20±0.05	0.15±0.04	<0.05
A-Left 1st Point	0.24±0.05	0.20±0.04	<0.05
A-Right 2nd Point	0.11±0.03	0.08±0.02	<0.05
A-Left 2nd Point	0.14±0.06	0.12±0.05	<0.05
A-Right 3rd Point	0.05±0.02	0.03±0.01	<0.05
A-Left 3rd Point	0.06±0.00	0.04±0.00	<0.05
A-Right 4th Point	0.06±0.02	0.04±0.01	<0.05
A-Left 4th Point	0.07±0.00	0.06±0.01	<0.05
P-Right 1st Point	0.12±0.02	0.07±0.02	<0.05
P-Left 1st Point	0.10±0.03	0.07±0.02	<0.05
P-Right 2nd Point	0.11±0.02	0.07±0.03	<0.05
P-Left 2nd Point	0.10±0.02	0.08±0.02	<0.05
P-Right 3rd Point	0.07±0.02	0.04±0.01	<0.05
P-Left 3rd Point	0.06±0.02	0.04±0.02	<0.05
P-Right 4th Point	0.07±0.02	0.05±0.02	<0.05
P-Left 4th Point	0.06±0.01	0.04±0.01	<0.05

A: Anterolateral, P: Posterolateral, 1st Point: 10 cm proximal to the lateral malleolus, 2nd Point: 10 cm distal to the lower border of the patella, 3rd Point: 10 cm proximal to the upper border of the patella, 4th Point: 20 cm proximal to the upper border of the patella

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OP-062

Central Sensitization and Neuropathic Pain in Lipedema: Beyond Swelling

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OBJECTIVE: Lipedema is a chronic connective tissue disorder characterized by symmetrical enlargement of
the lower extremities, pain, and tenderness, often accompanied by easy bruising. Pain in lipedema is frequently disproportionate to the degree of swelling and may present with neuropathic features. Neuropathic pain and central sensitization are common in chronic pain syndromes such as fibromyalgia, restless legs syndrome, and temporomandibular disorders, suggesting overlapping mechanisms. However, the prevalence and severity of neuropathic pain and central sensitization in lipedema, as well as their psychosocial associations, remain underexplored. This study aimed to compare neuropathic pain characteristics, central sensitization, and psychosocial factors between women with lipedema and body mass index (BMI)-matched women with lipohypertrophy or obesity.
MATERIAL AND METHODS: In this cross-sectional study, 54 women with lipedema and 54 BMI-matched women with
lipohypertrophy/obesity were recruited. Pain intensity was assessed using the Visual Analogue Scale (VAS), neuropathic pain with the painDETECT questionnaire and Leeds Assessment of Neuropathic Symptoms and Signs (LANSS), central sensitization with the Central Sensitization Inventory (CSI), psychological status with the Hospital Anxiety and Depression Scale (HADS), and cognitive-affective factors with the Pain Catastrophizing Scale (PCS). Group comparisons and correlation analyses were performed.
RESULT: The mean age was 43.46 ± 9.8 years in the lipedema group and 42.12 ± 10.2 years in controls.
Neuropathic pain prevalence was 41% in lipedema vs. 15% in controls ($p < 0.001$). VAS scores were higher in lipedema (6.4 ± 1.5 vs. 4.1 ± 1.7, $p < 0.001$). PainDETECT scores averaged 18.7 ± 6.3 vs. 12.1 ± 5.8 ($p < 0.001$), LANSS scores 11.9 ± 5.4 vs. 7.2 ± 4.9 ($p < 0.001$), and CSI scores 45.8 ± 12.7 vs. 34.2 ± 11.4 ($p < 0.001$). In lipedema, painDETECT, LANSS, and CSI scores correlated positively with VAS ($r = 0.62$, $r = 0.58$, $r = 0.55$; all $p < 0.001$), and with HADS and PCS scores (all $p < 0.01$). No such correlations were found in controls.
CONCLUSION: Lipedema pain frequently exhibits neuropathic features, is associated with higher central
sensitization, and correlates with greater psychological distress and pain catastrophizing compared to BMI-matched controls. These findings highlight the importance of evaluating neuropathic and central sensitization components, as well as psychosocial factors, in the management of lipedema-related pain.

Keywords: Lipedema, Neuropathic Pain, Central Sensitization

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OP-063

Pain Beyond Swelling: Neuropathic Features of Lipedema Compared to Lymphedema

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OBJECTIVE: To compare pain characteristics in patients with lipedema and bilateral lower extremity lymphedema, and to determine whether lipedema-related pain demonstrates a neuropathic pattern.
MATERIAL AND METHODS: In this cross-sectional study, clinically diagnosed female patients with lipedema or bilateral lower extremity lymphedema were assessed using the Visual Analogue Scale (VAS) for pain intensity, the PainDETECT questionnaire for pain pattern, the Leeds Assessment of Neuropathic Symptoms and Signs (LANSS) for neuropathic pain, and the Beck Depression Inventory (BDI) for psychological status. The two groups were compared for neuropathic pain prevalence, pain severity, and psychosocial variables.
RESULT: Fifty-four patients with lipedema (mean age 43.46 years) and 36 patients with bilateral lower extremity lymphedema (mean age 51.21 years) were included. Numbness and burning were more prevalent in the lipedema group, whereas other symptoms showed no significant differences between groups. VAS, PainDETECT, and LANSS scores were higher in the lipedema group, and both PainDETECT and LANSS scores were positively correlated with VAS scores. In lipedema patients, LANSS and PainDETECT scores were also correlated with BDI scores, while no such correlations were found in the lymphedema group.
CONCLUSION: Pain in lipedema commonly exhibits neuropathic features and is associated with higher pain intensity and greater psychological distress compared to lymphedema. These findings underscore the importance of evaluating neuropathic pain components and psychological factors in the comprehensive management of lipedema.

Keywords: Lipedema, neuropathic pain, edema

OP-064

Relationship Between Handgrip Strength, Quadriceps Muscle Thickness, Quality of Life and Mobility in Patients with Lipedema

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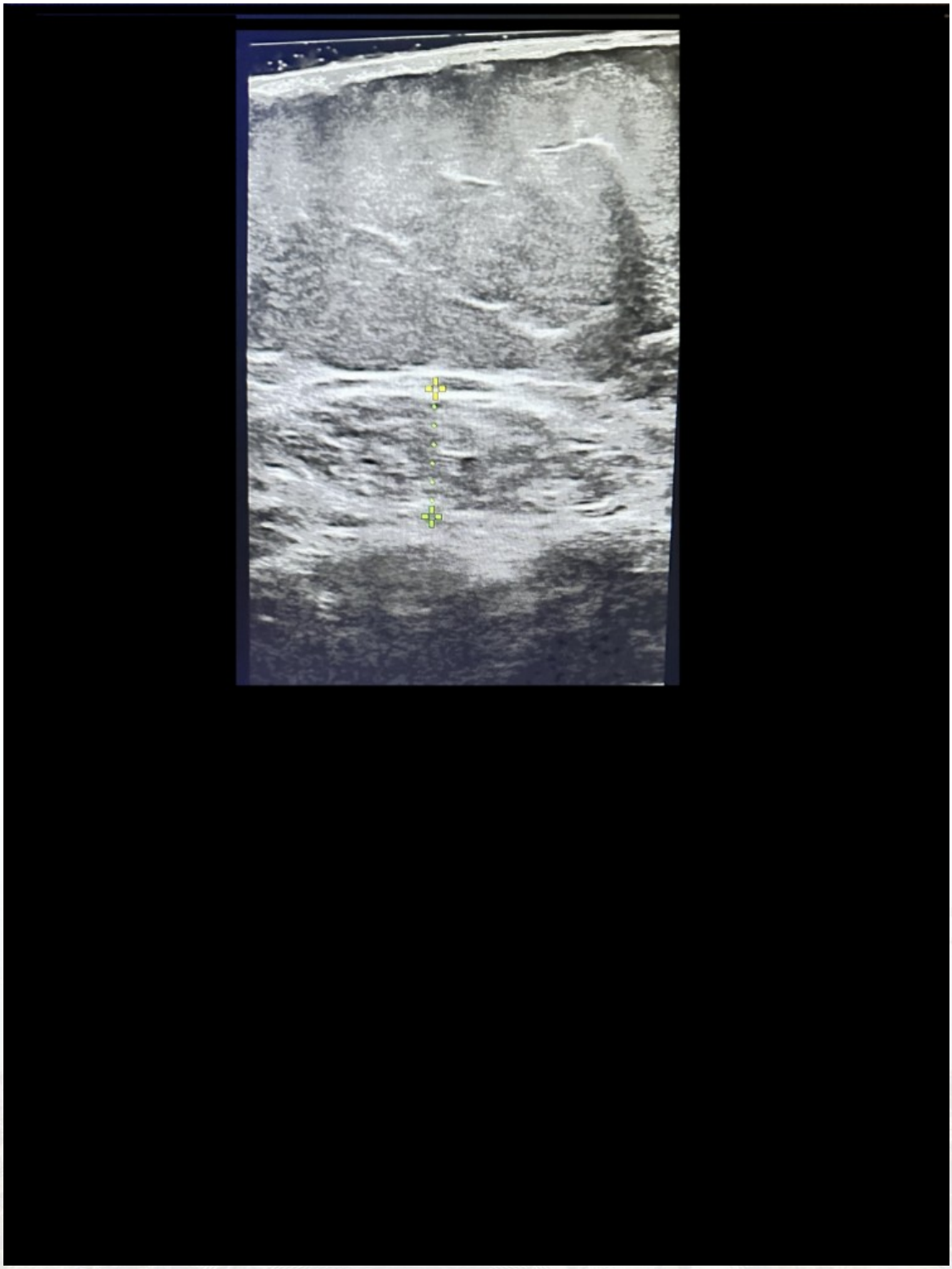
OBJECTIVE: Lipedema is a disease affecting women, characterized by bilateral abnormal fat accumulation in the upper and/or lower extremities. It typically begins during periods of hormonal change such as puberty, pregnancy, and menopause. Numerous studies in the literature have shown that lipedema is associated with poorer quality of life, psychosocial distress, and a number of medical comorbidities and complications. Untreated lipedema can progress, leading to gait problems, immobility, and a host of other health problems related to immobility. Handgrip strength is one of the most accepted methods in the literature for determining generalized muscle weakness resulting from immobilization.
Handgrip strength provides an isometric strength measurement that not only allows the detection of upper extremity muscle weakness but also provides an indicator of overall strength by reflecting the strength of the lower extremities.
Our aim in this study was to investigate the relationship between grip strength, quadriceps muscle thickness, quality of life and mobility in patients with lipedema.
MATERIAL AND METHODS: The study included 113 patients with stage 1, 2, 3, type 2, and 3 lipedema (which may also involve the arm). All patients were female and had the right dominant hand. Grip strength for the dominant side was recorded using a Jamar dynamometer. The dominant rectus femoris muscle thickness was measured using a 5-12 MHz transducer ultrasound, as described in previous studies. All patients were assessed for quality of life using the EuroQuality 5 Dimensions (EQ-5D) and for mobilization using the Lower Extremity Functionality Scale(LEFS). Patients were divided into two groups based on literature cut-off values for grip strength. The groups were evaluated for rectus femoris, quality of life, and mobility.
RESULT: There were no significant differences between the two groups in terms of age, BMI, or waist-to-height ratio ($p>0.05$). There were significant differences between the group with higher and lower handgrip strength in terms of quadriceps thickness, EQ-5D score, and LEFS score $p<0.05$).
As a result of the evaluation of risk factors affecting hand grip strength using logistic regression, it was observed that LEFS (OR 1.030) and rectus femoris thickness (OR 1.113) were related. Low LEFS and low rectus femoris thickness increase the risk of decreased hand grip strength.
CONCLUSION: A relationship was found between hand grip strength and quality of life and mobility. Our study concluded that ultrasonography could be developed as an alternative method for determining total muscle strength due to its ease of use. It could also be used to assess and monitor muscle strength in clinics where handgrip strength measurements are not available.

Keywords: Lipedema, handgrip strength, rectus femoris muscle thickness, quality of life, mobility

Measurement of Rectus Femoris Muscle



Evaluation of Hand Grip Strength according to age, BMI and WHtR and Evaluation of quadriceps thickness, mobility and quality of life according to hand grip strength

	Handgrip Strength	Handgrip Strength	
	≥16	<16	p
	Median±SD	Median±SD	
Age	45.85±11.47	49.37±13.58	0.141
BMI	30.87±5.69	32.24±7.25	0.269
WHtR	0.62±0.07	0.65±0.12	0.095
	Handgrip Strength	Handgrip Strength	
	≥16	<16	
	Median±SD	Median±SD	
Rectus Femoris Thickness	16.39±3.57	14.64±3.65	+0.012*
EQ-5D index(median)	0.64±0.20 (0.69)	0.52±0.25 (0.58)	0.002*
EQ-5D Vas score (median)	63.05±19.18 (70)	55.34±21.17 (50)	0.032*
LEFS (median)	54.40±16.12 (56.5)	43.19±19.70 (46)	0.002*

*+Student t test Mann Whitney U Test *p<0.05. WHtR: Waist-height ratio*

OP-065

Psychological Impact of Lipedema on Italian Women: A Study

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OBJECTIVE: Lipedema is a connective tissue disorder that predominantly affects women, characterized by the abnormal accumulation of adipose tissue in the lower limbs, and sometimes the upper limbs, resulting in disproportionate body shape. Chronic pain in the affected areas is a feature. While recent research has focused on the somatic aspects of the disease, the psychological dimensions remain underexplored. The main aim of this study is to assess mental health, psychological well-being, and quality of life in Italian women with lipedema, compared to healthy controls.
MATERIAL AND METHODS: A total of 109 women participated in the study, divided into two groups: 77 diagnosed with lipedema and 32 without chronic illnesses. Participants completed an online Google Form that included demographic, medical, and nutritional data, as well as a set of validated psychological questionnaires. Lipedema symptoms were assessed using the Visual Analog Scale (VAS), the Lipedema Symptom Severity scale (LSS), and the Lower Extremity Functional Scale (LEFS). Mental health was evaluated using the Patient Health Questionnaire-9 (PHQ-9) and the Eating Attitude Test (EAT-26). Psychological distress was measured using the Medically Unexplained Symptoms scale (MUS), the Perceived Stress Scale (PSS), and three ad hoc additional questionnaires investigating adverse life events, lifetime mental disorders, and body shape distress. Well-being and quality of life were assessed using the WHO-5 Well-Being Index, the Satisfaction With Life Scale (SWLS), and the Acceptance and Action Questionnaire-II (AAQ-II).
RESULT: The sample of women with lipedema, compared to the control group, showed statistically significant differences in the following variables: PHQ-9 Total ($p < 0.001$), EAT-26 Total ($p < 0.001$), lifetime mental disorders ($p < 0.001$), WHO-5 ($p < 0.001$), SWLS ($p < 0.001$), AAQ-II ($p < 0.001$), body shape distress item ($p < 0.001$), and MUS ($p < 0.001$). Significant Pearson correlations emerged between: • VAS and PHQ-9 ($r = 0.508^*$, $p < 0.001$), EAT-26 ($r = 0.333$, $p = 0.003$), and lifetime mental disorders ($r = 0.312^*$, $p = 0.006$); • MUS and PHQ-9 ($r = 0.734^*$, $p < 0.001$), EAT-26 ($r = 0.414^*$, $p < 0.001$), and lifetime mental disorders ($r = 0.002$); • Body shape item and PHQ-9 ($r = -0.507^*$, $p < 0.001$), EAT-26 ($r = -0.474$, $p < 0.001$), and lifetime mental disorders ($r = -0.280$, $p = 0.014$); • Body exposure item and PHQ-9 ($r = -0.455^*$, $p < 0.001$), EAT-26 ($r = -0.442$, $p < 0.001$), and lifetime mental disorders ($r = -0.280$, $p = 0.002$). Further correlations involving VAS included: MUS ($r = 0.467^*$, $p < 0.001$), PSS ($r = 0.430$, $p < 0.001$), WHO-5 ($r = -0.427$, $p < 0.001$), SWLS ($r = -0.397$, $p < 0.001$), and AAQ-II ($r = 0.370^*$, $p < 0.001$). Multiple linear regression identified VAS ($\beta = 0.343$, $p = 0.05$) and MUS ($\beta = 0.634$, $p < 0.001$) as significant predictors of PHQ-9 scores, with MUS being the predominant factor. Multiple linear regression identified also PHQ-9 scores ($\beta = 0.860$, $p = 0.003$) and the item “physical appearance” scores ($\beta = -4.058$, $p = 0.007$) as significant predictors of EAT-26 score.
CONCLUSION: Women with lipedema exhibit a more critical psychological profile compared to healthy women: greater emotional suffering, body image distress, higher levels of stress, and lower quality of life. Chronic pain appears to play a significant role in diminishing well-being and mood. Findings suggest that MUS symptoms and pain are predictors of depressive mood, while depression is the key predictor of disordered eating behaviors. These findings underscore the need for further

psychological research on lipedema and the importance of a multidisciplinary approach to care that includes attention to patients' emotional and psychological well-being.

Keywords: lipedema, psychological well-being, stress, pain, quality of life

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OP-066

Traditional or Innovative? Comparison of ESWT and CDT Treatments in Lipedema

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OBJECTIVE: The aim of this study was to compare the efficacy of Extracorporeal Shock Wave Therapy (ESWT) and Complex Decongestive Therapy (CDT) in lipedema patients.
MATERIAL AND METHODS: Thirty-three lipedema patients admitted to Giresun University Giresun Training and Research Hospital were included in the study. Patients were randomly assigned to the groups by envelope method; demographic and clinical data were recorded. All patients received three sessions of treatment per week for two weeks. 11 patients received ESWT only, 11 patients received CDT only, and 11 patients received ESWT and then CDT in the same session. Both lower extremity volume measurements, Body-Mass Index (BMI), Visual Analog Scale (VAS), algometric measurements, Nottingham Health Profile (NHP) quality of life scale, Dual Energy X-ray Absorptiometry (DXA) measurements (body composition, android and gynoid fat mass, total fat mass) were evaluated twice in total, just before the start of treatment and in the second week after treatment.
RESULT: Pain (p=0.003, p=0.003, p=0.003, respectively), lower extremity right/left volume measurements (p=0.04, p=0.013, p=0.042 / p=0.003, p=0.021 p=0.041 respectively) algometric measurements on right/left (p=0.005, p=0.016, p=0.003/p=0.07, p=0.50, p=0.003 respectively) and general quality of life (respectively p=0.003, p=0.003, p=0.003) showed significant improvement, but they were not superior to each other in ESWT, CDT and ESWT+CDT treatments (p>0.05). There was no significant difference in total (p=1.000) and lower extremity fat mass (p=0.213 / p=0.929) in the group receiving CDT treatment. A statistically significant improvement was detected in the ESWT (p=0.003, p=0.003/p=0.004) and ESWT+CDT (p=0.003, p=0.004/p=0.008) group. However, due to the low level of this improvement, no significant advantage was detected in ESWT and ESWT+CDT treatments compared to CDT treatment (p>0.05).
CONCLUSION: All treatments are safe methods that can be applied in the treatment of lipedema. ESWT treatment, whose efficacy has been demonstrated in many studies including our study, is recommended to be preferred over other methods because it is inexpensive, easily accessible and easy to apply.

Keywords: Lipedema, Pain, ESWT, CDT

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OP-068

Effect of Combined Therapy on Lower Extremity Functionality and Quality of Life in Lipedema: A Case Series

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OBJECTIVE: This study was planned to investigate the effectiveness of a combined treatment consisting of Low Intensity Extracorporeal Shock Wave Therapy (LiESWT), manual lymph drainage, intermittent pneumatic compression application and lifestyle recommendations on lower extremity functionality and quality of life in lipedema patients.
CASE: A total of 16 female patients diagnosed with lipedema (Age: 45.18±10.67 years, Body Mass Index: 28.21±5.16 kg/m²) were included in the study. The patients received a total of 10 sessions of LiESWT, manual lymphatic drainage, and intermittent pneumatic compression, applied to the lower extremities twice a week. LiESWT was performed using the Modus ESWT® Focused Shockwave Therapy device (İnceler Medikal, Ankara), delivering 6000 impulses at a rate of 4 impulses per second along the extremities—anterior regions during one session and posterior regions during the next. The average energy density used was 0.23 mJ/mm² for the thigh and 0.18 mJ/mm² for the lower leg. This was followed by approximately 30 minutes of manual lymphatic drainage and then 20 minutes of intermittent pneumatic compression therapy. At the beginning of the treatment, patients were advised on lifestyle modifications appropriate for lipedema. To assess the impact of the treatment on lower extremity functionality and quality of life, the Lower Extremity Functional Scale and the Lymphedema Functionality, Disability, and Quality of Life Questionnaire were administered before the treatment, as well as at the end of the 5th and 10th sessions.
RESULT: As a result of the study, it was observed that lower extremity functionality and quality of life in patients with lipedema improved over time ($p<0.001$). The questionnaire scores are presented in Table 1.

Keywords: Lipedema, Low-Intensity Extracorporeal Shock Wave Therapy, Lower Extremity Functionality, Quality of Life, Modus ESWT® Focused Shockwave Therapy

Lower Extremity Functional Scale and Lymphedema Functionality, Disability, and Quality of Life Questionnaire Scores Over Time

	Before Treatment	Session 5	Session 10	p Value
Lower Extremity Functional Scale	49.93±15.35	61.12±12.71	65.93±9.96	<0,001
Lymphedema Functionality, Disability, and Quality of Life Questionnaire Scores	3.86±1.6	2.93±1.53	2.32±1.54	<0,001

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OP-069

From Delayed Diagnosis to Treatment Preferences: A Comprehensive Patient-Centered Analysis in Lipedema

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OBJECTIVE: To provide a comprehensive overview of the lipedema patient experience by combining data on diagnostic journey, treatment expectations, and willingness to adopt different therapies, and to explore the influence of clinical characteristics (BMI, stage, age) on these factors.
MATERIAL AND METHODS: A descriptive cross-sectional study was conducted among 30 women clinically diagnosed with lipedema to explore diagnostic pathways, treatment expectations, and therapy preferences. Data collection included age at symptom onset, time to diagnosis, number and type of physicians consulted, misdiagnoses, and first healthcare professional visited. Satisfaction with healthcare services was measured using the PSQ-18. Participants rated the importance of six treatment outcomes—pain relief, swelling reduction, aesthetic improvement, ease of movement, participation in daily life, and social confidence—on a 0–4 Likert scale. Willingness to try six treatment modalities (compression garments, exercise, liposuction, diet, manual lymphatic drainage, and pharmacological treatment) was also evaluated using a 0–4 Likert scale. Body mass index and lipedema stage were recorded. Statistical analyses included independent t-tests, one-way ANOVA, and Pearson correlations to assess associations between clinical variables, treatment expectations, and therapy preferences.
RESULT: RESULTS: Participants experienced a substantial diagnostic delay, with a mean of 7.9 ± 3.4 years between symptom onset (24.6 ± 6.3 years) and official diagnosis (32.5 ± 6.8 years). On average, patients consulted 4.8 ± 2.1 physicians before diagnosis, and 83.3% reported at least one misdiagnosis, most frequently obesity (70%), fibromyalgia (40%), and cellulite (26.7%). Cardiovascular surgeons were the most common first point of contact (43.3%), followed by physiatrists (20%) and endocrinologists (16.7%).

Overall healthcare satisfaction was moderate (general satisfaction = 3.2 ± 0.9), with highest ratings in communication (3.6 ± 0.7) and lowest in financial aspects (2.6 ± 1.2) and accessibility (2.9 ± 1.1). Treatment expectations were highest for pain relief (3.8 ± 0.4) and aesthetic improvement (3.7 ± 0.5), followed by swelling reduction (3.5 ± 0.6) and ease of movement (3.4 ± 0.7). Early-stage (1–2) and lower-BMI patients placed significantly greater emphasis on aesthetic outcomes compared with stage 3 ($p = 0.043$) and higher-BMI individuals ($p = 0.030$).

Conservative treatments were most preferred, with exercise (3.6 ± 0.5), manual lymphatic drainage (3.4 ± 0.7), and diet (3.2 ± 0.6) receiving the highest willingness scores. Compression garments (3.0 ± 1.1) and liposuction (2.3 ± 1.4) were less favored overall, although stage 3 patients expressed greater willingness to undergo liposuction compared with early-stage patients ($p = 0.042$). Higher BMI correlated positively with willingness to use compression garments ($r = 0.412$, $p = 0.031$) and undergo liposuction ($r = 0.369$, $p = 0.049$).

These findings indicate that while patients prioritize symptom relief and aesthetic outcomes, preferences vary by disease stage and BMI, with conservative modalities being the most acceptable treatment approaches overall.
CONCLUSION: Lipedema patients face substantial diagnostic delays and misdiagnoses, often starting their journey with specialists who may not recognize the condition. Treatment expectations emphasize both symptom relief and aesthetic improvement, with clear subgroup differences by BMI and disease stage. While conservative therapies are preferred, advanced-stage and higher-BMI patients are more receptive to invasive interventions. These insights highlight the need for early diagnosis, multidisciplinary care, and personalized treatment planning that aligns with patient priorities.

Keywords: lipedema, patient preferences, healthcare access

Table 1. Diagnostic Journey Characteristics

Variable	Mean ± SD / n (%)
Age at first symptoms	24.6 ± 6.3 years
Age at official diagnosis	32.5 ± 6.8 years
Time to diagnosis (delay)	7.9 ± 3.4 years
Number of doctors before diagnosis	4.8 ± 2.1
≥1 misdiagnosis received	25 (83.3%)
Most common misdiagnoses	Obesity: 21 (70%), Fibromyalgia: 12 (40%), Cellulite: 8 (26.7%)

Nearly all patients faced a significant diagnostic delay (~8 years) and consulted multiple physicians. Misdiagnoses, especially obesity and fibromyalgia, were frequent.

OP-070

Evaluation of Treatment Outcomes in Women Diagnosed with Lipedema: Real-World Data

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OBJECTIVE: To evaluate the effectiveness of complete decongestive therapy (CDT) combined with exercise and dietary counseling in reducing limb volume and body mass index (BMI) in women diagnosed with lipedema under real-world clinical conditions, compared to exercise and dietary counseling alone.
MATERIAL AND METHODS: This single-center, retrospective case-control study included 36 women diagnosed with lipedema between 2018 and 2024. Patients were allocated to two groups: the CDT group (n=25), receiving complete decongestive therapy (CDT) plus diet, exercise, and self-manual lymphatic drainage (self-MLD), and the control group (n=11), receiving the same interventions without CDT.
Demographic, clinical, and anthropometric data—including limb volumes calculated from circumference measurements using specialized software—were collected from medical records. CDT comprised an intensive phase (patient education, self-MLD, 23-hour daily compression bandaging, exercise, skin care) and a maintenance phase (compression garments, continued exercise, diet, and MLD). All patients received dietary counseling, low-impact exercise guidance, and educational materials, with weekly monitoring until limb volume reduction plateaued.
RESULT: Among 36 women with lipedema, Type 3 was most common (66.7%) and 38.9% had Stage 4 disease. The CDT group (n=25) was older than controls (n=11) (58.4 ± 11.0 vs. 49.5 ± 11.3 years, p=0.017) and more frequently used compression garments (64% vs. 0%, p<0.001). Fibrosis was significantly associated with advanced stage (p=0.00017).

In the CDT group, body weight, BMI, and both limb volumes decreased significantly (p<0.001), with mean reductions of 7.13% (right) and 6.33% (left). BMI dropped from 38.0 ± 7.1 to 36.7 ± 6.8 kg/m². In controls, weight and BMI decreased modestly (p=0.033), but limb volume changes were not significant. Mean treatment duration was shorter in the CDT group (3.2 ± 1.0 weeks) compared to controls (16.1 ± 11.6 weeks).
CONCLUSION: CDT offers an effective treatment option for patients with lipedema. These findings

provide a foundation for future, large-scale studies aimed at further refining and optimizing treatment approaches for this challenging condition

Keywords: Adipose tissue, Lymphedema, Lymphatic disease, Lower Limb, Edema

Within-Group Changes Analysis

Table 3: Within-Group Changes Analysis

Variables	Grup 1			Group 2 (Control)			Group p-Value
	Before	After	p-Value	Before	After	p-Value	
Body Weight (kg)	91,91 (±16,82)	88,63 (±17,19)	**<0.001**	96,37 (±19,12)	91,78 (±20,95)	**0.033**	0.225
BMI (kg/m^2)	38,03 (±7,08)	36,69 (±7,25)	**<0.001**	39,23 (±8,68)	37,39 (±9,43)	**0.033**	0.236
Right Lower Limb Volume (mL)	13920,00 (±3054,29)	12927,28 (±2774,45)	**<0.001**	13539,72 (±3419,18)	12765,09 (±3774,97)	0.091	0.260
Left Lower Limb Volume (mL)	13877,08 (±3003,23)	12998,75 (±2858,25)	**<0.001**	13830,45 (±3462,79)	12938,27 (±3934,04)	0.050	0.483

Within-Group Changes Analysis

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OP-071

Functional validation of novel TIE1 variants as causes for primary lymphedema

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OBJECTIVE: Primary lymphedema (PL) is a chronic, debilitating disease, characterized by swelling, most commonly of the limbs, due to lymph accumulation for which there is no cure. We recently reported the molecular impact of three loss-of-function variants in the tyrosine kinase receptor TIE1 causing late onset forms of lymphedema, both in human patients and mouse models [1]. This established TIE1 as a new PL-causing gene. Stratification of the genetically and clinically heterogeneous PL patients is the foundation for developing novel therapeutic approaches.
MATERIAL AND METHODS: We screened our cohort of >900 PL index patients for possible pathogenic variants in TIE1, using our in-house developed Highlander software. We selected variants predicted to be damaging by at least 5 out of 20 algorithms and at less than 0.3% in control population databases. For the variants of unknown significance (VUS), we also explored whether any would be predicted to alter splicing, and assessed stability and integrity of mRNAs extracted from patients cells or by using a minigene assay. We mutagenized missense variants in TIE1 expression constructs, and studied both global expression and membrane localization of TIE1 in transfected cells.
RESULT: We identified 22 new VUSs, including nine susceptible to alter splicing. RNA stability was assessed for six variants in patient cells, and to overcome difficulty in obtaining RNA from patients, the exons and surrounding introns of seven variants were cloned in a minigene vector. Preliminary results show that one of the VUSs leads to the loss of a donor site resulting in splicing alteration. Among the 19 mutagenized missense variants, two had significantly reduced global TIE1 expression level compared to WT, whereas two showed a significant increase. Flow cytometry performed for 12 variants demonstrated significantly reduced cell surface expression for one, despite a global expression level comparable to WT. This suggests the latter to be sequestrated inside the cells.
CONCLUSION: Prior to functional validation of missense variants, it is important to explore potential RNA stability alterations, either from patient-derived cells or using a minigene assay. It is essential to characterize the predicted VUSs in vitro to assess whether they have a damaging impact or not. Among the patients carrying the 22 VUSs, the age at onset of PL was at older age than observed for other PL-associated genes. This makes us hypothesize that the TIE1 variants rather predispose to PL and need a concomitant genetic or environmental factor to induce PL, rather than being a Mendelian monogenic cause. Functional studies are needed to clarify this. This is also an essential step towards establishment of molecular therapies for PL, a so far neglected disease.

Keywords: gene, mutation, primary lymphedema

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OP-072

Assessment of gene–disease associations and recommendations for genetic testing for somatic variants in vascular anomalies by VASCERN-VASCA

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OBJECTIVE: Vascular and lymphatic anomalies caused by somatic (postzygotic) variants are clinically and genetically heterogeneous diseases with overlapping or distinct entities. The genetic knowledge in this field is rapidly growing, and genetic testing is now part of the diagnostic workup alongside the clinical, radiological and histopathological data. Nonetheless, access to genetic testing is still limited, and there is significant heterogeneity across the approaches used by the diagnostic laboratories, with direct consequences on test sensitivity and accuracy. The clinical utility of genetic testing is expected to increase progressively with improved theragnostics, which will be based on information about the efficacy and safety of the emerging drugs and future molecules. The aim of this study was to make recommendations for optimising and guiding the diagnostic genetic testing for somatic variants in patients with vascular malformations.
MATERIAL AND METHODS: Physicians and lab specialists from 11 multidisciplinary European centres for vascular anomalies reviewed the genes identified to date as being involved in non-hereditary vascular malformations and evaluated gene–disease associations. A core list of 24 genes were selected based on the current practices in the participating laboratories, the ISSVA classification and the literature.
RESULT: The group made recommendations about the technical aspects for identification of low-level mosaicism and variant interpretation. In total 45 gene–phenotype associations were evaluated: 16 were considered definitive, 16 strong, 3 moderate, 7 limited and 3 with no evidence.
CONCLUSION: This work provides a detailed evidence-based view of the gene–disease associations in the field of vascular malformations caused by somatic variants, including lymphatic malformations, Klippel-Trenaunay syndrome and complex lymphatic anomalies. Knowing both the gene–phenotype relationships and the strength of the associations greatly help laboratories in data interpretation and eventually in the clinical diagnosis. This study reflects the state of knowledge in the literature as of mid-2023 and will be regularly updated on the VASCERN-VASCA website [1].

1. VASCERN-VASCA. Available from: https://vascern.eu/groupe/vascular-anomalies/.

Keywords: ERN, gene curation, genetic testing, mosaic, precision medicine, postzygotic

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OP-073

Evaluation of the Reliability, Usefulness, and Quality of ChatGPT's Responses to Common Questions About Lipedema

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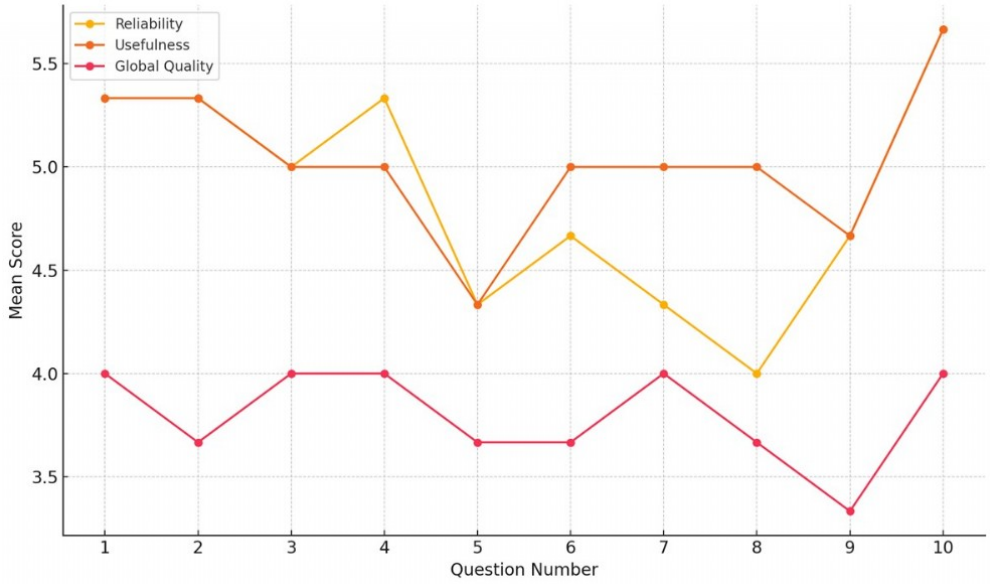
OBJECTIVE: Lipedema is a chronic disorder marked by disproportionate, painful subcutaneous fat deposition predominantly affecting women, yet remains underrecognized. As artificial intelligence (AI)–driven chatbots gain traction as health-information resources, their reliability in delivering accurate, clinically relevant guidance requires rigorous evaluation. To assess the reliability, usefulness, and overall quality of ChatGPT-4.0 responses to lipedema-related queries commonly posed by the public.
MATERIAL AND METHODS: Twenty-five lipedema-related search terms (2004–2025) were identified via Google Trends. Three physical medicine and rehabilitation specialists selected ten representative questions spanning disease definition, symptomatology, etiopathogenesis, and management (including conservative measures, dietary interventions, and liposuction). On 3 May 2025, each question was posed to ChatGPT-4.0 in an independent session. Three raters scored responses on three domains—reliability, usefulness, and global presentation quality—using a 7-point Likert scale. Inter-rater reliability was determined via intraclass correlation coefficient (ICC) employing a two-way random-effects model with absolute agreement. To evaluate intra-session consistency, three questions were re-queried on separate occasions; negligible content variation obviated exclusion.
RESULT: Mean reliability scores ranged from 4.3 to 6.0, with an overall mean ± SD of 4.87 ± 0.55. Usefulness scores averaged 5.03 ± 0.37, while global quality scores averaged 3.80 ± 0.23. Inter-rater agreement was good for reliability (ICC = 0.727; 95% CI: 0.265–0.923) and moderate for usefulness (ICC = 0.615; 95% CI: 0.017–0.890), but poor for global quality (ICC = –0.071; 95% CI: –2.466–0.720), reflecting variable perceptions of narrative coherence (Table 1). Score distributions across questions are depicted in Figure 1.
CONCLUSION: ChatGPT-4.0 delivers generally reliable and useful information on lipedema, with consistent inter-rater reliability in core content domains. However, variability in global quality underscores the need for improved narrative structure and depth. While AI chatbots may serve as adjunct tools to enhance patient and clinician education—particularly where specialist access is limited—they should not supplant expert-validated, evidence-based guidelines. Future iterations should integrate up-to-date clinical evidence, multidisciplinary expertise, and citation of peer-reviewed literature to optimize accuracy and coherence.

Keywords: Artificial intelligence, chatbot, digital health literacy, global quality scale, lipo-lymphedema

figure 1



Distribution of mean reliability, usefulness, and global quality scores by question.

Table 1

	Rater 1		Rater 2		Rater 3		All Raters	All Raters		
	Mean±SD	Median (IQR)	Mean±SD	Median (IQR)	Mean±SD	Median (IQR)	Mean±SD	Median (IQR)	ICC	95% CI of ICC Lower-upper
Reliability Score	5.2 ± 0.63	5.0 (5.0/6.0)	4.8 ± 0.79	5.0 (4.0/5.0)	4.6 ± 0.52	5.0 (4.0/5.0)	4.87 ± 0.55	4.83 (4.33/5.33)	0.727	0.265/0.923
Usefulness Score	5.2 ± 0.42	5.0 (5.0/5.0)	5.1 ± 0.57	5.0 (5.0/5.0)	4.8 ± 0.42	5.0 (5.0/5.0)	5.03 ± 0.37	5.0 (5.0/5.33)	0.615	0.017/0.890
Global Quality Score	3.8 ± 0.42	4.0 (4.0/4.0)	3.7 ± 0.48	4.0 (3.0/4.0)	3.9 ± 0.32	4.0 (4.0/4.0)	3.80 ± 0.23	3.83 (3.67/4.0)	-0.071	-2.466/0.720

Descriptive and inter-rater reliability statistics for reliability, usefulness, and global quality scores. ICC: Intraclass Correlation Coefficient; CI: Confidence Interval; SD: Standard Deviation; IQR: Interquartile Range (25th/75th percentile).

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OP-074

Evaluation of the Accuracy and Reproducibility of Large Language Models (ChatGPT, DeepSeek, Gemini) in Responding to Patient-Centered Lipedema Questions

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OBJECTIVE: Lipedema is a frequently misdiagnosed chronic condition that significantly impacts patients' quality of life. As artificial intelligence (AI)-based large language models (LLMs) become increasingly integrated into healthcare communication, their accuracy and consistency in providing patient-centered information require thorough evaluation, especially in rare diseases like lipedema. Therefore, this study aimed to evaluate the accuracy and reproducibility of responses generated by ChatGPT, DeepSeek, and Gemini to questions frequently asked by patients with lipedema.
MATERIAL AND METHODS: This cross-sectional study assessed the accuracy and reproducibility of responses generated by ChatGPT, DeepSeek, and Gemini to 25 commonly asked lipedema-related questions. Each model was queried twice in separate sessions, and answers were evaluated by three independent experts using a four-point rating scale. To ensure the objectivity and consistency of expert evaluations, inter-rater agreement was assessed using Cohen's kappa coefficient.
RESULT: DeepSeek achieved the highest proportion of comprehensive and correct responses (72%), followed by Gemini (64%) and ChatGPT (56%). Accuracy varied across content categories, with the lowest scores observed in the "treatment, follow-up, and maintenance" section. Reproducibility analysis revealed that DeepSeek produced the most consistent responses across sessions, while ChatGPT and Gemini showed more variability, particularly in treatment and quality-of-life questions. Cohen's kappa values indicated high inter-rater agreement overall, with perfect agreement in some categories for ChatGPT and DeepSeek.
CONCLUSION: LLMs can provide generally accurate and consistent responses to patient-centered questions about lipedema, particularly in areas related to general information and diagnosis. However, reduced accuracy and reproducibility in complex clinical domains suggest that expert oversight is essential when using these tools for patient education.

Keywords: artificial intelligence, lipoedema, chatbot, machine learning, deep learning, reliability

Figure 1: Scores represented as a percentage of the total number of questions within each category

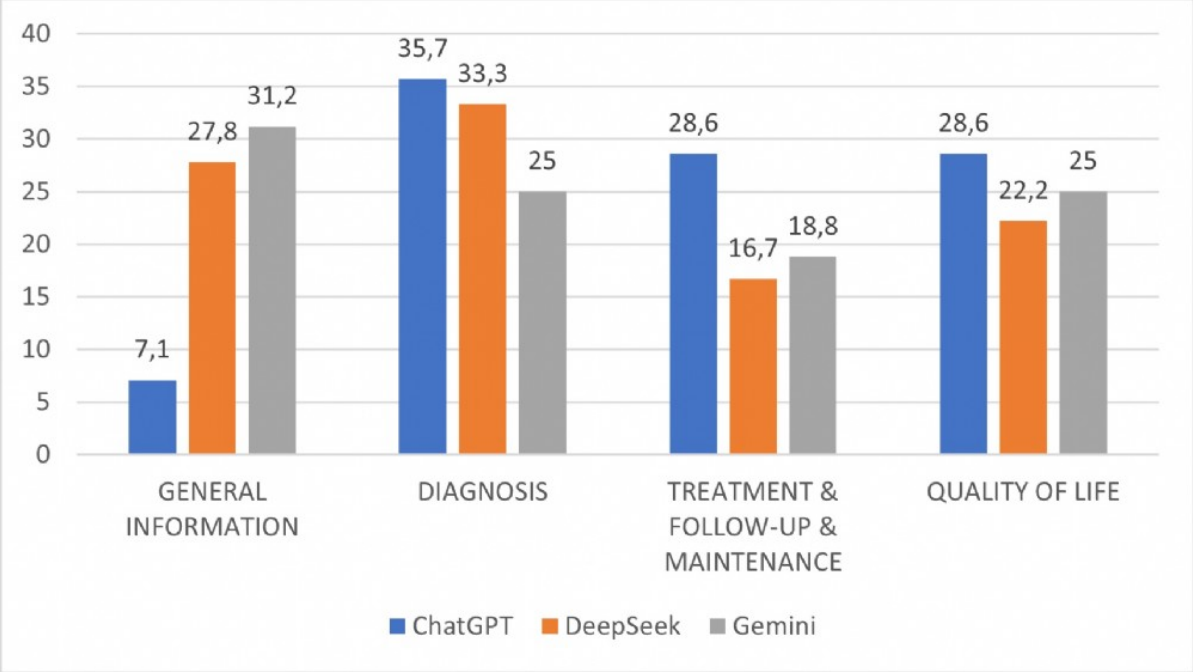

Table 1:Agreement between two reviewers

Category	System	Kappa (κ)	95% CI	p
	ChatGPT	0.86	0.68–1.04	<0.001
All questions	DeepSeek	0.80	0.52–1.07	<0.001
	Gemini	0.73	0.45–1.01	<0.001
	ChatGPT	1.00	1.00–1.00	0.001
General Information	DeepSeek	1.00	1.00–1.00	0.014
	Gemini	N/A[2]	N/A	N/A
	ChatGPT	1.00	1.00–1.00	0.014
Diagnosis	DeepSeek	N/A[1]	N/A	N/A
	Gemini	N/A[2]	N/A	N/A
	ChatGPT	0.54	0.08–1.01	0.061
Treatment & Follow-up	DeepSeek	0.53	0.03–1.03	0.090
	Gemini	0.53	0.03–1.03	0.090
	ChatGPT	1.00	1.00–1.00	0.025
Quality of Life	DeepSeek	1.00	1.00–1.00	0.025
	Gemini	1.00	1.00–1.00	0.025

CI: Confidence interval, N/A[1]: Cohen's Kappa could not be computed because all scores were identical between raters (no variance). Reviewers were in complete agreement, N/A[2]: Cohen's Kappa could not be computed because one rater's scores were constant (no variance)

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OP-076

Content Quality, Reliability, and Source Evaluation of Turkish-Language YouTube Videos on Lymphedema: A Cross-Sectional Study

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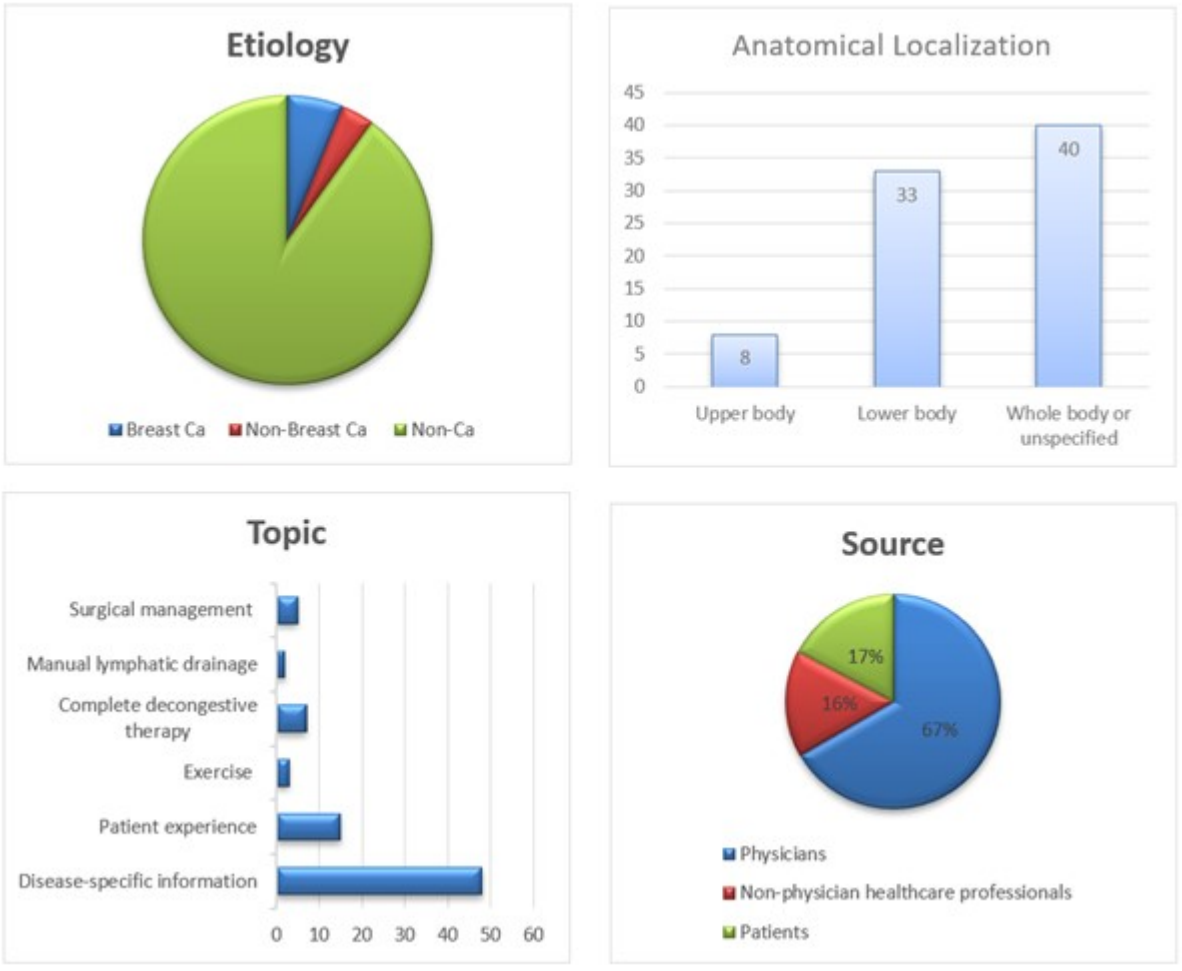
OBJECTIVE: Lymphedema is a chronic, progressive disorder that significantly impacts patients' quality of life. In recent years, YouTube has emerged as a commonly used platform for health information. Despite its accessibility, the quality and reliability of content on the platform remain questionable. This study aims to evaluate the quality, reliability, and source attribution of Turkish-language YouTube videos related to lymphedema.
MATERIAL AND METHODS: On February 20, 2025, a systematic search of YouTube was conducted using three Turkish **Keywords:** "Lenfödem" (lymphedema), "Lenfödem rehabilitasyonu" (lymphedema rehabilitation), and "Fil hastalığı" (elephantiasis). The top 50 most-viewed videos for each keyword were selected, resulting in 150 videos. After exclusions (short duration, irrelevant content, duplicates), 81 videos were included in the final analysis. Videos were evaluated by two independent Physical Medicine and Rehabilitation specialists using mDISCERN, JAMA Benchmark Criteria, and the Global Quality Scale (GQS). Data on etiology, anatomical localization, topic classification, and video source were recorded, along with quantitative metrics such as view count, video duration, like ratio, and Video Power Index (VPI). Statistical analyses included Kruskal-Wallis, Chi-square, and Spearman's correlation tests.
RESULT: Among the 81 included videos, the mean number of views was 324,609 ± 2,664,004, with an average duration of 454 ± 618 seconds. The mean scores were: mDISCERN 2 ± 1, JAMA 2 ± 1, and GQS 3 ± 1. According to GQS, 44.4% of videos were low-quality, 38.3% were moderate, and 17.3% were high-quality. Most videos (90.1%) focused on non-cancer-related lymphedema; only 6.2% addressed breast cancer–related lymphedema. Whole-body involvement was the most common anatomical focus (49.4%), and disease-specific information was the dominant topic (60%). Videos were primarily uploaded by physicians (66.7%), followed by patients (17.3%) and non-physician healthcare professionals (16%). Videos uploaded by physicians had significantly higher mDISCERN, JAMA, and GQS scores ($p < 0.001$). In contrast, patient-generated videos had higher view counts but lower quality. Statistically significant correlations were observed between quality scores and video source, content topic, and anatomical focus, while etiology showed no significant association. Strong positive correlations were found between mDISCERN, JAMA, and GQS scores ($r = 0.718–0.857$; $p < 0.001$).
CONCLUSION: This study demonstrates that the overall quality and reliability of Turkish-language YouTube videos on lymphedema are suboptimal. Despite the platform's widespread use, critical topics such as breast cancer–related lymphedema are underrepresented. Higher-quality videos are more likely to be uploaded by physicians, underscoring the importance of professional engagement in digital content creation. To reduce misinformation and enhance health literacy, healthcare professionals should be encouraged to produce accessible, high-quality educational videos for patients.

Keywords: Lymphedema; YouTube, Health education, Video quality, Digital health, Breast cancer

Figure 1: Video Classifications



This figure summarizes the classification of the 81 Turkish-language YouTube videos on lymphedema included in the study. Etiology: The vast majority of videos (90.1%) focused on non-cancer-related lymphedema (Non-Ca), while only 6.2% addressed breast cancer–related lymphedema (Breast Ca) and 3.7% covered non–breast cancer malignancy–related cases (Non-Breast Ca). Anatomical Localization: Regarding the anatomical focus, 49.4% of videos addressed whole-body or unspecified localization, 40.7% lower body involvement, and only 9.9% upper body involvement. Topic Classification: Most videos (60%) provided disease-specific information. Other topics included patient experiences (18.8%), complete decongestive therapy (8.8%), surgical management (6.3%), exercise (3.8%), and manual lymphatic drainage (2.5%). Video Source: The majority of videos were uploaded by physicians (66.7%), followed by patients (17.3%) and non-physician healthcare professionals such as physiotherapists (16%).

Comparison of video features and quality by source

		Low quality (n, %)	Medium quality (n, %)	High quality(n, %)	p-value*
Number of views View ratio Like ratio Video duration (second) VPI JAMA score mDISCERN score		704,799 ± 3,994,089	13,525 ± 17,039	35,809 ± 45,671	0.433
Number of likes		1,315 ± 6,648	168 ± 261	362 ± 498	0.372
Number of comments		164 ± 834	18 ± 32	26 ± 35	0.853
Number of days since upload		2,098 ± 1,218	1,514 ± 958	1,436 ± 1,224	0.071
View ratio		342.19 ± 1,822.72	15.64 ± 28.60	54.81 ± 106.39	0.204
Like ratio		0.79 ± 0.86	1.04 ± 1.04	1.07 ± 1.04	0.471
Video duration (second)		233±151	480±688	1008±883	0.001
VPI		0.82 ± 3.18	0.22 ± 0.43	1.05 ± 2.54	0.515
JAMA score		1 ± 0	2 ± 1	2 ± 0	0.000
mDISCERN score		2 ± 1	3 ± 1	4 ± 0	0.000
Etiology					0.528
	Breast Ca	3 (8.3%)	1 (3.2%)	1 (7.1%)	
	Non-Breast Ca	0 (0.0%)	2 (6.5%)	1 (7.1%)	
	Non-Ca	33 (91.7%)	28 (90.3%)	12 (85.7%)	
Anatomical Localization					0.008

	Upper body	3 (8.3%)	3 (9.7%)	2 (14.3%)	
	Lower body	22 (61.1%)	10 (32.3%)	1 (7.1%)	
	Whole body or unspecified	11 (30.6%)	18 (58.1%)	11 (78.6%)	
Topic					0.048
	Disease-specific information	17 (47.2%)	20 (66.7%)	11 (78.6%)	
	Patient experience	13 (36.1%)	2 (6.7%)	0 (0.0%)	
	Exercise	1 (2.8%)	1 (3.3%)	1 (7.1%)	
	Complete decongestive therapy	4 (11.1%)	2 (6.7%)	1 (7.1%)	
	Manual lymphatic drainage	0 (0.0%)	2 (6.7%)	0 (0.0%)	
	Surgical management	1 (2.8%)	3 (10.0%)	1 (7.1%)	
Source					0.002
	Physicians	17 (47.2%)	25 (80.6%)	12 (85.7%)	
	Non-physician healthcare professionals	6 (16.7%)	5 (16.1%)	2 (14.3%)	
	Patients	13 (36.1%)	1 (3.2%)	0 (0.0%)	

*VPI: Video Power Index, GQS: Global Quality Scale, JAMA: Journal of the American Medical Association, mDISCERN: modified DISCERN tool *Kruskal-Wallis test for numeric data*

OP-077

Mapping lymphedema and lipedema research in Turkey: insights from graduate theses (2010–2024)

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OBJECTIVE: This study aims to conduct a descriptive analysis of the content of theses on lymphedema and lipedema published between 2010 and 2024 in the Turkish Council of Higher Education (YÖK) Thesis Center. Specifically, this study seeks to examine the types of research conducted (interventional, observational, or validation studies), evaluate the diversity of conservative treatment methods applied to individuals diagnosed with lymphedema or lipedema, and identify commonly assessed parameters.
MATERIAL AND METHODS: A search of the YÖK Thesis Center website using the keywords “lymphedema” and “lipedema” identified 133 theses on lymphedema and 15 on lipedema. A total of 105 postgraduate theses that met the inclusion criteria were analyzed in this bibliometric study. Theses were examined according to year of publication, thesis type, academic discipline, research design, and evaluated parameters.
RESULT: • Only 8 studies included male participants. No thesis was found related to pediatric lymphedema.
• Thesis Types: Master’s (45%), medical specialty (34%), and doctoral dissertations (21%).
• Distribution of Lymphedema Theses by Discipline:
o Physiotherapy and Rehabilitation: 51 theses (54.3%)
o Nursing: 17 theses (18.1%)
o Physical Medicine and Rehabilitation: 26 theses (27.7%)
• Distribution of Lipedema Theses by Discipline:
o Physiotherapy and Rehabilitation: 4 theses
o Physical Medicine and Rehabilitation: 9 theses (70% of all lipedema theses)
o Nursing: None
• Research Designs: The majority were interventional studies (60%), followed by observational/evaluative studies (32%), and validation studies (8%).
• Most Frequently Assessed Parameters: Pain, range of motion (ROM), limb circumference, functionality, and quality of life were the most prominent. Commonly used tools included LYMQOL-Arm, ULL-27, DASH, and QLQ-C30/BR23. Several studies also assessed biochemical markers and oxidative stress indicators. In recent years, objective imaging and tissue assessment methods such as ultrasonography, shear wave elastography, and MoistureMeter-D have been increasingly utilized. (Table 1)
CONCLUSION: The number of postgraduate theses on lymphedema in Turkey has increased significantly in recent years. Notably, the dominance of Physiotherapy and Rehabilitation highlights its leading role in this field. Lipedema research, on the other hand, has only emerged in the past nine years, with most theses conducted in the field of Physical Medicine and Rehabilitation. The growing prevalence of interventional studies employing objective measurement tools indicates a maturing scientific perspective. However, the limited number of validation studies remains a notable gap.

Future research should focus on underrepresented groups such as patients with lower extremity lymphedema, pediatric populations, and male patients. The integration of technology-assisted

assessment tools and telerehabilitation is also recommended. Moreover, strengthening interdisciplinary collaborations will enhance the quality of lymphedema and lipedema research in Turkey.

Keywords: Lymphedema, Lipedema, Graduate Thesis, Bibliometric Analysis, Physiotherapy, Rehabilitation

Table 1: Parameters and Assessment Tools Used in Lymphedema and Lipedema Research Between 2010 and 2024

Parameters	Most Frequently Used Assessment Tools	Number of Theses (2010-2024)
Pain	VAS, NRS	42
Functionality	ROM, DASH, ULL-27	30
Quality of Life	LYMQOL-Arm, QLQ-C30/BR23	35
Circumference Measurement	Tape Measure, Frustum Method	40
Imaging	USG, Shear Wave Elastography, MoistureMeter-D	15

Pain and circumference measurement were the most frequently assessed parameters. Functionality and quality of life also constituted major research focuses. Although imaging techniques (USG, Shear Wave Elastography, MoistureMeter-D) were employed in a limited number of theses, their use has shown a remarkable increase in recent years. This trend reflects a transition in lymphedema research in Turkey from traditional measurement methods to technology-assisted approaches. Abbreviations: VAS: Visual Analogue Scale; NRS: Numerical Rating Scale; DASH: Disabilities of the Arm, Shoulder and Hand Questionnaire; ULL-27: Upper Limb Lymphedema 27; LYMQOL-Arm: Lymphedema Quality of Life Questionnaire – Arm; QLQ-C30/BR23: European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire – Core 30 and Breast Cancer Module.

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OP-078

Evaluating the accuracy and reproducibility of ChatGPT and DeepSeek responses to lymphedema-related patient questions

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OBJECTIVE: The use of artificial intelligence (AI)-based chatbots in healthcare is rapidly increasing, and the accuracy and consistency of the information they provide are critical for clinical reliability. This study aimed to compare the accuracy and reproducibility of responses provided by ChatGPT and DeepSeek to patient questions related to lymphedema.
MATERIAL AND METHODS: A total of 33 frequently asked patient questions about lymphedema were created and entered twice in separate sessions into the free versions of ChatGPT-3.5 and DeepSeek using the “new chat” feature. The responses were independently evaluated by two experts experienced in lymphedema management. In cases of disagreement, a third expert in the field provided the final score. Answers were graded using a four-level scoring system, and inter-rater agreement was assessed using Kappa analysis.
RESULT: DeepSeek was found to provide more comprehensive and consistent answers (%54.5 accuracy; κ=0.87; 97.0% reproducibility). ChatGPT more frequently produced correct but incomplete responses (%51.5 accuracy; κ=0.83; 93.9% reproducibility). The highest performance was observed in the quality-of-life category, while the lowest was in the treatment-follow-up category for ChatGPT and in the general information category for DeepSeek.
CONCLUSION: ChatGPT and DeepSeek performed well in answering patient queries related to lymphedema, particularly in the quality-of-life (QoL) category. However, their performance was relatively lower in treatment-follow-up for ChatGPT and in general information for DeepSeek. Therefore, while AI tools can provide valuable insights, detailed and reliable information, particularly regarding treatment, should always be sought from qualified healthcare professionals.

Keywords: Artificial intelligence, ChatGPT, DeepSeek, lymphedema, patient education

Figure 1. Distribution of the percentage of questions per grade across all questions.

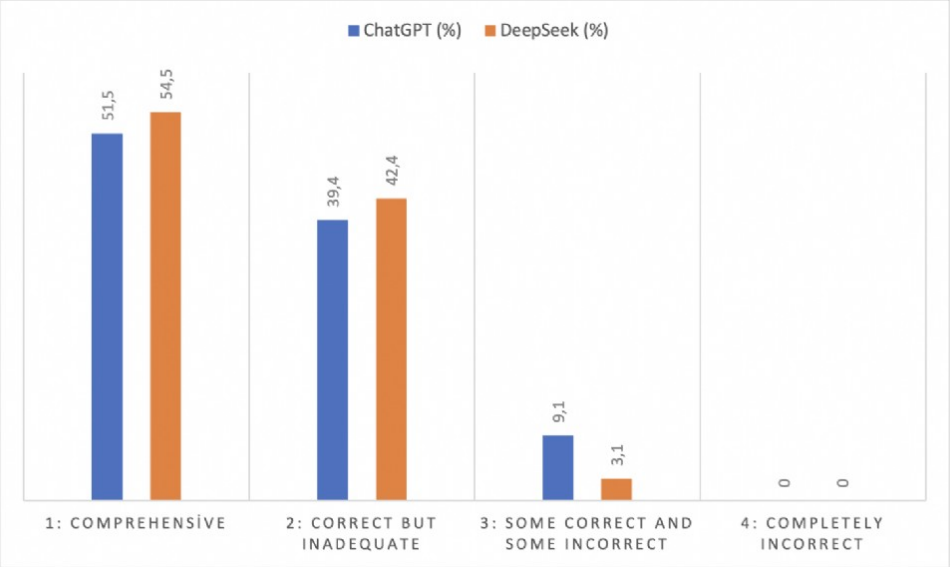

Table 1. Agreement between two reviewers

Category	System	Kappa (κ)	95% CI	p
All questions	ChatGPT	0.83	0.65-1.0	<0.001
	DeepSeek	0.87	0.70-1.0	<0.001
General Information	ChatGPT	0.75	0.30-1.0	0.028
	DeepSeek	1.0	1.0-1.0	0.005
Diagnosis	ChatGPT	1.0	1.0-1.0	0.008
	DeepSeek	1.0	1.0-1.0	0.008
Treatment & Follow-up & Maintenance	ChatGPT	0.83	0.52-1.0	<0.001
	DeepSeek	0.80	0.43-1.0	0.010
Quality of Life	ChatGPT	0.71	0.21-1.0	0.035
	DeepSeek	0.60	-0.072-1.0	0.064

CI: Confidence interval.

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OP-079

The Potential Role of Artificial Intelligence in Lymphedema Care: A Survey on Patient Readiness and Attitudes

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OBJECTIVE: Artificial intelligence (AI) is gaining momentum in various medical fields, primarily in surgical specialties. Recently, patient-facing AI applications have emerged, offering opportunities for education, symptom monitoring, and therapeutic guidance. Given the importance of patient self-management in lymphedema care, this study aimed to evaluate the knowledge, attitudes, and readiness of lymphedema patients to adopt AI-based tools in their care.
MATERIAL AND METHODS: A structured digital questionnaire was developed to assess patients' awareness of AI, experience with smart technologies, and openness to AI-supported education and rehabilitation. The survey was distributed via email to patients currently receiving treatment or follow-up care at our lymphedema unit. Between March 1 and July 15, 2025, the questionnaire was completed by 97 patients. Data were collected on demographics, digital literacy, prior use of AI applications, and perspectives regarding the potential of AI in lymphedema management.
RESULT: Of the 97 respondents, 86.2% were female and 13.8% male, with an age range of 17–77 years. A majority (81.8%) resided in urban areas (34 in the capital, 47.8% in other cities), while 18.2% lived in smaller towns or villages. Educational attainment was high: 58.5% held a university degree, 38.3% had completed secondary education, and only 3.2% had a lower educational level. AI awareness was widespread, with 95% reporting familiarity with the concept. However, only 67% had used any form of AI, most frequently ChatGPT (33%). Notably, 36% reported difficulties using smart devices. Despite this, 80% believed AI could provide meaningful support in their care, and 47% felt AI could partially substitute for therapist input in certain aspects of rehabilitation.
CONCLUSION: AI-based applications hold significant promise for enhancing patient education, empowerment, and long-term self-management in lymphedema care. However, successful implementation requires targeted digital literacy support and tailored onboarding strategies to bridge the gap between technological potential and patient readiness.

Keywords: Artificial intelligence, lymphedema, patient education, self-management, digital health, rehabilitation technology

OP-080

Telehealth and remote management of lymphedema patients

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OBJECTIVE: Our specialized Lymphedema care facility get patients from across India and abroad. We follow a standard method of care through initial assessment and counselling, followed by Comprehensive Decongestive therapy (CDT) initiation and antibiotics as per need. Surgery is felt required for only 5-10% of cases, though lately technology enhancements have increased the number. Life long care and maintenance at home is required, even for the operated cases, which means frequent revisits.
Our patients find frequent revisits a challenge which became even more so during COVID-19. Using innovative telehealth tools, we have managed to A. Shorten and occasionally obviate Comprehensive Decongestive therapy (CDT) initiation time and B. Decrease revisits through online monitoring. This study compares outcomes of CDT based care online versus physical visits
MATERIAL AND METHODS: For all remote lymphedema and limb ulcer patients, history, examination findings, photographs were viewed online through a special online platform (https://aims2.health) with a direct Zoom® link for video-conferencing before the physical visit. If possible limb circumference was recorded at 5 cm intervals and converted to limb volume through a software (Medic Aid®). Patients were requested to start Penicillin if there was evidence of ADLA (Adeno-Dermato Lymphangitis Attacks) and get a Lymphoscintiscan locally.
An appointment for a visit to the clinic, was provided wherein CDT was initiated though bandages, stockings and IPC pumps and occasionally, Manual Lymphatic Drainage (MLD) was initiated. Patients were counselled and taught on how to continue selfcare at home. They were provided follow up support online as per need. The online visits were used for monitoring of progress with a request of self-measurement limb circumference, and upload of photographs.
RESULT: Due to the pre-visit online consult, average care initiation time has been decreased from 2 weeks to 4-5 days. Online monitoring and revisits have helped improve patient retention. Long-term outcomes bordering between Good (50-75% of volume reduction and Excellent (75% improvement) with reduction of incidence of ADLA, remain unchanged between patients followed up physically or even completely by remote means.
Revisits were requested for ADLA attacks, inability to procure penicillin. purchase of stockings, additional bandage sets as well as re-adjustment of the settings of IPC pumps.
The role of telehealth is important even for appointments. We do travel frequently, which means that care initiation is a challenge for walk in patients. In such cases, our staff arranges the online visit from the clinic itself for interim care measures.

CONCLUSION: Telehealth helps shorten CDT initiation as well as long-term care for patients with lymphedema. Tools are simple and should be adopted by all care practitioners. In India, this option is required all the more so as there is a shortage of trained therapists at many places. Even while the outcomes of one patient having complete care initiation also remotely during the COVID period was presented previously, it is not our preferred choice.

Keywords: Telehealth, Lymphedema, remote care monitoring, Comprehensive Decongestive Therapy (CDT)

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OP-081

Evaluation of the reliability and usefulness of ChatGPT's answers to questions related to lymphedema

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OBJECTIVE: Lymphedema is a significant health problem that negatively impacts quality of life in physical, social, and psychological aspects and leads to increased healthcare costs. Artificial intelligence programs are widely used today to learn about medical issues. The quality of information provided by Chat Generative Pre-trained Transformer-4omni (ChatGPT-4o) regarding lymphedema remains uncertain. In this study, we aimed to examine whether Chat GPT-4o's answers to the most frequently asked questions about lymphedema are a reliable and useful resource.
MATERIAL AND METHODS: ChatGPT-4o was asked 12 questions about lymphedema in this cross-sectional study, which was determined using Google Trends and clinical experience. ChatGPT-4o's responses were evaluated by five independent PMR experts specializing in lymphedema between July 14 and 20, 2025. A 7-point Likert-type reliability and usefulness scale was used for the evaluation.
RESULT: The mean and standard deviation of the reliability scale for all questions were found to be 4.3±0.6 (Median: 4.2, Q1-Q3: 3.8-5.0), and the mean of the usefulness scale was 4.6±0.4 (Median: 4.8, Q1-Q3: 4.0-5.0). The median scores for the reliability scale for each question ranged from 3 (relatively reliable) to 5 (relatively very reliable). The median score for seven questions was 4 (reliable). The median scores for the usefulness scale for each question ranged from 4 (reliable) to 5 (moderately useful). The median score for seven questions was 5 (moderately useful). In the reliability analysis conducted between the raters, a moderate level of agreement was found, with intraclass correlation coefficients (ICC) of 0.572 for reliability and 0.521 for usefulness.
CONCLUSION: ChatGPT-4o provides reliable and somewhat useful information on lymphedema. ChatGPT-4o users should be aware of its limitations as a source of information about lymphedema and its use in patient management. Moderate agreement between raters in reliability and usefulness assessments suggests that the scores exhibit individual variation.

Q1-Q3: 25th and 75th percentile values (interquartile range)

Keywords: Artificial intelligence, ChatGPT, Lymphedema

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OP-082

Dual-Energy X-ray Absorptiometry-Based Assessment of Body Fat Distribution in Distinct Adiposity Phenotypes

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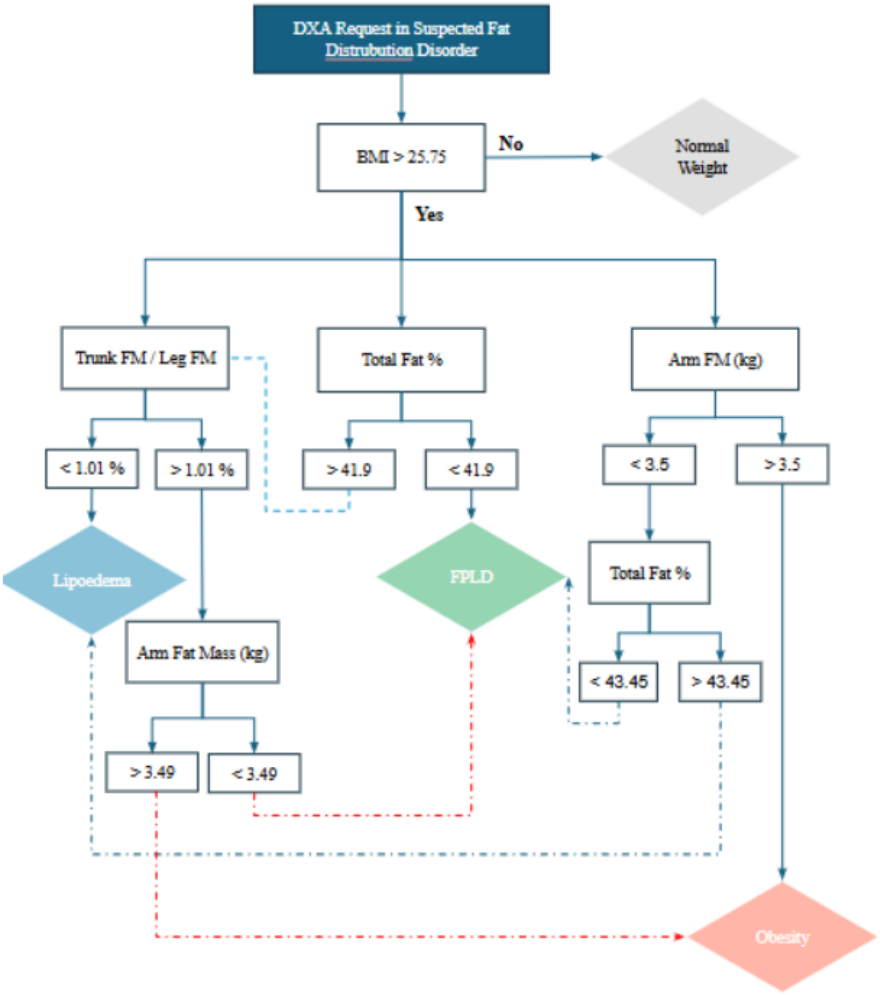
OBJECTIVE: Differentiating lipoedema, familial partial lipodystrophy (FPLD), and obesity based solely on clinical evaluation can be challenging due to overlapping phenotypic features. Dual-energy X-ray absorptiometry (DXA) objectively quantifies regional body composition and may offer significant advantages for distinguishing these adipose tissue disorders. This study aimed to investigate whether specific DXA-derived indices could reliably differentiate lipoedema, FPLD, obesity, and normal-weight individuals.
MATERIAL AND METHODS: This retrospective study included 72 female participants, equally allocated into four groups: clinically diagnosed lipoedema, FPLD, obesity, and normal-weight controls. All participants underwent whole-body DXA imaging (Horizon Wi, Hologic Inc.) to quantify total and regional fat distribution parameters. Receiver operating characteristic (ROC) curve analysis was performed to determine the optimal cut-off values of DXA-derived indices for differentiating among these adiposity phenotypes. All scans were conducted using the same DXA device under standardized conditions. Clinical data were retrospectively retrieved from institutional medical records.
RESULT: Regional body composition analysis using DXA revealed distinct adiposity patterns across the four groups. Lipoedema was most effectively distinguished from obesity and FPLD by the Trunk FM/Leg FM, with lower values indicating lipoedema. This parameter demonstrated excellent discriminatory performance (AUC: 0.964; 95% CI: 0.920–1.000; $p < 0.001$). FPLD was characterized by a centripetal fat distribution pattern, most notably reflected in the Trunk FM/Leg FM and Trunk FM/Limb FM. Both parameters moderately to strongly distinguished FPLD from normal weight controls. Trunk FM/Leg FM yielded an AUC of 0.860 (95% CI: 0.732–0.987; $p < 0.001$) while the Trunk FM/Limb FM demonstrated an AUC of 0.860 (95% CI: 0.735–0.985; $p < 0.001$). Total fat percentage ≥43.5% almost perfectly discriminated lipoedema from FPLD (AUC: 0.99; 95% CI: 0.96-1.00). Global ROC analysis demonstrated that regional DXA-derived indices outperformed the generalized marker BMI in discriminating between adiposity phenotypes.
CONCLUSION: Accurate assessment of regional fat distribution using DXA allows for effective differentiation between lipoedema, FPLD, obesity, and normal adipose tissue profiles. Our proposed DXA-based diagnostic algorithm may serve as a valuable clinical tool to support diagnostic accuracy and optimize patient care.

Keywords: Lipoedema, Lipodystrophy, Obesity, Dual-energy X-ray absorptiometry, Body Composition Assessment

DXA Request in Suspected Fat Distrubution Disorder



DXA-based diagnostic flowchart used to differentiate between lipoedema, FPLD, obesity, and normal-weight control fat distribution patterns.

OP-083

The Relationship Between Leg Volume and Perceptual Outcomes in Women with Lipedema: A Cross-Sectional Study

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OBJECTIVE: Lipedema is characterized by disproportionate fat accumulation in the lower extremities, often leading to negative body image and sleep disturbances. However, the relationship between objectively measured leg volume and subjective symptoms remains unclear.
To investigate whether higher leg volume, measured by partial leg volume (PCEV), is associated with poorer body image and sleep quality in women with lipedema.
MATERIAL AND METHODS: Thirty women clinically diagnosed with lipedema were included in this cross-sectional study. Leg circumferences were measured every 10 cm from the ankle to the groin and converted into total partial leg volume using the frustum formula (PCEV). Participants were divided into two groups based on the median PCEV value of 5800 cm³:
Low-volume group (<5800 cm³, n=15)
High-volume group (≥5800 cm³, n=15)
Body image was assessed using the Body Image Scale (BIS) and sleep quality with the Pittsburgh Sleep Quality Index (PSQI). Independent sample t-tests were used to compare groups.
RESULT: Table 1. Descriptive Characteristics of Participants (n = 30)
Parameter Mean ± SD / n (%)
Age (years) 41.2 ± 7.8
BMI (kg/m²) 27.9 ± 3.1
PCEV (Partial Leg Volume, cm³) 5816.4 ± 903.5
Body Image Score (BIS) 14.9 ± 3.9
Sleep Quality Score (PSQI) 8.7 ± 2.5

Participants with lipedema had a moderately high mean leg volume and reported poor body image and suboptimal sleep quality on average, indicating both physical and psychosocial burden.

Table 2. Comparison Between Low and High PCEV Groups
Parameter Low PCEV (<5800 cm³, n=15) High PCEV (≥5800 cm³, n=15) p-value
Body Image Score (BIS) 17.3 ± 3.2 12.4 ± 2.9 0.001
Sleep Quality Score (PSQI) 7.1 ± 1.8 10.3 ± 2.1 0.003

High leg volume was significantly associated with lower body image scores and worse sleep quality. Both differences were statistically significant and clinically meaningful, suggesting that symptom severity correlates with perceptual distress.

Table 3. Correlation Between PCEV and Patient-Reported Outcomes

Variable Pair Pearson's r p-value
PCEV ↔ Body Image Score (BIS) –0.587 0.001
PCEV ↔ Sleep Quality Score (PSQI) +0.491 0.006
BIS ↔ PSQI –0.405 0.025

PCEV was moderately negatively correlated with body image scores, and positively correlated with sleep disturbances. Additionally, poor body image was significantly associated with worse sleep quality, suggesting a psychophysical loop in patients with higher symptom load.
CONCLUSION: Higher partial leg volume in lipedema patients was significantly associated with lower body image perception and reduced sleep quality. These results emphasize that objective physical burden may directly influence subjective well-being, and that assessment of both physical and perceptual metrics is crucial for holistic treatment.

Keywords: Lipedema, Body image, Sleep quality

Correlation Between PCEV and Patient-Reported Outcomes

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BIS ↔ PSQI	–0.405 0.025

PCEV was moderately negatively correlated with body image scores, and positively correlated with sleep disturbances. Additionally, poor body image was significantly associated with worse sleep quality, suggesting a psychophysical loop in patients with higher symptom load.

OP-083

Management of Upper Extremity Lymphedema in Turkey and Germany: A Comparative Analysis from the Perspective of Physical Medicine and Rehabilitation

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OBJECTIVE: Upper extremity lymphedema is a common chronic condition following breast cancer treatment that reduces quality of life. Variations in clinical practices across different healthcare systems directly affect treatment outcomes. This study aims to compare the management approaches to upper extremity lymphedema in Turkey and Germany.
MATERIAL AND METHODS: Clinical experience was supported by literature published between 2016 and 2025 in PubMed and national databases. Diagnostic assessment, complex decongestive therapy (CDT), compression applications, patient education, and systemic differences were evaluated.
RESULT: In Germany, standardized CDT is performed by certified therapists, compression garments are reimbursed by insurance, and follow-up is conducted systematically. In Turkey, although the number of centers is increasing, therapist training, reimbursement, and long-term follow-up remain insufficient. Recent studies demonstrate that CDT improves not only edema but also functional parameters, motor performance, and quality of life.
CONCLUSION: Although Turkey is approaching international standards in CDT application, systemic barriers persist in education, reimbursement, and long-term follow-up. Germany's structured system serves as a model. Combining the strengths of both countries may optimize patient outcomes.

Keywords: Upper extremity lymphedema, complex decongestive therapy, Turkey, Germany

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OP-084

Body Image, Self-Esteem, and Social Withdrawal in Women with Lipedema: A Cross-Sectional Study

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OBJECTIVE: Lipedema is a chronic adipose tissue disorder with both physical and psychosocial consequences. Clinical observations suggest that body dissatisfaction and low self-esteem are common among women with lipedema, contributing to social withdrawal.
The Objective of this study evaluate body image, self-esteem, and social withdrawal in women with lipedema, and to examine their associations with clinical variables such as BMI and disease stage.
MATERIAL AND METHODS: A total of 30 women (mean age 40.3 ± 9.0 years) clinically diagnosed with lipedema were included. Data collection involved:
• Demographic & clinical form (age, BMI, disease stage, education, marital status),
• Body Image Scale (BIS; 0–30, higher = worse image),
• Rosenberg Self-Esteem Scale (RSES; 0–40, higher = higher self-esteem),
• Social Withdrawal Index (custom; higher = greater withdrawal).
Data were analyzed using descriptive statistics, Pearson correlations, and BMI-based group comparisons.
RESULT: Table 1. Demographic and Clinical Characteristics of Participants (n = 30)
Variable Mean ± SD / n (%)
Age (years) 41.3 ± 7.2
BMI (kg/m²) 30.8 ± 3.9
Marital Status (Married) 19 (63.3%)
Lipedema Stage II 22 (73.3%)
Lipedema Stage III 8 (26.7%)
Age at symptom onset 21.6 ± 5.8
Currently under treatment 17 (56.7%)
🔍 Legend: This table presents the demographic and clinical profile of women with lipedema. The majority were in Stage II and had symptoms beginning in early adulthood.

Table 2. Mean Scores of Psychosocial Measures
Scale Mean ± SD Range (Min–Max)
Body Image Scale (BIS) 18.6 ± 5.7 6 – 28
Rosenberg Self-Esteem (RSES) 14.9 ± 3.4 8 – 21
Social Isolation Index 7.1 ± 2.3 3 – 11

Higher BIS scores indicate more negative body image. Mean scores show moderate body dissatisfaction, slightly below-average self-esteem, and moderate social withdrawal.

Correlation Between Psychosocial Scales
Correlation r p-value
BIS ↔ RSES –0.512 0.004*
BIS ↔ Social Isolation +0.441 0.012*
RSES ↔ Social Isolation –0.398 0.026*

Body image negatively correlated with self-esteem and positively with social isolation. As body dissatisfaction increases, self-esteem decreases and social withdrawal increases (*p<0.05).

. Differences in Psychosocial Scores According to Clinical Variables
Variable BIS Mean ± SD RSES Mean ± SD p (BIS) p (RSES)
BMI <30 vs ≥30 16.9 ± 5.1 vs 20.3 ± 5.4 16.1 ± 2.8 vs 13.7 ± 3.5 0.039* 0.021*
Stage II vs III 17.3 ± 5.2 vs 22.1 ± 4.9 15.6 ± 2.7 vs 13.2 ± 3.8 0.048* 0.043*

Higher BMI and more advanced disease stage were significantly associated with worse body image and lower self-esteem.

Results Summary:
• Most patients had moderate to severe body image dissatisfaction.
• A significant inverse correlation was observed between body image and self-esteem.
• Higher BMI and more advanced stage were associated with worse body image and self-esteem.
• Patients reporting greater social withdrawal also tended to have more body dissatisfaction and lower self-esteem.
CONCLUSION: In women with lipedema, deteriorated body image is strongly linked to reduced self-esteem and increased social isolation. These findings highlight the need for integrating psychosocial support into lipedema management, especially in individuals with advanced stage and higher BMI.

Keywords: Body Image, Lipedema, Social withdrawal

Correlation Between Psychosocial Scales

Correlation	r p-value
BIS ↔ RSES	–0.512 0.004*
BIS ↔ Social Isolation	+0.441 0.012*
RSES ↔ Social Isolation	–0.398 0.026*

*: Body image negatively correlated with self-esteem and positively with social isolation. As body dissatisfaction increases, self-esteem decreases and social withdrawal increases (*p<0.05).*

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OP-085

The Association Between Lipedema Symptom Severity, Sleep Quality and Body Image: A Cross-Sectional Study

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OBJECTIVE: Lipedema is a chronic and progressive adipose tissue disorder affecting primarily women, characterized by disproportionate lower extremity fat accumulation, pain, and heaviness. Despite increasing awareness, the impact of symptom severity on psychosocial parameters such as sleep quality and body image remains poorly understood. The aim of this study examine the association between lipedema symptom severity (pain, heaviness, and limb volume) and sleep quality and body image in women with clinically diagnosed lipedema.
MATERIAL AND METHODS: Thirty women (aged 18–55) with Stage 1–3 lipedema were included. Symptom severity was measured using Visual Analog Scales (VAS) for pain and swelling, and lower limb volume was calculated via the frustum method based on circumferential measurements every 10 cm. Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI) and body image using the Body Image Scale (BIS). Pearson correlation and multivariate regression analyses were conducted. Statistical significance was set at $p < 0.05$.
RESULT: Participants exhibited high symptom burden and clinically poor sleep quality (PSQI > 5). BIS scores indicate impaired body image.
All correlations between symptom severity and both PSQI and BIS were statistically significant and positive, indicating that increased symptoms are associated with worse sleep and more negative body image.
Pain, heaviness and limb volume were all independent predictors of poor sleep quality, jointly explaining over 50% of the variance in PSQI scores.
CONCLUSION: In women with lipedema, symptom severity—including pain, swelling, and increased limb volume—was significantly associated with reduced sleep quality and worsened body image. All symptoms independently predicted poor sleep outcomes. These findings underscore the importance of early diagnosis, symptom management, and integrated psychosocial support to enhance quality of life in this underdiagnosed population.

Keywords: Lipedema, Sleep Quality, Body Image

Correlation Matrix Between Symptoms, Sleep Quality and Body Image

Variable 1	Variable 2	r	p-value
Pain (VAS)	PSQI	0.59	0.001
Heaviness (VAS)	PSQI	0.52	0.004
PCEV	PSQI	0.46	0.009
Pain (VAS)	BIS	0.48	0.006
Heaviness (VAS)	BIS	0.41	0.015
PCEV	BIS	0.44	0.011

All correlations between symptom severity and both PSQI and BIS were statistically significant and positive, indicating that increased symptoms are associated with worse sleep and more negative body image. _____

OP-086

Beyond the Volume: Functional Disability and Quality of Life in Women With Breast Cancer-Related Lymphedema

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OBJECTIVE: Breast cancer-related lymphedema (BCRL) can cause significant functional limitations and reduced quality of life. While prior studies have shown associations between limb volume and patient-reported outcomes, further research is needed to clarify their extent and clinical significance. This study aimed to assess these associations and compare outcomes between patients with low and high excess arm volume.
MATERIAL AND METHODS: This study included 73 female patients with unilateral secondary BCRL, classified as Stage I–III according to the International Society of Lymphology (ISL). All participants had undergone breast cancer surgery and developed ipsilateral upper limb lymphedema. Assessments were conducted at a tertiary rehabilitation clinic between April 2024 and April 2025. Upper limb volume was calculated using circumferential tape measurements and the truncated cone formula. The Percent Change of Excess Arm Volume (PCEV) was used to quantify relative edema and classify patients into low (<20%) and high (≥20%) PCEV groups. Functional status was assessed using the Quick Disabilities of the Arm, Shoulder and Hand (QuickDASH) questionnaire. Lymphedema-specific health-related quality of life was evaluated with the Lymph-ICF questionnaire, covering five domains: physical, mental, household, mobility, and life/social activities. Symptom severity (discomfort, heaviness, swelling, daily activity interference) was rated on a 0–10 visual analog scale (VAS). Neuropathic pain features were screened using the Leeds Assessment of Neuropathic Symptoms and Signs (LANSS). Statistical analyses were performed using SPSS version 30.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (mean, standard deviation, median, minimum, and maximum) were reported for continuous variables. Group comparisons were conducted using the Mann–Whitney U test or chi-square/Fisher's exact test, as appropriate. Spearman's rank correlation coefficients were used to evaluate associations among continuous variables. Statistical significance was set at $p < 0.05$.
RESULT: The mean age was 58.2 years (39–84), and mean time since surgery was 73.7 months (3–312), significantly longer in the high PCEV group (p=0.002). ISL stage distribution differed between groups (Figure 1), with 88% of high PCEV patients classified as Stage II–III vs. 55% in the low PCEV group (p=0.003). Swelling, heaviness, and daily activity VAS scores, QuickDASH scores, and Lymph-ICF physical function and life/social domains were significantly worse in the high PCEV group (p<0.05). No group differences were observed in LANSS scores or Lymph-ICF mental, household and mobility domains (Table 1). PCEV correlated with Lymph-ICF physical (r=0.346, p=0.003) and social domains (r = 0.318, p = 0.006), indicating that larger volume increases were associated with worse physical functioning and social participation. QuickDASH scores correlated strongly with all Lymph-ICF domains (r=0.354–0.720, p<0.001). Lymph-ICF mobility showed weak correlations with VAS scores for discomfort, heaviness, swelling, and interference with daily activities (r=0.236–0.298), while discomfort-VAS demonstrated moderate correlations with all other Lymph-ICF domains (r=0.334–0.584, p<0.01).
CONCLUSION: Patients with BCRL who had higher excess arm volume exhibited greater symptom

burden and impairments in certain domains of health-related quality of life compared to those with lower volume. However, the significant correlations observed between symptom severity, functional disability, and HRQoL, regardless of edema volume, indicate that objective limb volume does not fully capture the patient experience. Notably, substantial functional limitations and reduced quality of life may also be present in patients with lower degrees of edema. These findings emphasize the importance of comprehensive early assessment of not only limb volume but also patient-reported outcomes. The results support an early, multidisciplinary approach in lymphedema management, with an emphasis on symptom relief, functional rehabilitation, and quality of life improvement, even in patients at milder clinical stages or with lower edema volumes.

Keywords: Breast cancer-related lymphedema, edema volume, functional disability, Lymph-ICF, quality of life

OP-087

Practitioner experiences and training needs in Complete Decongestive Therapy at the North Estonia Medical Centre: mixed-methods study and implications for national service development

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OBJECTIVE: Complete Decongestive Therapy (CDT) is the standard of care for lymphoedema but remains resource-intensive, physically demanding, and dependent on specialised skills. In Estonia, CDT has been provided for many years, with demand and service volumes increasing, although provision has been constrained by available resources. Recently, the reimbursed session duration was extended from 60 to 70 minutes by the Estonian Health Insurance Fund. At the North Estonia Medical Centre (NEMC), most practitioners deliver CDT alongside physiotherapy or occupational therapy, typically performing 1–2 sessions per day, except for two part-time nurses. This study examined practitioners' experiences, perceived workload, and training needs within this evolving service context.
MATERIAL AND METHODS: CDT has been reimbursed in Estonia since 2014. Nationally, annual sessions increased from 572 in 2014 to 8,533 in 2023 (~1,000 patients/year). NEMC is among the largest providers, delivering over 16,000 sessions during 2014–2023, predominantly for oncology-related lymphoedema. The average number of sessions per patient (6.2–7.8/year) remains below international recommendations. Treatment is coordinated by rehabilitation physicians.

Data collection included:
Focus group interview with CDT practitioners using six structured topics: motivation, physical/technical challenges, emotional aspects, preferred workload, training experiences, and continuing education needs. Thematic coding was applied.
Online questionnaire completed by 10 practitioners (aged 35+ years, most trained within the last decade), with multiple-choice and Likert-scale items.
RESULT: Focus group FINDINGS: CDT practitioners at NEMC valued the diversity and visible results of their work, though some reported physical and emotional demands that require organisational support and balanced caseloads. International study visits (e.g., Földi Clinic) were highly valued. Physical challenges, according to some practitioners, included repetitive movements and lower limb bandaging; extended session times were viewed positively. The absence of a pressure measurement device was noted as a limitation. Participants noted that working with oncology patients was not perceived as more difficult, and their appreciation was regarded as a positive and rewarding aspect of the work. Learning CDT was described as challenging but achievable, with hands-on training rated as more effective than lectures. Desired improvements included practical, internationally oriented courses, exposure to different CDT approaches (e.g., Italian, Brazilian), and nutrition education. Collaboration with rehabilitation physicians and unified exercise/nutrition recommendations were considered essential.
Questionnaire findings: Six respondents (60%) were currently providing CDT; seven (70%) expected to continue in five years. Potential reasons for discontinuation included career change, workload, and personal factors. Eight (80%) considered their initial training sufficient. Mean perceived complexity (0–100) was 63 for theory and 57 for practice. Priority training topics included complex case management (80%), research updates (70%), CDT techniques, case analysis, skin care, and compression products

(60% each). Collaboration within the care team was valued highly, with 80% reporting they could always or usually consult a rehabilitation physician, and all respondents considering this ability important. Most reported no difference in treating oncology patients, while two (20%) experienced emotional impact from chronic cases. Six (60%) saw no health risks from CDT; others expressed occasional concerns. All respondents to the workload question (n=8) considered it appropriate, likely due to the mixed-duty model.

CONCLUSION: The continuing need for CDT services in Estonia presents both opportunities and challenges. Practitioners at NEMC value the visible results and diversity of their work, yet the physical and emotional demands underscore the need for supportive organisational strategies. National service development should prioritise: (1) unified exercise and nutrition education, (2) expanded opportunities for practical and international training, and (3) balanced caseload models to support practitioner well-being. The well-established rehabilitation physician–physiotherapist collaboration at NEMC aligns with European best practice and remains a cornerstone for delivering high-quality, patient-centred CDT.

Keywords: Complete Decongestive Therapy, lymphoedema, workload, training needs, healthcare service development, interdisciplinary collaboration

OP-088

Rise of Lipedema: Prevalence, Quality of Life Impact in the State of Qatar

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OBJECTIVE: This study aims to:
1. Explore the observed increase in lipedema prevalence in the State of Qatar
2. Describe the associated symptoms and factors affecting the quality of life in patients with lipedema
MATERIAL AND METHODS: This study is based on retrospective documentation and clinical records collected between 2019 and 2024 from the Oncology and Lymphedema Physiotherapy Department at Hamad Medical Corporation, Qatar Rehabilitation Institute.

A descriptive retrospective review was conducted on adult female patients diagnosed with lipedema. Data were gathered from clinical evaluations, including assessments of symptom presentation, disease staging, and patient-reported outcomes. The analysis also considered social, cultural, and environmental factors affecting patient experience and treatment adherence.
RESULT: Clinical experience and documentation indicated an increasing number of lipedema diagnoses over recent years. Patients are commonly presented with pain, swelling, heaviness, and mobility limitations. Many reported psychosocial concerns, including body image dissatisfaction and emotional distress. Cultural considerations, such as modesty, environmental factors like extreme heat, and lack of awareness, were frequently noted as barriers to early diagnosis and effective treatment.
CONCLUSION: The findings highlight a growing awareness and recognition of lipedema in Qatar. Addressing region-specific challenges such as cultural sensitivities and environmental conditions is crucial for improving patient outcomes. This study supports the need for increased professional education, multidisciplinary care models, and targeted awareness campaigns within the region.

Keywords: Lipedema, quality of life, prevalence, barriers to care, Middle East, conservative treatment

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OP-089

Establishing a Lymphatic Education and Surgery Center in Uganda: Cohort Profile and Early Surgical Outcomes of a Humanitarian Aid Initiative

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OBJECTIVE: To implement and assess one of the first dedicated lymphatic education surgery centers in Uganda, established within the context of a humanitarian aid mission. The center aims to provide structured diagnostic pathways, education and microsurgical treatment for patients with chronic lymphedema and related conditions in a low-resource environment.
MATERIAL AND METHODS: Between 2024-2025: 214 patients underwent standardized evaluation, including clinical staging of lymphedema, wound assessment, and documentation of functional impairment. Management strategies ranged from conservative care and wound care to surgical intervention, with selected candidates undergoing vascularized lymph node transfer (VLNT). Follow-up assessments evaluated short-term clinical outcomes and patient-reported symptom relief.
RESULT: A total of 214 patients were assessed and treated. Among them 41.2% had unilateral lymphedema 51.6% had bilateral involvement, and 14.4% presented with chronic wounds, 18 of whom also had lymphedema. Eleven additional cases involved other lymphatic or soft tissue pathologies. VLNT was performed in six patients, with encouraging short-term outcomes, including improved skin integrity and reduction in perceived limb burden. Disease durations ranged from several months to over 40 years. A substantial proportion of patients had previously undergone non-standard or ineffective treatments, including undocumented injections and traditional remedies. No perioperative complications were reported.
CONCLUSION: The establishment of one of Uganda's first lymphatic education and surgery centers within a humanitarian aid setting has demonstrated that advanced microsurgical treatment, including VLNT, can be delivered safely and effectively in a low-resource environment. The high proportion of patients with chronic and bilateral lymphedema confirms the urgent need for structured lymphatic care. This center now provides a basis for continued clinical service and the development of regional conservativ and surgical capacity.

Keywords: Lymphedema, Education Surgery, Humanitarian Aid, Uganda, Chronic Wound, Vascularized Lymph Node Transfer (VLNT)

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OP-090

The Relationship Between Health Literacy, Quality of Life, and Disease Factors in Individuals at Risk for Lymphedema

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OBJECTIVE: Lymphedema is a chronic and often progressive condition that frequently emerges as a consequence of cancer treatment, especially breast cancer. Characterized by lymphatic fluid accumulation and limb swelling, lymphedema affects patients physically and psychosocially. Health literacy, defined as the capacity to access, comprehend, and apply health-related information, is a crucial determinant in chronic disease self-management. This study aims to explore the associations between health literacy, quality of life, and various clinical and demographic characteristics among individuals at risk for or diagnosed with lymphedema.
MATERIAL AND METHODS: A cross-sectional study was conducted involving 52 participants either diagnosed with lymphedema. Sociodemographic (age, education, occupation, BMI), clinical (lymphedema stage, comorbidities, cancer therapies), and treatment-related data were collected. Health literacy was assessed using the Turkish Health Literacy Scale (TSOY-32), and quality of life was evaluated via the Lymphedema Quality of Life Questionnaire – Arm (LYKQ-Arm). Descriptive statistics summarized sample characteristics. The Kruskal-Wallis test compared scores across lymphedema stages. Spearman correlation assessed the association between health literacy and quality of life domains. Multiple linear regression identified predictors of health literacy.
RESULT: The participants had a mean age of 55.13 ± 12.20 years and a BMI of 28.32 ± 4.58. The average health literacy score was 2.88 ± 0.96. Among quality of life domains, the appearance-related domain significantly differed according to lymphedema stage ($p = 0.0359$), indicating a psychosocial dimension affected by physical presentation. No statistically significant correlations were found between total health literacy scores and quality of life dimensions ($p > 0.05$). However, regression analysis revealed that both age ($\beta = -0.036$, $p = 0.0027$) and education level ($\beta = 0.344$, $p = 0.0131$) were significant predictors of health literacy.
CONCLUSION: Our findings underscore the role of demographic factors, particularly age and education, in shaping health literacy levels in this population. While health literacy did not show a direct relationship with perceived quality of life, its potential indirect influence through disease comprehension and coping strategies remains noteworthy. The observed variation in appearance-related quality of life suggests body image concerns may intensify as lymphedema progresses, necessitating both physical and psychological support mechanisms in care strategies.This study highlights the importance of health literacy in the context of chronic conditions such as lymphedema. Tailored educational interventions targeting older and less-educated individuals could enhance understanding and management of the disease. These results offer valuable insights for healthcare providers in developing effective lymphedema education programs that are responsive to patients' literacy needs and psychosocial well-being

Keywords: Health literacy, Lymphedema,Quality of life,Chronic disease management,Cancer survivorship, Patient education

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OP-091

Comparison of edema, muscle strength, functional capacity, functionality and quality of life in patients with different stages of lower limb lymphedema

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OBJECTIVE: This study aimed to compare edema, muscle strength, functional capacity, functionality and quality of life in patients with different stages of secondary lower limb lymphedema (LLL).
MATERIAL AND METHODS: A total of 76 patients (mean age: 47.06±16.16 years; 84.2% female) with LLL were included in the study. Edema was assessed using tissue dielectric constant (TDC). Muscle strength was evaluated using maximum inspiratory/expiratory pressure (MIP/MEP) and a dynamometer. Functional capacity was assessed with the 6-Minute Walk Test (6MWT), functionality with the Lower Extremity Functional Scale (LEFS), and quality of life with the Lymphedema Quality of Life Scale (LYMQOL).
RESULT: Participants were distributed as follows: 17.1% in Stage 1, 47.4% in Stage 2, and 35.5% in Stage 3 of LLL. Participants in Stage 3 were the oldest, had the highest body mass index, and exhibited the longest disease duration. Additionally, Stage 3 patients had a higher prevalence of smoking and unemployment compared to those in other stages. Significant differences were observed between groups in TDC, MEP, and tibialis anterior muscle strength. However, no significant differences were found between groups in MIP, gastrocnemius muscle strength, functional capacity, functionality, and quality of life.
CONCLUSION: This study demonstrated that patients with Stage 3 LLL exhibit a higher degree of edema, as well as reduced expiratory muscle strength and tibialis anterior muscle strength, compared to those with Stage 1 and Stage 2 LLL. In addition, this study underscores the necessity of evaluating respiratory and leg muscles strength in patients with LLL.

Keywords: functionality, lymphedema, muscle strength, respiratory muscles, quality of life

OP-092

The Effect of Lymphedema on Quality of Life in Breast Cancer Patients with Modified Radical Mastectomy

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OBJECTIVE: It has been observed that arm function and quality of life are severely affected in patients who undergo surgery for breast cancer and develop lymphedema afterwards. The ULL-27 (Upper Limb Lymphedema-27) quality of life questionnaire was developed specifically for individuals who developed upper limb lymphedema after breast cancer. ULL-27 consists of physical, psychological and social sub-parameters. The aim of this study was to determine whether ULL-27 differs between lymphedema stages, whether the duration of lymphedema and quality of life were correlated, and whether the diameter difference in the arm was correlated with quality of life. In addition, we investigated if people with the dominant hand and affected extremity on the same side had a different quality of life than those with the affected extremity on a different side.
MATERIAL AND METHODS: This study comprised 50 patients who were admitted to the Lymphedema Unit of the Department of Physical Medicine and Rehabilitation, Gülhane Training and Research Hospital; 39 of the patients had lymphedema, while 11 did not. Clinical and demographic data of all patients were recorded. Quality of life was measured with ULL-27. The ULL-27 scale uses a 5-point Likert scale (1=strongly disagree, 5=strongly agree). The first 15 questions assess the physical dimension, questions 16-22 assess the psychological dimension and questions 23-27 assess the social dimension. The lowest score is 27 and the highest score is 135. A high score on the scale indicates that lymphedema has a negative impact on quality of life.
RESULT: Within the group of 39 patients with lymphedema, 14 were in Stage 0, 14 were in Stage 1, and 12 were in Stage 2. No statistically significant difference was found between the groups in terms of quality of life ($p>0.05$). In 18 of 39 patients with lymphedema, the affected extremity and the dominant hand were on the same side, while in 21 patients the affected extremity and the dominant hand were on different sides. No significant difference was found between these two groups in terms of quality of life ($p>0.05$). A weak negative correlation was found between the duration of lymphedema and ULL-27 (ULL-27 physical rs: -0.069 p: 0.68; ULL-27 psychological rs: -0.078 p: 0.64; ULL-27 social rs: -0.226 p:0.17 ULL-27 total rs: -0,113 p: 0,50). There was a weak positive correlation with the diameter difference in the arm (ULL-27 physical rs: 0.223 p: 0.17; ULL-27 psychological rs: 0.039 p: 0.81; ULL-27 social rs: 0.037 p:0.82 ULL-27 total rs: 0.215 p: 0,19).
CONCLUSION: In conclusion, unlike other quality of life scales, ULL-27 is valuable because it is specific for individuals with upper extremity lymphedema after breast cancer. Future studies should include a larger sample size and identify preventable factors affecting quality of life.

Keywords: Lymphedema, Quality of life, ULL-27

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OP-093

Effectiveness of Complete Decongestive Therapy (CDT) in Patients with Phlebolymphedema: A Retrospective Study

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OBJECTIVE: Phlebolymphedema is an edema resulting from the accumulation of protein-rich fluid in the interstitial space, due to venous and/or lymphatic system insufficiency accompanied by systemic factors. It is considered a subtype within the lymphedema spectrum, with Complete Decongestive Therapy (CDT) being the primary treatment modality. This study aimed to evaluate the efficacy of CDT in patients diagnosed with lower extremity phlebolymphedema.
MATERIAL AND METHODS: A retrospective analysis was conducted on 108 patients aged 18–75 years who presented to the Lymphedema Clinic at AŞH Physical Therapy and Rehabilitation Hospital between 2020 and 2025 and underwent 10 sessions of CDT. Demographic data (age, sex, height, weight, body mass index [BMI]) and clinical characteristics (lymphedema stage, history of venous surgery) were recorded. Limb volumes were determined by circumferential measurements pre- and post-treatment (pre-treatment volume [PTV] and post-treatment volume [PoTV]), calculated using the Truncated Cone (Frustum) formula. Statistical analyses were performed using IBM SPSS 29.0. Wilcoxon signed-rank test was used to compare volume measurements before and after treatment. Mann-Whitney U and Kruskal-Wallis tests evaluated intergroup differences, while Chi-square tests assessed categorical variables. Spearman correlation analysis was employed to examine relationships between continuous variables and treatment response.
RESULT: The mean age of participants was 58.2 ± 10.4 years, with 94.4% (n=102) being female. The mean BMI was 31.8 ± 5.1. A history of venous surgery was present in 26.9% of patients. Distribution of lymphedema stages was as follows: stage 1, 13.89% (n=15); stage 2, 48.15% (n=52); stage 3, 37.96% (n=41). The mean PTV was 10,976.4 ± 3,859.1 mL, and the mean PoTV was 10,060.3 ± 2,825.7 mL. The volumetric reduction between pre- and post-treatment was 8.34%, which was statistically significant ($p < 0.001$, $r = 0.83$). A statistically significant positive correlation was found between BMI and volumetric reduction ($p = 0.0007$). No significant associations were observed between treatment response and age, sex, or history of venous surgery ($p = 0.337$, $p = 0.832$, $p = 0.625$, respectively).
CONCLUSION: CDT is a significant and effective therapeutic modality for reducing limb volume in patients with phlebolymphedema. While a statistically significant positive correlation was found between BMI and volumetric reduction, no significant relationships were identified between treatment response and age, sex, or venous surgery history.

Keywords: phlebolymphedema, lymphedema, decongestive lymphatic therapy, chronic venous insufficiency, lower extremity

OP-094

Lymphedema vs. Venous Insufficiency: Can the C-Reactive-Protein-Albumin-Lymphocyte (CALLY) Index Differentiate Inflammatory Burden?

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OBJECTIVE: This study aimed to evaluate the role of inflammation in lymphedema and chronic venous insufficiency (CVI) pathogenesis, by comparing inflammatory markers such as C-reactive protein-albumin-lymphocyte (CALLY) index, neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR), systemic immune-inflammation index (SII), and CRP-to-albumin ratio (CAR) between affected patients and healthy controls.
MATERIAL AND METHODS: A total of 94 patients who presented to Yozgat City Hospital Physical Medicine and Rehabilitation, Yozgat Bozok University Faculty of Medicine, Physical Medicine and Rehabilitation and Cardiovascular Surgery clinics between January 2018 and July 2025 were included. The study population consisted of 29 patients with lower extremity lymphedema, 30 with CVI, and 35 healthy individuals with nonspecific leg pain.
This multicenter retrospective study reviewed demographic characteristics, laboratory results and diagnostic imaging reports from hospital databases. Patients diagnosed with lower extremity lymphedema based on lymphoscintigraphy in physical medicine and rehabilitation clinics were assigned to the lymphedema group. Those diagnosed with CVI through venous Doppler ultrasonography in the cardiovascular surgery clinic were categorized as the CVI group. The control group consisted of patients presenting to the physical medicine and rehabilitation clinic with unrelated complaints (e.g., nonspecific leg pain) and no diagnosis of lymphedema or CVI. Participants in the CVI and control groups were selected to match the lymphedema group in terms of demographic characteristics. Blood samples were obtained during lymphoscintigraphy for the lymphedema group and during Doppler ultrasonography for the CVI group. Inflammatory markers were calculated as follows: CALLY = (Albumin × Lymphocyte) / (CRP × 10^4), SII = (Neutrophil × Platelet) / Lymphocyte. Other ratios (NLR, MLR, PLR, CAR) were derived by standard formulae. Statistical analysis was performed using Kruskal-Wallis and post-hoc Dunn tests.
RESULT: Of all the evaluated markers, the CALLY index showed a statistically significant difference among the groups ($p<0.001$). The lymphedema group exhibited significantly lower CALLY scores (2.20 ± 1.78) compared to CVI (4.69 ± 3.78) and control groups (4.97 ± 1.68), suggesting a distinct inflammatory and nutritional profile. Post-hoc analysis confirmed that lymphedema group differed from both CVI and control groups, while CVI and control groups did not differ from each other. CRP was significantly higher in the lymphedema group (0.87 ± 1.20 mg/dL) compared to CVI (0.40 ± 0.40 mg/dL) and control (0.21 ± 0.05 mg/dL) groups ($p<0.001$), whereas albumin levels were lowest in the lymphedema group (4.09 ± 0.36 g/dL, $p<0.001$).
No significant differences were found between groups in leukocyte, neutrophil, lymphocyte, monocyte counts, or MLR values ($p > 0.05$). NLR showed a borderline difference among groups ($p=0.054$), with post-hoc analysis indicating a significant difference only between the lymphedema and control groups. Additional significant differences were observed in PLR ($p=0.004$), SII ($p=0.010$), and CAR ($p<0.001$). Post-hoc analysis showed that PLR and SII differed only between the lymphedema and control

groups, while CAR differed between the lymphedema and control, and CVI and control groups.
CONCLUSION: Systemic inflammation appears to play a prominent role in lymphedema pathogenesis and a moderate role in CVI. The CALLY index, along with SII and CAR, may serve as valuable adjunctive tools in the clinical assessment of these conditions. These markers may also contribute to improved differential diagnosis in patients presenting with lower extremity edema of unclear origin, particularly in distinguishing lymphedema from CVI in clinical practice.

Keywords: Lymphedema, Chronic Venous Insufficiency, Inflammation, CALLY Index, Biomarkers

Demographic and Laboratory Parameters of the Study Groups

Parameter	Lymphedema (n=29)	CVI (n=30)	Control (n=35)	p-value
Sex - Female (n/%)	23 (79.3)	20 (66.7)	26 (74.3)	0.541
Sex - Male (n/%)	6 (20.7)	10 (33.3)	9 (25.7)	0.541
Age (years)	61.59 ± 14.28	58.70 ± 12.78	58.49 ± 6.42	0.252
CRP (mg/dL)	0.87 ± 1.20	0.40 ± 0.40	0.21 ± 0.05	<0.001*
Albumin (g/dL)	4.09 ± 0.36	4.44 ± 0.29	4.37 ± 0.27	<0.001*
Total Protein (g/dL)	7.29 ± 0.44	7.02 ± 0.39	7.28 ± 0.51	0.026*
Leukocyte (/mm³)	7424 ± 2307	7264 ± 2069	6909 ± 1563	0.839
Lymphocyte (/mm³)	1948 ± 755	2246 ± 688	2231 ± 551	0.059
Neutrophil (/mm³)	4769 ± 2194	4183 ± 1469	3883 ± 1118	0.430
Monocyte (/mm³)	548 ± 148	550 ± 150	537 ± 135	0.880
Platelet (/mm³)	306414 ± 113310	273067 ± 59718	249086 ± 66692	0.018*
CALLY	2.20 ± 1.78	4.69 ± 3.78	4.97 ± 1.68	<0.001*
NLR	2.81 ± 1.90	1.96 ± 0.71	1.82 ± 0.58	0.054
MLR	0.32 ± 0.16	0.27 ± 0.11	0.25 ± 0.06	0.177
PLR	173.71 ± 85.64	131.96 ± 46.29	116.39 ± 33.37	0.004*
SII	914.01 ± 864.22	534.53 ± 226.06	453.35 ± 197.40	0.010*
CAR	0.22 ± 0.34	0.09 ± 0.09	0.05 ± 0.01	<0.001*

a Pearson chi-square test, bKruskal Wallis Test, c Post Hoc-Dunn test, CVI: chronic venous insufficiency, CRP: C-reactive protein, CALLY: C-reactive protein-albumin-lymphocyte index, NLR: Neutrophil-to-lymphocyte ratio, MLR: Monocyte-to-lymphocyte ratio, PLR: Platelet-to-lymphocyte ratio, CAR: C-reactive-protein-to-albumin ratio, SII: Systemic Immune-Inflammation index

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OP-095

Analyzing efficacy and tolerance for Compression therapy for ulcers in a tropical setting

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OBJECTIVE: Analyzing efficacy and tolerance for Compression therapy for ulcers in a tropical setting.
MATERIAL AND METHODS: Retrospective analysis of tolerance of various components of compression and care outcomes of lymphoedema and ulcer
patients in India.
Care protocol: Patients were first assessed for diagnosis and staging. All were counselled on the treatment plan with emphasis on
need of continued home care. Photographs and Circumference measurements were taken for volume assessment. Ulcer assessment
was separately done as required. All were given Long term Benzathine Penicillin unless allergic.
Compression therapy choices at initiation was Multi Layer Lymphoedema Bandaging (MLLB) and Intermittent Pneumatic
Compression (IPC). Patients carried the same MLLB sets for maintenance at home after 4-7 days. Some could afford continuation of
IPC at home. Garments were ordered once limb size was stable. Ulcer patients were not treated any differently except for dressing
and avoidance of more expensive MLLB components till the ulcer healed.
RESULT: Out of 580 total patients, there were 32 with ulcers, with duration ranging between 6 month to 12 years. Size varied from
less than a cm, and causing lymphorrhoea, to around 160 sq cm. All ulcers healed completely within 2 to 6 weeks except in two. One
failure had deep circumferential scarring but 90% reduction of ulcer size was achieved. The only complete failure had a large
weeping ulcer. The desired protocol could not be sustained due to repeated infection.
CONCLUSION: In a tropical setting, where heat and humidity is a problem compression therapy is well tolerated. No specific change of protocol in ulcer care is required unless the size is extremely large

Keywords: ulcers, topical setting, Compression Therapy

OP-096

Penicillin – a much ignored panacea for Lymphatic and Venous disorders of the limbs

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OBJECTIVE: BACKGROUND: We run a specialized lymphedema clinic in New Delhi India and get patients from across India. Being in a non-endemic area, filaria related cases are not so common. Other causes predominate, which include post breast and reproductive organ malignancy, Venous disease, Idiopathic, congenital, obesity and others. Benzathine Penicillin used for controlling Adeno-Dermato-Lymphangitis Attacks (ADLA) has been a key contributor to our appreciable results in Lymphedema. 1.2 megaunits is given every 2-3 weeks for years. Many patients face issues of procuring the medicine and even if we provide them from our clinic, unable to get the shots administered as the local clinics refuse to do so. They had worse outcomes than others. We quantify these outcomes and also advocate regular usage.
OBJECTIVE: Understand role of Benzathine Penicillin in management of venous and lymphatic disorders along with prescription specifics.
MATERIAL AND METHODS: Retrospective data of patients was collected of all patients who were prescribed Benzathine Penicillin from the clinic's Electronic Health Record system using Structured Query Language (SQL). Further classification of the data included patient demography, diagnoses, evidence of Infection and outcomes with more details for vascular patients and complications. Follow up care for those on long term therapy included history of ADLA as well as its relation with continuance of Benzathine Penicillin shots,
RESULT: 767 patients across various ages and gender with 90% having lymphedema or venous ulcer, have received between one to 50 or more injections of Benzathine Penicillin over the last 25 years at our clinic. Lymphedema cases were advised repeated 3 weekly doses, but some could not continue. A sensitivity test was done only first time or if the patient came back after long gap. Out of a total of over 10000 shots, 3 immediate reactions occurred– 2 vasovagal reactions and one inadvertent IV injection. 9 patients developed evidence of allergy at the test site of which two received the full dose as not detected on the sensitivity test. One of these and 2 more had a full body rash. There was no related mortality. Patients, unable to use penicillin for various reasons had higher incidence of ADLA with higher rate of recurrence and worse outcomes.
CONCLUSION: Penicillin is safe and should be recommended as part of long term care of lymphedema and venous ulcers. Worries about reactions and allergy are overrated. Use of sensitivity test is controversial. Penicillin should be part of standard care for lymphedema at least in tropical countries

Keywords: Penicillin, Adeno-dermato-lymphangitis Attacks (ADLA), Lymphedema, Varicose Ulcers

OP-097

Multidisciplinary treatment of chronic wounds in patients with lymphoedema

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[5]Multidisciplinary protocol for wounds treatment in patients with lymphoedema
[6]Lymphoedema is a disorder of the lymphatic system characterized by impaired lymph transport and the accumulation of protein-rich fluid in the interstitial space. One of the complications in patients with lymphoedema is the development of chronic, hard-to-heal wounds. To implement a multidisciplinary decongestive treatment protocol for patients with stage III lymphoedema and associated wounds. The protocol includes graduated compression bandages, use of lymphapress devices, absorptive dressings, debridement, biostimulatory wave therapy, as well as physical and nutritional therapy. We analyzed 24 wounds ranging from 2.25 to 180 cm² in 15 patients (12 female, 3 male), with an average age of 67 years (range: 35-86). Diagnoses were established using the International Society of Lymphology, Classification for primary lymphoedema (Conelli F) and the CEAP classification for chronic venous insufficiency. Color Doppler imaging revealed multisegmental venous insufficiency in all patients, with 9 cases of post-thrombotic etiology. Lymphoscintigraphy showed dilated lymphatic vessels and slowed lymphatic flow.Ultrasound examinations detected inflammatory edema, nodular hyperplasia of the dermis, and enlarged or obstructed lymphatic vessels.Following 12 weeks of multidisciplinary decongestive therapy, 65% (8 out of 12) of the wounds achieved full healing Stage III lymphoedema significantly delays granulation tissue formation (correlation coefficient Ro = 0.593) and prolongs wound healing time (Ro = 0.519), with both values showing statistical significance (J.M. Delić, EWMA, 2011).Lymphoedema is strongly associated with female gender, varicose veins, obesity, and cellulite. Studies have shown elevated levels of inflammatory biomarkers in affected skin - such as IL-1α, IL-1, IL-1Ra, IL-6, TNF-alpha, EGF, metalloproteinases, and granulocyte colony-stimulating factors-compared to intact skin. These conditions reduce the capacity for granulation tissue remodeling and increase the diffusion distance for oxygen and nutrients, resulting in tissue hypoxia and malnutrition (M. Sterit, Waldemar, EWMA). Stage III lymphoedema is a significant risk factor for impaired wound healing and contributes to the development of hard-to-heal wounds. Simultaneous treatment of lymphoedema and chronic wounds is essential and should be considered a basic component of therapy.
[7]Lymphiedema, chronic wounds,Multidisciplinary protocol
[8]There is none
[9]Verified data

INTRODUCTION: Lymphoedema is a disorder of the lymphatic system characterized by impaired lymph transport and the accumulation of protein-rich fluid in the interstitial space. One of the complications in patients with lymphoedema is the development of chronic, hard-to-heal wounds.
OBJECTIVE:
To implement a multidisciplinary decongestive treatment protocol for patients with stage III lymphoedema and associated wounds. The protocol includes graduated compression bandages, use

of lymphapress devices, absorptive dressings, debridement, biostimulatory wave therapy, as well as physical and nutritional therapy.

MATERIAL AND METHODS: METHODS: We analyzed 24 wounds ranging from 2.25 to 180 cm² in 15 patients (12 female, 3 male), with an average age of 67 years (range: 35-86). Diagnoses were established using the International Society of Lymphology, Classification for primary lymphoedema (Conelli F) and the CEAP classification for chronic venous insufficiency.

RESULT: RESULTS: Color Doppler imaging revealed multisegmental venous insufficiency in all patients, with 9 cases of post-thrombotic etiology. Lymphoscintigraphy showed dilated lymphatic vessels and slowed lymphatic flow.Ultrasound examinations detected inflammatory edema, nodular hyperplasia of the dermis, and enlarged or obstructed lymphatic vessels.Following 12 weeks of multidisciplinary decongestive therapy, 65% (8 out of 12) of the wounds achieved full healing.

DISCUSSION:

Stage III lymphoedema significantly delays granulation tissue formation (correlation coefficient Ro = 0.593) and prolongs wound healing time (Ro = 0.519), with both values showing statistical significance (J.M. Delić,EWMA, 2011).Lymphoedema is strongly associated with female gender, varicose veins, obesity, and cellulite. Studies have shown elevated levels of inflammatory biomarkers in affected skin - such as IL-1α, IL-1, IL-1Ra, IL-6, TNF-alpha, EGF, metalloproteinases, and granulocyte colony-stimulating factors-compared to intact skin. These conditions reduce the capacity for granulation tissue remodeling and increase the diffusion distance for oxygen and nutrients, resulting in tissue hypoxia and malnutrition (M.Sterit,Waldemar, EWMA).

CONCLUSION: Stage III lymphoedema is a significant risk factor for impaired wound healing and contributes to the development of hard-to-heal wounds. Simultaneous treatment of lymphoedema and chronic wounds is essential and should be considered a basic component of therapy.

Keywords: Lymphoedema, chronic wounds, multidisciplinary protocol

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OP-098

Rethinking Lymphatic Anatomy in the Modern Era

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OBJECTIVE: To critically re-evaluate lymphatic anatomy in the modern era by integrating extensive classical cadaveric studies with contemporary imaging techniques. This approach aims to identify anatomical variations, derivative lymphatic vessel pathways, and discrepancies between traditional cadaveric descriptions and modern imaging findings. Additionally, the study seeks to correlate these anatomical insights with patient-specific pathophysiology, ultimately enhancing understanding of lymphatic disorders and informing more precise diagnostic and therapeutic strategies.
MATERIAL AND METHODS: A total of 150 cadaveric preparations were analyzed, focusing on the lymphatic anatomy of the upper and lower limbs, skin, and central lymphatic structures. These findings were correlated with contemporary imaging modalities, including ICG lymphography, lymphoscintigraphy, magnetic resonance (MR) imaging, SPECT-CT, and conventional lymphangiography. Additionally, 80 different clinical cases from our vascular and lymphatic unit were reviewed to link anatomical findings with patient presentations.
RESULT: Comparison between classical descriptions and modern imaging revealed previously underappreciated anatomical variants and derivative lymphatic vessel pathways. Systematic analysis of these variations provided a more dynamic understanding of lymphatic architecture and its clinical relevance, highlighting patterns that may explain patient-specific pathophysiology.
CONCLUSION: Integrating classical anatomical knowledge with advanced imaging enables a comprehensive re-evaluation of lymphatic structures. This approach not only enhances understanding of lymphatic disorders but also guides more precise diagnostic and therapeutic strategies, supporting individualized and targeted patient care.

Keywords: lymphatic anatomy, anatomical variations, lymphatics images

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OP-099

Two-Year Experience with Postoperative Rehabilitation Following Lympho-Venous Anastomosis (LVA) Surgery at Semmelweis University, Hungary

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OBJECTIVE: Lympho-venous anastomosis (LVA) surgery is a promising microsurgical intervention for chronic lymphedema. The objective of this study was to evaluate postoperative changes in functional status and quality of life, and to develop a tailored rehabilitation protocol based on our findings.
MATERIAL AND METHODS: This retrospective analysis included 51 patients (35 lower limb, 16 upper limb) who underwent LVA surgery between June 2023 and May 2025 at Semmelweis University, Heart and Vascular centre. All participants completed a structured three-week inpatient rehabilitation program consisting of personalized complex decongestive therapy (CDT), which included skin care, manual lymphatic drainage, multilayer bandaging, and therapeutic exercise with compression. Exercise therapy included physiotherapy, lymphatic-specific exercises, sports therapy, and mobilization using assistive devices (MotoMed, R-Force). Assessment tools included: the Functional Independence Measure (FIM), Barthel Index, Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire for upper limb cases, Lymphedema Quality of Life Questionnaire (LYMQOL), and the Short Form Health Survey (SF-36). The six-minute walk test (6MWT) was used for lower limb cases. Limb volume, body weight, body mass index (BMI), body composition, and perceived heaviness were recorded. Assessment tools were repeated 6 months after surgery.
RESULT: Initial functional scores were high (FIM mean: 124; Barthel Index: 98) and showed no significant postoperative change (after 6 months FIM mean:126/Barthel Index mean: 100). Limb volume remained stable (upper arm mean changes: 159 ml, lower leg: 1559 ml) what means it was no significant change.
However, significant improvements were observed in quality-of-life indicators: LYMQOL global rating (Q21): Upper limb: 6.3 → 7.5, Lower limb: 6.65 → 8.66. LYMQOL domains (mean ± SD).
Upper limb: Function: 18.4 ± 0.5 → 12.6 ± 0.6, Appearance: 15.2 ± 0.5 → 10.0 ± 0.6, Symptoms: 12.3 ± 0.3 → 8.2, Mood: 12.4 ± 0.4 → 6.4 ± 0.5.
Lower limb: Function: 16.4 ± 0.5 → 14.6 ± 0.6, Appearance: 15.2 ± 0.5 → 12.0 ± 0.6, Symptoms: 15.2 ± 0.3 → 9.8, Mood: 14.6 ± 0.4 → 10.4 ± 0.5. Perceived aesthetic disturbance (10-point scale): Upper limb: 9.1 ± 0.7 → 4.7 ± 0.3, Lower limb: 8.66 ± 0.6 → 5.7 ± 0.4. All LYMQOL domain scores showed statistically significant changes ($p < 0.05$) indicating improved quality of life postoperatively.
CONCLUSION: Structured postoperative rehabilitation—particularly personalized complex decongestive therapy and guided exercise—plays a key role in enhancing quality of life following LVA surgery. While functional independence scores remained unchanged due to high baseline values, patients reported significantly improved quality of life and aesthetic satisfaction. These findings support the integration of rehabilitation into standard postoperative LVA care. Further prospective controlled studies are warranted.

Keywords: LVA, lymphedema, rehabilitation, LYMQOL, quality of life,

OP-100

MR Lymphangiography: A Cutting Edge Tool for Lymphedema Diagnosis

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OBJECTIVE: The knowledge of the status of the lymphatic system can greatly assist for the diagnosis of the lymphatic disease and its further management. There are many imaging tests for the diagnosis of lymphedema but its imaging has its advantages and disadvantages. The last 20 years there are many efforts in order to be depicted the lymphatic system in humans by investigators for the correct diagnosis of the lymphatic disease.
MATERIAL AND METHODS: Magnetic resonance imaging (MRI) is a non invasive tomographic imaging method. Images are obtained without the use of ionizing radiation by placing the body in a magnetic field and measuring relaxation of hydrogen protons (e.g. in water, fat etc.) as a function of their location. We performed MRL in different patients especially with the suspicion of the lymphedema in lower extremities.
RESULT: We managed to depict the lymphatic system of the lower extremity with the vessels and the lymph nodes. The most important thing is that we did not administrate any intravenous or subcutaneous drugs for the depiction of the Lymphatic system.
CONCLUSION: Studies will continue for MRLymphoangiography with the goals of the improvements of the technique of MRL and the improvements of the depiction of the Lymphatic system all the body until MRL will become the gold standard examination for the Lymphatic system and its diseases

Keywords: MR Lymphoangiography, Lymphatic system, Lymphedema, imaging

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OP-101

Importance of lymphoscintigraphic exam of the deep circulation for the study of oedemas of lower limb

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OBJECTIVE: Lymphoscintigraphy is considered the gold standard for diagnosing lymphedema. It allows: assessment of prognosis in confirmed clinical diagnoses; differetiation between types of edema whose origin is unclear; and early identification of lymphatic mechanical insufficiency in cases of lipedema.
A thorough lymphoscintigraphic examination studies both the superficial and deep lymphatic circulation. Alterations may affect both systems simultaneously or only one. Since 2013, at the Institute of Nuclear Medicine of the University Hospital of Udine, lymphoscintigraphy involves the separate examination of the superficial and deep lymphatic circulation. The aim of our study was to identify the clinical characteristics of cases in which only the deep circulation was impaired.
MATERIAL AND METHODS: A retrospective study was performed on lymphoscintigraphies performed from 2013 to the end of 2024 at the University Hospital of Udine (Italy). The examinations were performed with a first session for the visualization of the superficial system and, after 2-4 days, a second one for the deep circulation. After taking static images, performed immediately after the radionuclide injection, continuous segmental motor activity was performed for 45 minutes; images of the lower limbs and also of the trunk were taken one hour and two hours after inoculation.
RESULT: During the period under review, 508 patients were studied: 80 with upper limb examinations and 428 with lower limb studies. The differentiation between normal and abnormal results was performed on the basis of the Transport Index and of the Uptake Index (UI = ratio between radioactivity injected into the feet and that measured after one hour at the inguinopelvic level). In 18 cases, the lower limb examination was completely normal. In 98 patients, the disorder involved only the deep circulation: of the 196 limbs examined, 109 had abnormality of both TI and UI, 23 of TI only, and 43 of UI; finally, 21 were normal. From a diagnostic standpoint, 23 cases were diagnosed with overt lipedema, 14 with overt primary lymphedema 4 with secondary lymphedema; 15 cases were suspected to have primary lymphedema, and 10 with edema without clear diagnostic elements; finally, in 10 cases the subjects were people with class 2 or 3 obesity with circulatory return disorders.
CONCLUSION: Lymphoscintigraphy is the exam that allows us to identify mechanical insufficiency of the lymphatic systems of the limbs. There is growing evidence of the importance of examining the deep circulation in addition to the superficial one. In our experience, this approach allowed us to diagnose an isolated insufficiency of the deep network in nearly a quarter of subjects examined in the lower limbs. It has not only offered an improvement of diagnostic accuracy, but it has also allowed us to uncover the origin of subtle symptoms that are difficult to classify clinically.

Keywords: Lymphoscintigraphy, deep lymphatic system, leg oedema

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OP-102

Challenges in Treating Lymphatic Malformations: Translating Research from Bench to Bedside

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OBJECTIVE: Lymphatic malformations (LMs) are rare congenital, low-flow vascular anomalies resulting from aberrant lymphangiogenesis, most commonly affecting regions with abundant lymphatic vessels. Based on their morphology, they are classified as macrocystic or microcystic, with clinical manifestations that depend on size and location, frequently leading to compressive symptoms and functional impairment. Most isolated cystic LMs are associated with somatic PIK3CA mutations, which drive abnormal lymphatic proliferation. Recent advances in molecular diagnostics and imaging have enhanced the classification of these lesions and informed the development of targeted therapeutic strategies. This study aims to highlight the main clinical and molecular challenges in the diagnosis and management of LMs, and to explore how translational research is driving novel therapeutic approaches, bridging the gap between molecular discoveries and patient care.
MATERIAL AND METHODS: Between April 2024 and June 2025, we enrolled six patients aged 14 to 45 years. Four presented with isolated lymphatic malformations, and two had lymphatic malformations as part of a syndromic presentation. Lesion locations included two cases involving the ocular region, two affecting the lower limbs, and two involving the central lymphatic system. All patients underwent imaging evaluation, including magnetic resonance imaging (MRI), lymphoscintigraphy, ICG lymphography and lymphangiography, as well as genetic testing to identify pathogenic variants associated with lymphatic anomalies. In all cases, either resective surgery or bypass procedures were performed to treat the lymphatic malformation, followed by postoperative pharmacological therapy.
RESULT: Genetic testing confirmed PIK3CA mutations in four patients, while two presented with mutations associated with syndromic anomalies. Postoperative follow-up ranged from 3 to 12 months. All patients demonstrated partial or complete symptom improvement, with significant reduction in lesion size on imaging. Those with central lymphatic system involvement showed marked improvement in chylous effusion control. No major surgical complications were reported, and pharmacological therapy was generally well tolerated.
CONCLUSION: The combined use of surgery and targeted pharmacological therapy, guided by the understanding of the molecular mechanisms involved in lymphatic malformations, yields promising outcomes in their management. The application of the latest laboratory research related to the molecular treatment of lymphatic malformations has proven highly satisfactory, offering new perspectives for improved patient care and long-term control of the disease.

Keywords: lymphatics malformations, PIK3CA mutations, Molecular theraphy

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OP-103

Human Cadaver as an LVA Training Model: Is It Worthwhile?

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OBJECTIVE: The success of supermicrosurgical lymphaticovenular anastomosis (LVA) relies on the surgeon's technical skills, which can be enhanced through simulation. Many current models, however, lack essential procedural steps, such as lymphatic vessel identification and optimal anastomotic configurations, due to inherent limitations. This study evaluates the human cadaver as a high-fidelity model for LVA training.
MATERIAL AND METHODS: Supermicrosurgical LVA was simulated on fresh human cadavers, closely mirroring LVA surgery on live patients. Procedures were performed on both upper and lower extremities. Following each session, surgeons documented their experiences, comparing the fidelity and technical nuances of the simulation to real surgery, as well as any modifications required. They also evaluated how the cadaver model prepared them for actual procedures.
RESULT: Twenty limbs (10 upper, 10 lower) across 11 cadavers were evaluated, with 31 LVAs performed through 42 exploratory incisions. Surgeons reported the cadaver simulation provided maximum realism and surpassed other training models in preparing them for real-world LVA surgery.
CONCLUSION: The human cadaver offers unmatched fidelity for LVA simulation compared to currently available training models. We recommend this model as a final step in LVA skill preparation, providing comprehensive practice on all critical aspects of the procedure.

Keywords: Lymphaticovenular anastomosis, Supermicrosurgery, Human cadaver, Surgical training, Lymphedema surgery

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OP-104

Long-term patency of lymphatic-venous by-passes: pathophysiologic mechanisms

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OBJECTIVE: Lymphedema is always initially treated by combined decongestive physiotherapy (CDP). Those cases, refractory to CDP, may be managed by surgical therapy. One of the most used microsurgical procedures is represented by the technique of lymphatic-venous anastomosis (LVA). But very few papers report long term results of LVA. The aim of this study is to assess the long-term patency of multiple lymphatic-venous anastomosis (LVA) for the treatment of secondary lymphedemas.
CASE: From January 2014 to December 2014, 101 patients (mean age: 56.94 ± 8.98 years; female/male: 86/15) affected by secondary cancer-related lymphedema (38 lower and 63 upper limbs) were treated by LVA. All lymphedemas had previously been treated by conservative therapy without sustained results. Many patients (78%) had 1-3 episodes of acute lymphangitis/year. Lymphoscintigraphy, venous duplex-ultrasonography, and abdominal or axillary ultrasound investigation were performed preoperatively. MLVA patency was assessed by the lymphatic transport index (LyTI) and lymphoscintigraphic pattern.
RESULT: At 1 year after surgery, excess volume reduction was 75%-90% in the early stage II secondary lymphedemas, and 60%-75% in the late stage II. The decrease in volume maintained stability in the 5-years follow-up period. Two more advanced lower and one upper limb lymphedemas had 45%-60% reduction. LyTI showed a significant decrease between the preoperative mean value (31.7 ± 9.43) and after 18 months from surgery (11.2 ± 1.91) ($p < .001$). MLVA patency was shown in 98 (97%) patients. No patients had evidence of postoperative lymphangitis.
This study demonstrated the long-term patency of LVA in the treatment of cancer-related lymphedemas.

Keywords: lymphatic-venous by-pass, lymphedema therapy, lymphatic microsurgery, early treatment, long-term patency

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OP-105

Differential impact of EPHB4 likely pathogenic variants between lymphatic and CM-AVM2-related phenotypes

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OBJECTIVE: Heterozygous EPHB4 mutations have been linked to capillary malformation-arteriovenous malformation 2 (CM-AVM2), as well as to lymphatic-related hydrops fetalis (LRHF), late-onset primary lymphedema (PL), and central conducting lymphatic anomaly (CCLA). However, the molecular mechanisms leading to these phenotypic differences remain unclear.
MATERIAL AND METHODS: Using our Highlander software, we explored our large cohort of WES data of patients with lymphatic-related abnormalities and CM-related conditions for missense variants in EPHB4. Because the position of the variants in the protein does not discriminate the pathologies, we initiated in vitro molecular characterization by mutagenizing the variants in an expression vector and exploration of the transfected cells by western blot and flow-cytometry.
RESULT: We identified overall 73 amino acid substitutions, including 24 EPHB4 variants from lymphatic-related patients and 49 from CM-related patients. These variants were predicted as likely pathogenic by at least 5 out of 20 variant effect predictors used in Highlander. We have already characterized 25 of them and demonstrate differential molecular defects for 9 found in CM-related patients, 5 in lymphatic-related patient and 1 in a patient with a combination of both phenotypes.
CONCLUSION: These findings underscore the importance to identify rare EPHB4 missense variants, generally classified as Variants of Unknown Significance (VUS) and to perform functional validation to discriminate between rare polymorphisms without a functional impact and pathogenic variants. Moreover, it enables to differentiate the molecular mechanisms between LRHF or CM-AVM2. This is an essential step to establish targeted therapeutic approaches for the two diseases with distinct etiopathogenic mechanisms.

Keywords: gene, mutation, primary lymphedema

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OP-106

Localized Late-Onset Primary Lymphedema: An Emerging Underdiagnosed Condition?

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OBJECTIVE: Primary lymphedema (PL) is a rare congenital condition characterized by developmental and functional abnormalities in the lymphatic vascular system, leading to the accumulation of protein-rich fluid within tissues and resultant interstitial edema. The majority of PL cases have a genetic basis with autosomal dominant inheritance, although a causative mutation is identified in only approximately one-third of affected individuals. The condition can present congenitally or manifest later in life. This study aimed to evaluate a cohort of patients with late-onset, unilateral primary lymphedema, exclusively localized to the dorsum of the foot and toes, classified as stage 0-1 according to the International Society of Lymphology (ISL) staging system.
MATERIAL AND METHODS: We included 8 patients, aged 37 to 53 years, who presented with unilateral edema localized to the dorsum of the foot and toes (6 on the right side and 2 on the left). These patients were evaluated between April 2024 and March 2025 at the Lymphology Unit of the Central Military Hospital of Buenos Aires. All patients underwent lymphoscintigraphy (LCG), indocyanine green lymphography (ICG Lymp), and tissue biopsies (6 from the dorsum of the foot and 2 from the second toe of the affected foot) following a detailed clinical assessment. Additionally, a germline genetic panel was performed in 3 of the patients to evaluate potential genetic mutations.
RESULT: All patients demonstrated a localized dermal back flow pattern on the dorsum of the foot and toes, with evidence of collateral circulation through the deep lymphatic system on LCG. A rerouting pattern was identified through the posterior retromalleolar pathway in ICG Lymp, no detectable with LCG. Histopathological analysis of all tissue biopsies revealed lymphatic vessel ectasia, as well as mild interstitial edema. All germline genetic panels studied were negative.
CONCLUSION: This study delineates a distinct phenotype of late-onset primary lymphedema in adult patients, characterized by edema localized exclusively to the dorsum of the foot and toes. This variant is often underdiagnosed and frequently associated with subjective symptoms, with clinical manifestations becoming more pronounced in warmer months, when patients report increased difficulty wearing footwear. The study findings indicate a consistent pattern of deep lymphatic circulation on LCG, accompanied by a rerouting pattern on ICG lymphography. These findings contribute to a better understanding of this unique presentation of primary lymphedema.

Keywords: Primary lymphedema, Localaized edema, Late onset primary lymphedema.

OP-107

An updated classification of primary lymphedema based on age of onset, lymphatic anomalies and genetics and its impact on clinical treatment

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OBJECTIVE: To update the classification of extremity primary lymphedema (PLE) based on age of onset, lymphatic anomalies and genet
MATERIAL AND METHODS: A prospective research method was adopted. Patients with lower and upper limb PLE who visited Department of Plastic & Reconstructive Surgery, Shanghai Ninth People's Hospital, Shanghai JiaoTong University School of Medicine from January 207 to December 2021 were selected. Sex, age of onset, location, family history, morbidity were documented. The lymphatic imaging findings of magnetic resonance lymphography (MRL), indocyanine green lymphography (ICGL) and lymphoscintigraphy (LSG), skin tissue histology, whole exome sequencing were evaluated. Descriptive statistical method was used for data statistics.
RESULT: A total of 1,046 patients were included, among whom 1,013 had lower extremity involvement and 33 had upper extremity involvement. Divided by the age of onset, there were 237 cases of congenital (<1 year old) and 809 of late-onset (≥1 year old), with a ratio of about 1:4. Among the late-onset patients, the number of patients who the disease during adolescence (11-20 years old) was the highest, with a total of 276 cases. Among patients with congenital lower limb PLE, 13.2% (27/204) had a family history. Among those with late-onset of PLE, 6.6% (53/809) had a family history. A total of 225 patients underwent whole exome sequencing (208 cases in the lower limbs and 17 cases in the upper limbs), showing that 37 patients (17.8%, 37/208) with lower limb PLE were found to carry 38 pathogenic variants in FLT4, GJC2, CELSR1, PTPN14, FOXC2 and GATA2, only 1 patient (5.9%, 1/17) with upper limb PLE was found to carry a PIEZO1 compound heterozyg variant. Three major lymphatic anomalies were identified, in which segmental lymphatic dysfunction, characterized by delayed or partial demonstration of lymph vessels, was the most common and associated with FLT4, GJC2, CELSR1, and PTPN14 mutations. The next most common type was lymphatic hyperplasia, which was associated with FOXC2 and GATA2 variants, followed by initial lymphatic aplasia or dysfunction and associated with FLT4 and PIEZO1 mutation. This study also compares the clinical treatment outcomes of different lymphatic malformations
CONCLUSION: A classification of extremity PLE is proposed based on age of onset, lymphatic anomalies and genetics, which are segmental lymphatic dysfunction, lymphatic hyperplasia, and initial lymphatic aplasia or dysfunction. It provides a basis for exploring personalized and targeted therapies for various types of primary lymphedema.

Keywords: Primary lymphedema, Lymphatic dysfunction, Initial lymphatic aplasia or dysfunction, Lymphatic imaging,

OP-108

Robotic-Assisted Lymphovenous Anastomosis: A Systematic Review of Surgical Outcomes

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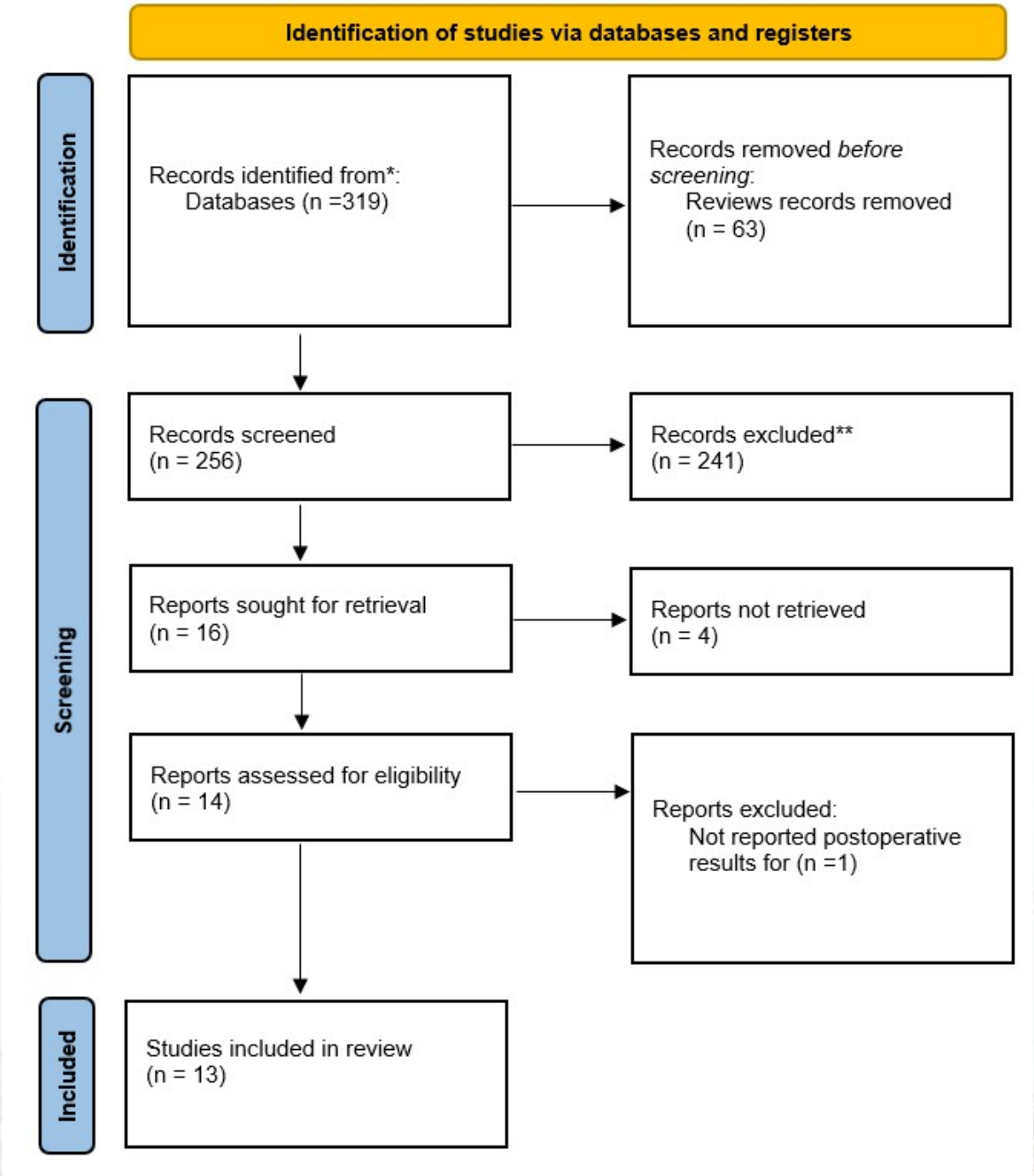
OBJECTIVE: Lymphovenous anastomosis (LVA) is an established microsurgical treatment for lymphedema. Robotic assistance in LVA procedures has emerged as a promising advancement, yet its effectiveness and clinical outcomes have yet to be systematically evaluated.
MATERIAL AND METHODS: A systematic review following PRISMA guidelines was conducted using PubMed and
manual searching for studies published between January 2000 and December 2024. Included studies reported outcomes of robotic-assisted LVA procedures. Risk of bias was assessed using appropriate tools including RoB 2 and ROBINS-I.
RESULT: Thirteen studies comprising 257 patients who underwent 225 robotic-assisted lymphovenous anastomoses were included. Mean anastomosis duration ranged from 16 to 25.3 minutes. Initial patency rates were 97-100%, with a 12-month patency of 66.6% for Robotic LVA versus 81.8% for manual LVA. Volume reduction was achieved in 86% of upper extremity cases (mean: -7.6%) and 72% of lower extremity cases (mean: -1.4%). Complications were minimal, primarily including vessels anastomotic thrombosis and wound infections. Surgeon satisfaction scores were lower for Robotic LVA (3.1 ± 0.6) compared to manual LVA (3.8 ± 0.8), though ergonomic benefits were noted.
CONCLUSION: Robotic LVA demonstrates comparable technical success and clinical outcomes to manual techniques, with high initial patency rates and signific number of patients who experienced volume reductions in treated limbs. While operative times are longer, a clear learning curve effect suggests improved efficiency with experience. The technology shows promise for lymphedema treatment, though larger randomized trials with longer follow-up are needed to establish long-term comparative efficacy.

Keywords: Lymphedema, Supermicrosurgery, Microsurgery, Robotic Surgery, Robotic Assisted Surgery

Figure 1



PRISMA Flow Diagram for Systematic Review of Robotic-Assisted Lymphovenous Anastomosis

OP-109

Single-Session Oncologic and Lymphatic Surgery: Simultaneous Lymphatic Reconstruction with Axillary Dissection

Onur Aksoy

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OBJECTIVE: This study aims to assess the safety and efficacy of simultaneous lymphaticovenular anastomosis (LVA) performed during axillary lymph node dissection in breast cancer patients, focusing on postoperative limb symmetry and quality of life.
MATERIAL AND METHODS: A total of 16 female patients (mean age: 54.2 ± 6.8 years) diagnosed with node-positive breast cancer were included. All patients underwent modified radical mastectomy with axillary dissection, and simultaneous LVA was performed at the wrist level by the the reconstructive surgical team. Circumference measurements were obtained preoperatively and at the 6th postoperative month at 10 cm above and 10 cm below the elbow bilaterally. Postoperative limb volume symmetry was assessed, and patient-reported outcomes were evaluated using the LymQoL (Lymphedema Quality of Life) questionnaire. Statistical analysis included paired t-tests with a significance threshold of $p < 0.05$.
RESULT: At 6 months, there was no statistically significant difference in limb circumference between the affected and unaffected arms ($p = 0.412$ above elbow, $p = 0.388$ below elbow). Mean total LymQoL score was 6.9 ± 0.7, indicating minimal symptom burden and high satisfaction. None of the patients developed clinically apparent lymphedema during the follow-up period.
CONCLUSION: Prophylactic LVA performed at the time of axillary dissection is a safe and effective approach to preserve limb symmetry and prevent early-onset lymphedema. This technique supports patient satisfaction and functional well-being and may be considered as an integrated part of oncologic surgery in high-risk patients.

Keywords: Lymphedema, lymphaticovenular anastomosis (LVA), axillary dissection, breast cancer surgery, LymQoL

Table 1. Mean Circumference Differences at 6 Months Postoperative

Measurement Site	Affected Arm (cm)	Unaffected Arm (cm)	Mean Difference (cm)	p-value
10 cm Above Elbow	29.3 ± 2.1	29.1 ± 2.2	0.2 ± 0.5	0.412
10 cm Below Elbow	25.5 ± 1.8	25.4 ± 1.7	0.1 ± 0.4	0.388

Mean Circumference Differences at 6 Months Postoperative

OP-110

Implementation of a surveillance program for early diagnosis and treatment of arm lymphedema

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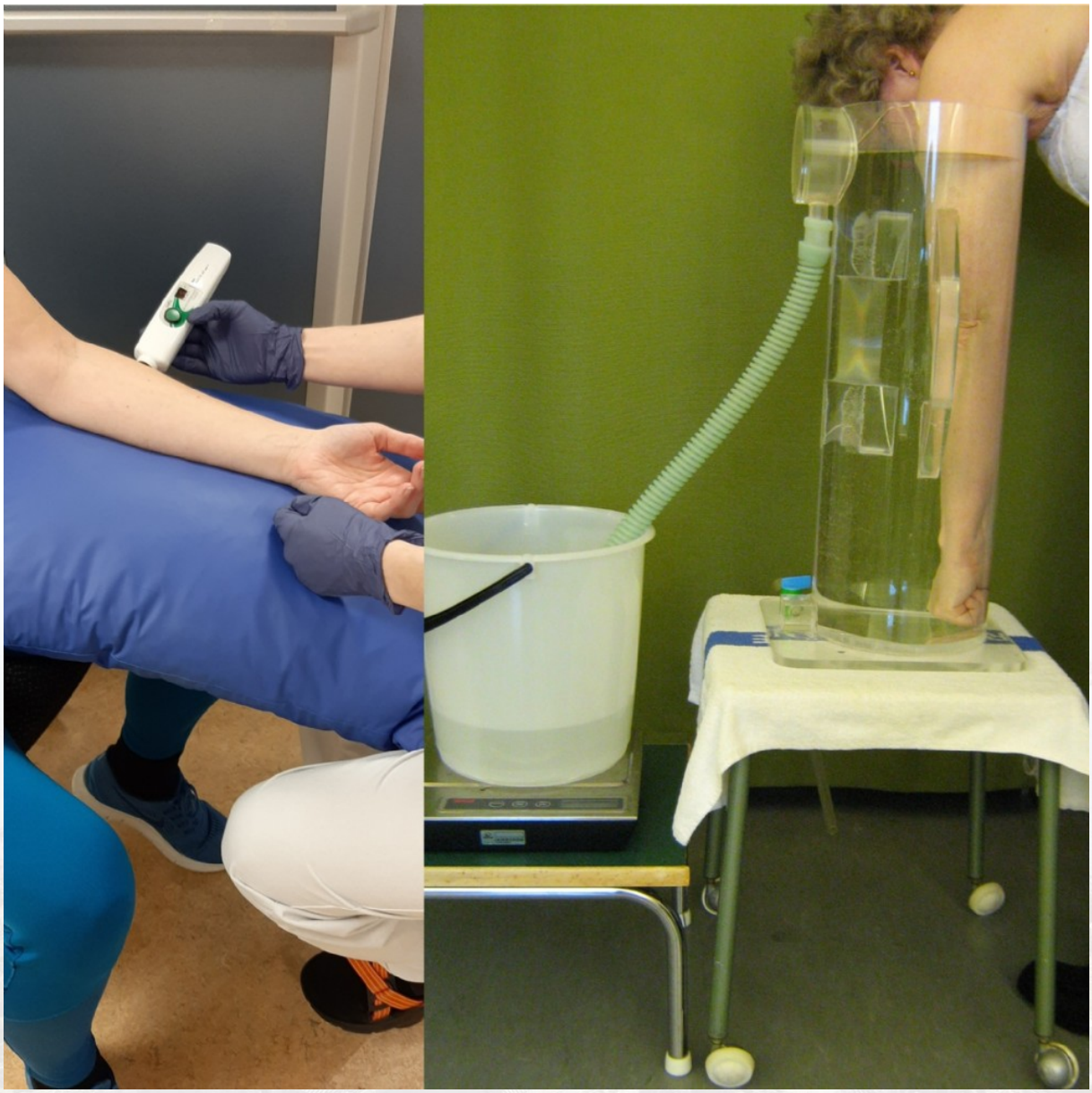
OBJECTIVE: Breast cancer treatment with axillary lymph node surgery and radiotherapy, as well as high BMI and physical inactivity, increase the risk of arm lymphedema. Though the incidence of arm lymphedema has decreased, due to a gradual decline in mortality, the prevalence has increased. Breast cancer survivors with chronic lymphedema (LE) experience a lower Health-Related-Quality of Life (HRQOL) than those without LE, and thus prevention is desired. The most important and evidence-based treatment of breast cancer related arm lymphedema (BCRL) is daily use of compression sleeve. In a 10-year follow-up study of early diagnosed and treated BCRL it was found that 28% of the patients no longer had lymphedema by definition (lymphedema relative volume ≥5%), and it was questioned whether these patients were in need of any treatment at all. Thus, a randomized controlled trail (RCT) was conducted with the aim to examine (i) the proportional difference in progression/no progression in mild BCRL, and (ii) changes in arm volume and local tissue water when treated with compression sleeve or not for 6 months, and by 12-months follow-up.
MATERIAL AND METHODS: The study included 75 women treated for unilateral breast cancer, with axillary node dissection and diagnosed with mild BCRL by Water Displacement Method (WDM) showing a lymphedema relative volume (LRV) 5-8% and/or Tissue Dielectric Constant (TDC) ratio 1.45/1.3 at the upper/forearm, in combination with palpation of increase skinfold thickness. The diagnosis was set within a screening program with follow-up of breast cancer patients at risk of arm lymphedema, one month post-surgery and three months post-radiotherapy.
Method
At the start of the RCT, the women with mild BCRL were randomized to a compression group (CG; compression sleeve (ccl 1), n=37) or not (NCG, n=38) for 6 months with an observational 12-months follow-up and progression/no progression of mild BCRL was examined, as well as changes in arm volume and local tissue water. Also, the difference between CG and NCG in disease specific HRQOL was investigated at 6 months.
RESULT: The TDC method detected more patients with mild BCRL, earlier after surgery and at a lower LRV compared to the WDM method, but both methods together with skinfold palpation for diagnosis are needed. Both methods also could detect changes in mild BCRL during treatment and thus can be used to evaluate treatment. A larger proportion of women in the NCG ($p<0.001$, 0.012) showed progression (57%, 67%) compared to the CG (16%, 31%) at 6 and 12 months, respectively. More than 30% of NCG did not progress at all. No changes of LRV and TDC ration were found at any follow-ups but were stable at a low level. The participants in both CG and NCG rated a high HRQOL, but the CG experienced a higher negative impact on HRQOL in the practical domain and in some of the items in the psychosocial domain compared to the NCG.
CONCLUSION: Implementing screening for at-risk patients and clinical assessments of skinfold thickness, local tissue water content, and arm volume can ensure early diagnosis. When BCRL is diagnosed early and is mild, it can be effectively managed by compression garment treatment over the long term, or even regress. Wearing a compression garment has a minor negative impact on HRQOL

and needs to be considered in
relation to the preventive effect. Recommendations for an organizational approach will be discussed.

Keywords: Arm lymphedema, prevention, water displacement method, tissue dielectric constant, skinfold thickness, compression

Assessments of local tissue water by Tissue dielectric constant and arm volume by the Water displacement method



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OP-111

Uncovering Deep Lymphatic Alterations in CEAP C0s: A Lymphoscintigraphic Study and Description of the Novel 'Fifth Toe Sign'

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OBJECTIVE: To investigate the prevalence of deep lymphatic system dysfunction in CEAP C0s (Clinical-Etiology-Anatomy-Pathophysiology Class 0s) patients using lymphoscintigraphy, and to preliminarily assess the diagnostic value of a novel clinical marker, the “fifth toe sign”.
MATERIAL AND METHODS: Retrospective observational study conducted at a single center between November 2018 and March 2025. Clinical records of all patients who attended the clinic during this period were reviewed. Subjects were eligible for inclusion if they presented with symptoms suggestive of venous disease (e.g., lower limb heaviness, cramps, or evening swelling) but showed no objective signs of venous pathology and underwent lymphoscintigraphy as part of their diagnostic workup. Subjects with active ulceration, clinically overt lymphedema, history of venous surgery or lumbar radiculopathy were excluded.
A total of 91 patients (85 females, 6 males; mean age 44.3 ± 14.1 years) were retrospectively enrolled. All underwent routine physical examination and lymphoscintigraphy to assess superficial and deep lymphatic function. The Transport Index (TI) was used for semiquantitative assessment of lymphatic flow. When present, the “fifth toe sign” (a sclero-edematous thickening of the fifth toe) was recorded.
RESULT: Pathological lymphoscintigraphy findings were present in 80 of 91 patients (87.9%), with 74 of 88 (84.1%) demonstrating deep lymphatic system dysfunction. The fifth toe sign was documented in 33 patients and was positive in 25 (27%). Sensitivity and specificity of the fifth toe sign for deep lymphatic dysfunction were 86.4% and 12.5%, respectively. No statistically significant correlation was found between the sign and lymphoscintigraphic abnormalities. Logistic regression did not reveal significant associations between the fifth toe sign and TI values in either limb.
CONCLUSION: Deep lymphatic dysfunction is highly prevalent among C0s patients, suggesting that subclinical lymphatic impairment may play a significant role in early venous symptomatology. This underscores the importance of integrating deep lymphatic assessment in the early diagnostic evaluation of chronic venous disease. While the fifth toe sign emerged as a potentially early indicator of lymphatic compromise, its low specificity limits its utility as a standalone diagnostic marker. It should therefore be interpreted as an adjunctive clinical feature rather than a definitive diagnostic marker. Further prospective studies are needed to confirm its diagnostic value and to clarify the role of deep lymphatic impairment in early-stage CVD.

Keywords: Lymphoscintigraphy, deep lymphatic system, CEAP C0s, chronic venous disease, fifth toe sign.

Patients' clinical and demographic characteristics.

	Category	N° (%)
Sex	F M Total	85 (93%) 6 (7%) 91 (100%)
Age (Average ± SD)		44.3 years (±14.1)
Fifth Toes Sign (Pos/Neg)	Neg N/a Pos	8 (9%) 58 (64%) 25 (27%)
Fifth Toe Sign	Bilateral Left Right unknown	24 (26%) 1 (2%) 0 66 (72%)
Lymphoscintigraphy	Neg Pos	11 (12%) 80 (88%)
Affected Side	Bilateral Right Left	60 (77%) 11 (14%) 7 (9%)
DLS Impairment	No Yes	14 (16%) 74 (84%)
Transport Index (Right DLS)	0 - 9 10 - 20 >20 Unknown	10 (10%) 12 (14%) 14 (16%) 55 (60%)
Transport Index (Left DLS)	0 - 9 10 - 20 >20 Unknown	15 (16%) 9 (11%) 11 (12%) 55 (61%)

Abbreviations: DLS: deep lymphatic system; N/a: not available

OP-112

Effects of Manual Lymphatic Drainage Combined with Press-Release Method Orthopedic Manual Lymphatic Physiotherapy on Upper Extremity Edema and Shoulder Joint Range of Motion and Pain in Patients with Breast Cancer

seung hyeok song[1], Sung Il Park[2], Sang Min Park[3]
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OBJECTIVE: The purpose of this study is to investigate the effectiveness of orthopedic manual lymphatic drainage techniques to move fluid and soften hardened tissues using functional assessment of the upper extremity of patients after breast cancer surgery, as well as edema and pain scales.
MATERIAL AND METHODS: The study included 24 patients diagnosed with lymphedema following mastectomy surgery, who received the intervention twice a day, three times a week for six weeks, and were evaluated for upper extremity swelling volume assessment and shoulder joint range of motion and pain sensory.
RESULT: In conclusion, this study demonstrates that the integrated lymphatic therapy approach of orthopedic manual lymphatic physiotherapy is an effective treatment for reducing edema, improving shoulder joint range of motion, and reducing pain sensory in the upper extremity in postoperative patients with breast cancer.
CONCLUSION: Orthopedic manual lymphatic physiotherapy with press-release techniques was effective in improving upper extremity edema, shoulder joint range of motion, and pain in a post-breast cancer surgery patient.

Keywords: Edema, Manual Lymph Drainage, Orthopedic manual lymphatic physiotherapy

intervention

The intervention for the Manual Lymph Drainage technique of the Press-Release technique section

result

Variable	Experimental group (N=12)	Control group (N=12	p *p<0.05	
Age(year	57.70±14.36	54.74±8.44	0.64	
Weight(kg)	57.80±7.90	58.47±8.41	0.61	
Height(cm)	158.65±4.20	157.43±2.68	0.51	
RT:Radiological treatment	2	1	0.11	
CT:Chemical treatment	4	5	0.21	
Radiological treatment+Chemical treatment	6	6	0.17	
Post operate duration	7.28±6.44	8.18±10.67	0.71	
Comparison of Upper arm volume				
Group	Part	Pre treatment (N=12) (M±SD)	Post treatment (N=12) (M±SD)	p
Experimental group	upper arm forearm	31.54±3.47 26.04±1.77	25.87±3.61 22.17±1.87	0.00 0.00
Control group	upper arm forearm	28.47±2.87 26.74±1.31	27.61±2.12 25.74±1.74	0.04 0.11
Comparison of ROM with shoulder joint				
Group	Motion	Pre treatment (N=12) (M±SD)	Post treatment (N=12) (M±SD)	p
Experimental group	Flexion Abduction External rotation	151.50±21.48 155.50±19.31 63.50±10.05	167.50±11.45 175.50±7.01 79.50±6.37	0.00 0.00 0.00
Control group	Flexion Abduction External rotation	150.50±13.01 145.50±24.13 62.50±14.07	153.50±21.17 150.35±22.34 63.47±8.54	0.08 0.01 0.67

Comparison of Pain				
Group	Pre treatment(N=12) (M±SD)	Post treatment (N=12) (M±SD)	p	
Experimental group	5.95±1.41	4.07±1.37	0.00	
Control group	6.04±1.96	5.78±1.44	0.06	

resurch result

OP-113

Can exercise prevent cancer-related lymphoedema?

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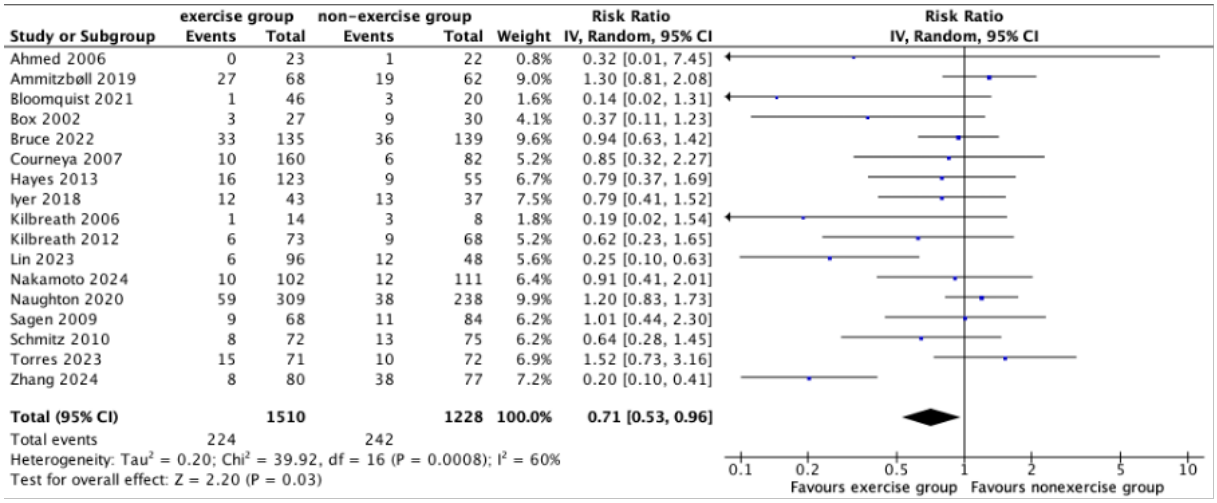
OBJECTIVE: This systematic review and meta-analysis aimed to evaluate the effect of exercise on the prevention of cancer-related lymphoedema.
MATERIAL AND METHODS: A search of 6 electronic databases was undertaken to identify intervention studies published up to May 2025. Studies included individuals at risk of cancer-related lymphoedema, comparing exercise to no exercise, and reporting lymphoedema outcomes. Given the lack of a gold standard for lymphoedema measurement, data from all assessment methods were extracted, though data from objective measures were prioritised over self-report when both were available. Meta-analyses using random effects models estimated the pooled effect of exercise on cancer-related lymphoedema. Subgroup analyses were conducted for exercise intervention characteristics (mode, length of intervention, supervision level), lymphoedema type (upper- versus lower-limb lymphoedema), lymphoedema measurement tool and the number of lymph nodes dissected (<5 versus 5+ lymph nodes removed).
RESULT: Seventeen studies (published 2002-2024), involving 2740 individuals were included. Most (88%, n=15) studies focused on upper-limb lymphoedema post-breast cancer, and two studies investigated risk of lower-limb lymphoedema post-ovarian (n=1) and cervical (n=1) cancer. Studies varied widely in sample characteristics, interventions, outcome measures, risk of bias and timing of assessment. Lymphoedema cases were defined using circumferences (n=4), arm volumes (n=5), bioelectrical impedance analysis (n=3), self-report (n=2), or a combination of these methods and/or clinician diagnosis (n=3). Relative risk (RR) of developing cancer-related lymphoedema for those in the exercise group compared with the non-exercise group was 0.71 (95% confidence interval (CI), 0.51 to 0.97) (Figure 1). When the meta-analysis was rerun excluding data from studies that included 1-38% of people with evidence of lymphoedema at baseline (9 studies), the RR of developing lymphoedema was 0.65 (95%CI 0.39-1.10). 91% (n=21 study arms) in favor of those in the exercise group compared with the non-exercise group. Compared to non-exercise control groups, subgroups analyses' results showed the RR of developing lymphoedema for those participating in exercise interventions lasting 12 weeks or more, and for those in mostly unsupervised exercise interventions was 0.69 and 0.54, respectively ($p<0.05$).
CONCLUSION: In the past, the message was that exercise did not cause cancer-related lymphoedema. These findings are practice-changing, as we now have scientific evidence that supports the role of exercise in the prevention of cancer-related lymphoedema, with the effect size considered clinically meaningful and supported statistically.

Keywords: lymphedema, meta-analysis, prevention.

Figure 1.



Study or Subgroup	exercise group Events	Total	non-exercise group Events	Total	Weight	Risk Ratio IV, Random, 95% CI
Ahmed 2006	0	23	1	22	0.8%	0.32 [0.01, 7.45]
Ammitzbøll 2019	27	68	19	62	9.0%	1.30 [0.81, 2.08]
Bloomquist 2021	1	46	3	20	1.6%	0.14 [0.02, 1.31]
Box 2002	3	27	9	30	4.1%	0.37 [0.11, 1.23]
Bruce 2022	33	135	36	139	9.6%	0.94 [0.63, 1.42]
Courneya 2007	10	160	6	82	5.2%	0.85 [0.32, 2.27]
Hayes 2013	16	123	9	55	6.7%	0.79 [0.37, 1.69]
Iyer 2018	12	43	13	37	7.5%	0.79 [0.41, 1.52]
Kilbreath 2006	1	14	3	8	1.8%	0.19 [0.02, 1.54]
Kilbreath 2012	6	73	9	68	5.2%	0.62 [0.23, 1.65]
Lin 2023	6	96	12	48	5.6%	0.25 [0.10, 0.63]
Nakamoto 2024	10	102	12	111	6.4%	0.91 [0.41, 2.01]
Naughton 2020	59	309	38	238	9.9%	1.20 [0.83, 1.73]
Sagen 2009	9	68	11	84	6.2%	1.01 [0.44, 2.30]
Schmitz 2010	8	72	13	75	6.2%	0.64 [0.28, 1.45]
Torres 2023	15	71	10	72	6.9%	1.52 [0.73, 3.16]
Zhang 2024	8	80	38	77	7.2%	0.20 [0.10, 0.41]
Total (95% CI)		**1510**		**1228**	**100.0%**	**0.71 [0.53, 0.96]**
Total events	224		242			

Heterogeneity: $Tau^2 = 0.20$; $Chi^2 = 39.92$, df = 16 (P = 0.0008); $I^2 = 60\%$
Test for overall effect: Z = 2.20 (P = 0.03)

Meta-analysis of exercise trials evaluating the effect of exercise on the prevention of lymphedema, using cumulative incidence or point prevalence. An RR less than 1 suggests reduced risk of lymphedema for those in the exercise intervention groups.

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OP-114

Evaluation of the Efficacy of Myofascial Chain Release Techniques on Postoperative Shoulder Joint Mobility Limitations Following Breast Cancer Surgery-Preliminary Study

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OBJECTIVE: To evaluate the effects of myofascial chain and acupoint release techniques and manual lymphatic drainage, applied both independently and in combination, on alleviating shoulder mobility limitations following breast cancer surgery.
MATERIAL AND METHODS: This study is a randomized, controlled, double-blind experimental trial. Women aged 30 to 60 years who had undergone simple (total) mastectomy, modified radical mastectomy, or breast-conserving surgery with accompanying axillary lymph node dissection within the last 1 year and who exhibited shoulder joint mobility restrictions secondary to breast surgery were included. Participants were allocated into four groups for treatment as follows: Control Group: Conventional physiotherapy program (CT); Experimental Group 1: CT plus Manual Lymphatic Drainage (MLD); Experimental Group 2: CT plus Acupoint Release (AR) techniques; and Experimental Group 3: CT combined with MLD and AR techniques were applied. All participants received treatment twice weekly for six-weeks. Evaluations were performed at three time points: pre-treatment, immediately post-treatment, and at one-month follow-up.
RESULT: The preliminary findings demonstrated that all groups experienced significant improvements in pressure-pain threshold, joint range of motion, and pain intensity. Likewise, anxiety and depression levels and functional status improved across all groups in response to the intervention, and these gains were sustained at one-month follow-up. However, no consistent change was observed in the elasticity of the breast scar tissue.
CONCLUSION: Neither the isolated nor the combined application of MLD and AR techniques confers any superiority over conventional physiotherapy protocols. Statistical analyses performed on an enlarged patient cohort would yield more reliable conclusions on this matter.

This project was supported by TÜBİTAK (1002-A/ 123S163) and the Scientific Research Projects Coordination Unit of IMU (2023-KDT-SB-0002).

Keywords: Acupoint, mastectomy, shoulder limitation

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OP-115

Changes in upper-body function predict breast cancer-related lymphoedema: Results from a prospective, population-based cohort study

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OBJECTIVE: To describe upper-body function after breast cancer diagnosis, and to evaluate whether declines in upper-body function after breast cancer diagnosis predict breast cancer-related lymphoedema.
MATERIAL AND METHODS: The North Carolina Breast Cancer Study is a longitudinal, prospective, population-based cohort study involving women diagnosed with invasive breast cancer (n=2998). Upper-body function and breast cancer-related lymphoedema were assessed at baseline (between 2- to 9-months post-diagnosis) and at 2 and 7-year follow-up. Upper-body function was assessed with the Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH) questionnaire. The validated tool includes 11 items with a total possible score ranging from 0 to 100. A change score of +13 points was defined a priori as being a clinically relevant decline in upper-body function. Incidence of breast cancer-related lymphoedema was collected via self-report of a clinical diagnosis. Logistic regressions were used to explore the predictive relationship between change in upper-body function (that is, those who reported declines in upper-body function between baseline and 2-year follow up, compared with those who reported no change or improvements in upper-body function) and breast cancer-related lymphoedema at 2- and 7-years after diagnosis, adjusted for participant's age, race, body mass index at baseline, cancer stage at diagnosis, number of extracted lymph nodes, and treatment type (surgery, surgery and radiation, surgery and chemotherapy, or surgery and radiation and chemotherapy).
RESULT: The mean age of the total sample was 52 years, 48% reported body mass index >30 kg/m², and the median number of examined lymph nodes was 4 (minimum, maximum: 0, 57). Declines in upper-body function between baseline and 2--years post-diagnosis were reported in 16.4% of women. Compared with those who reported either no change or improvements in upper-body function between baseline and 2 -year follow-up, worsening upper-body function was associated with a >2-fold increase in the odds of reporting breast cancer-related lymphoedema at 2- and 7-years after diagnosis (OR (95% Confidence Interval): 2.26 (1.75, 2.92) and 2.04 (1.56, 2.66), respectively).
CONCLUSION: These results support the need for early identification and subsequent management of impairments in upper-body function to reduce development of lymphoedema.

Keywords: breast cancer, upper-body function, lymphedema, cohort study.

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OP-116

Lymphatic injections on cadavers for anatomical study

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[3]*lux vox pharmacy grenoble*

OBJECTIVE: Through history of anatomy of the lymphatic vessels the authors evoke the first injections and the different solutions used by anatomists.From Mascagni to Papamiltiades they explain the historical importance of Gerota's solution which represented a corner stone of anatomical research; but they want to prove that in the second part of the XX e century important progress of technics allowed excellent results in many fields.That is the result of Papamiltiades solution that is colored cedar oil.But we personnally add a stone in this edifice using colored china wood oil an bakelite.
MATERIAL AND METHODS: 460 corpses essentially fetuses or still borns were used for the study.
180 for lymphatic vessels of the stomach
130 for lymphatics of pancreas
50 for lymphatics of lung
40 for lymphatics of thyroid
20 for lymphatics of esophagus
40 for lymphatics of upper and lower limbs
Gerota's solution Papamiltiades solution and personnal China wood oil were used
RESULT: The results obtained by Papamiltiades and personnal China wood oil seemed better for us: better difusion of solution and more beautifull aspect.
But this anatomical study on cadavers convinced us that study on corpses do not allow the anatomist to speak of lymphatic drainage but only to give descrpition of the channels without concept of territory.
CONCLUSION: The anatomical study of lymphatic vessels on corpses is still now of great importance for some paradoxal spreads of cancerous cells which were not explained seemed linked to unknown anatomy

Keywords: lymphatic, vessels,solutions, technic, injection

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OP-117

Exploring the role of distal lymphaticovenular anastomoses (LVA) in the prevention of lower limb lymphedema post inguinal nodal dissection

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OBJECTIVE: Lymphedema is an often overlooked and underestimated condition, and this progressive chronic disease has serious implications on patients' quality of life. Radiotherapy after lymph node dissection has significantly increased the risk of developing extremity lymphedema. The main goal in lymphedema management is to prevent rather than cure. Prophylactic procedures like LymPHA and distal LVA (Lymphaticovenous anastomosis) are widely practised and reported for upper extremity lymphedema prevention post axillary nodal clearance for breast lesions. To our knowledge, there is no current study regarding distal LVA for lower limb lymphedema prevention. We report a pilot study of applicability of prophylactic distal LVAs after inguinal nodal clearance.
CASE: Four patients who underwent prophylactic LVA distal to the groin, along with a pedicled anterolateral thigh flap for groin cover after complete inguinal lymph node dissection were analysed. All patients had pelvic and perineal malignancies and received post operative radiotherapy. Their characteristics, operative details, postoperative complications and follow-up course was noted. Bioimpedance and volume assessments were recorded for assessing development of lymphedema.
RESULT: All 4 patients had an uneventful postoperative course without any early nor late surgical complications. The average follow-up period was 14.6 months. We observed no surgical site wound related complications or extremity lymphedema development throughout the post-surgical follow-up. Transient lymphorrhoea typically seen after major inguinal nodal dissection and skin excision was also reduced in intensity and duration. Also, we observed no increase in limb diameter and volume measured at 1, 3, 6 and 12 months postoperatively.
CONCLUSION: In our experience, performing distal LVA after groin lymphadenectomy has the advantages of being oncologically safe, away from the radiation zone, entails a better lymphatic and vein match, ensures lesser back pressure in veins and a more reliable and easier superficial anastomosis. The preliminary report of this novel technique when applied in selected patients at high risk of developing post-surgical lymphedema is encouraging. Although, standardised protocol for selection of high risk patients and a larger sample size is needed for assessing feasibility and superiority in a clinical setting.

Keywords: Lymphedema, Lymphaticovenular anastomosis, Prophylactic LVA, Lower extremity lymphedema

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OP-118

Surgical Management of Genital Lymphedema Using the Combined Charles' Procedure and Lymphatic Superficial Circumflex Iliac Artery Perforator Flap Transfer (CHASCIP)

Pedro Ciudad[1]

[1]*Pedro Ciudad*
[2]*Joseph M Escandón*

OBJECTIVE: Despite various therapeutic options, evidence remains limited on optimal medical or surgical management of genital lymphedema in male patients. This study evaluated postoperative outcomes of male patients undergoing a combination of the Charles Procedure and lymphatic superficial circumflex iliac artery perforator (SCIP) flap reconstruction for penoscrotal lymphedema.
MATERIAL AND METHODS: Male patients with International Society of Lymphology stage III genital lymphedema involving the scrotum and penis were included. All underwent the Charles Procedure combined with bilateral pedicled lymphatic SCIP flap transfer. Data on demographics, indocyanine green lymphography and lymphoscintigraphy findings, symptom duration, pre- and postoperative duration of complex decongestive therapy (CDT), estimated blood loss, surgical time, length of stay, and complications were analyzed. Genital Lymphedema Score (GLS) were evaluated.
RESULT: Eight patients were included. The mean age was 43 years, and BMI was 28.4 kg/m2. The mean follow-up was 34 months. Secondary genital lymphedema was the most common type (75%). The average weight of resected lymphedematous tissue was 1772.7 g. The mean estimated blood loss was 200.6 mL, and mean surgical time was 160 min. Two patients (25%) experienced postoperative complications: one developed seroma formation and dehiscence, while the other had partial skin graft loss. No cases of lymphedema recurrence were observed. Sexual dysfunction improved in all patients (87.5% versus 0%; $p < 0.001$). GLS scores significantly decreased after the procedure (6.6 versus 0.6; $p < 0.001$).
CONCLUSION: The combined Charles Procedure and bilateral lymphatic SCIP flap transfer is an effective surgical approach for penoscrotal lymphedema, optimizing postoperative outcomes with a low complication and recurrence rate.

Keywords: genitalia, iliac artery, lymphedema, male, perforator flap.

OP-119

Modern approaches in Lipedema treatment. Our experience after more than 100 cases

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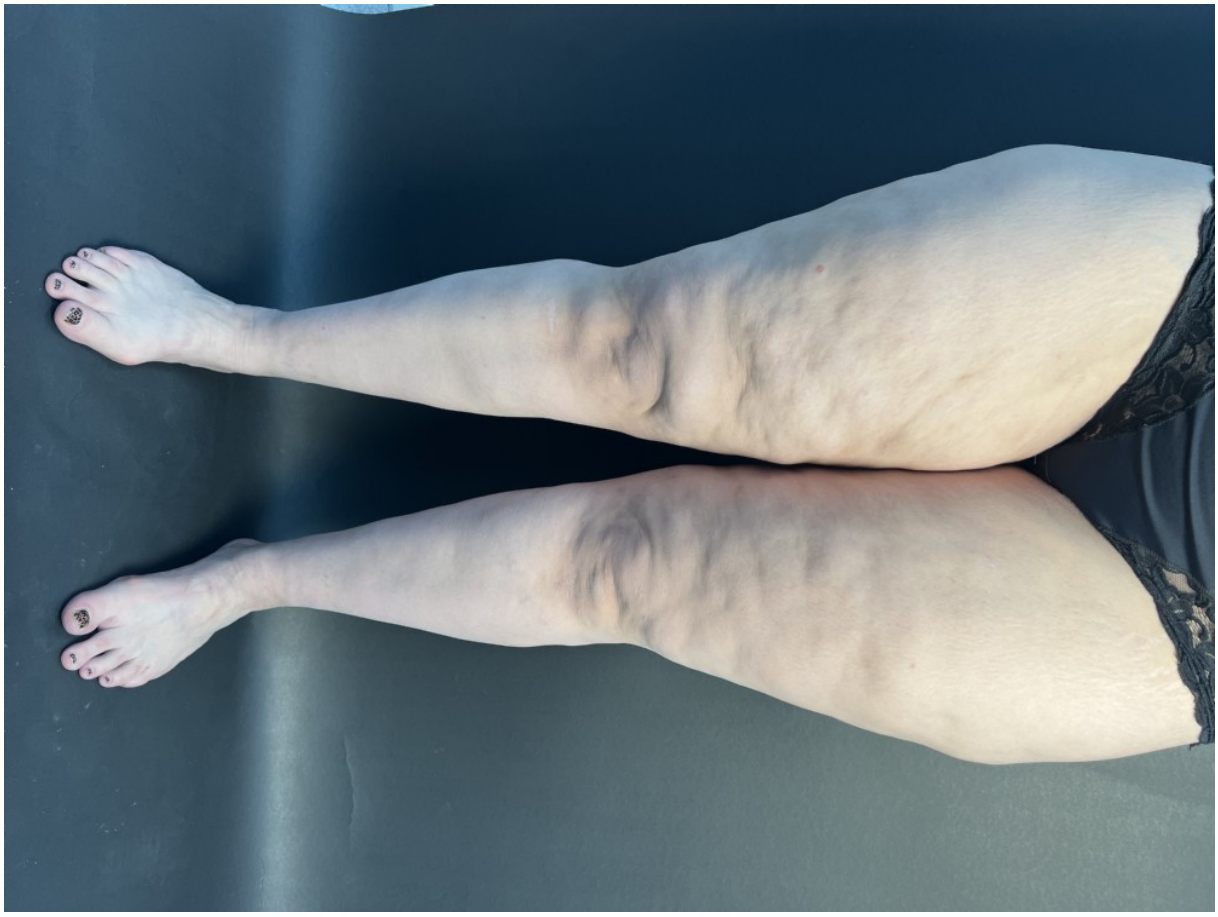
OBJECTIVE: Lipedema is a chronic condition characterized by abnormal fat distribution, primarily affecting the lower extremities and often leading to significant physical and psychological distress. Recent advancements in treatment modalities have expanded the therapeutic landscape for managing this complex disorder. This congress presentation will explore modern abilities in lipedema treatment, emphasizing the integration of surgical and non-surgical approaches to optimize patient outcomes.
CASE: We will discuss the role power-assisted liposuction as a primary intervention, highlighting its effectiveness in reducing excessive adipose tissue while preserving lymphatic function with ICG Lympography. Additionally, we will examine the importance of conservative management strategies, including compression therapy and manual lymphatic drainage, which play a crucial role in symptom relief and improving quality of life.
RESULT: Emerging technologies, such as advanced imaging techniques, will be reviewed for their utility in accurately diagnosing lipedema and guiding treatment decisions. Furthermore, we will present case studies illustrating the successful application of combined surgical, including skin debulking procedures, and non-surgical interventions like CDT to achieve both aesthetic and functional improvements.

This presentation aims to provide a comprehensive overview of current best practices in lipedema management, emphasizing a multidisciplinary approach that encompasses surgical innovation and supportive care to enhance patient well-being.

Keywords: lipedema, liposuction, CDT

One of the cases, different stages



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OP-120

A Novel Surgical Approach in the Treatment of Massive Localized Lymphedema of the Medial Thigh Region: Functional Excision and Reconstruction with a 'Book-Cover' Flap

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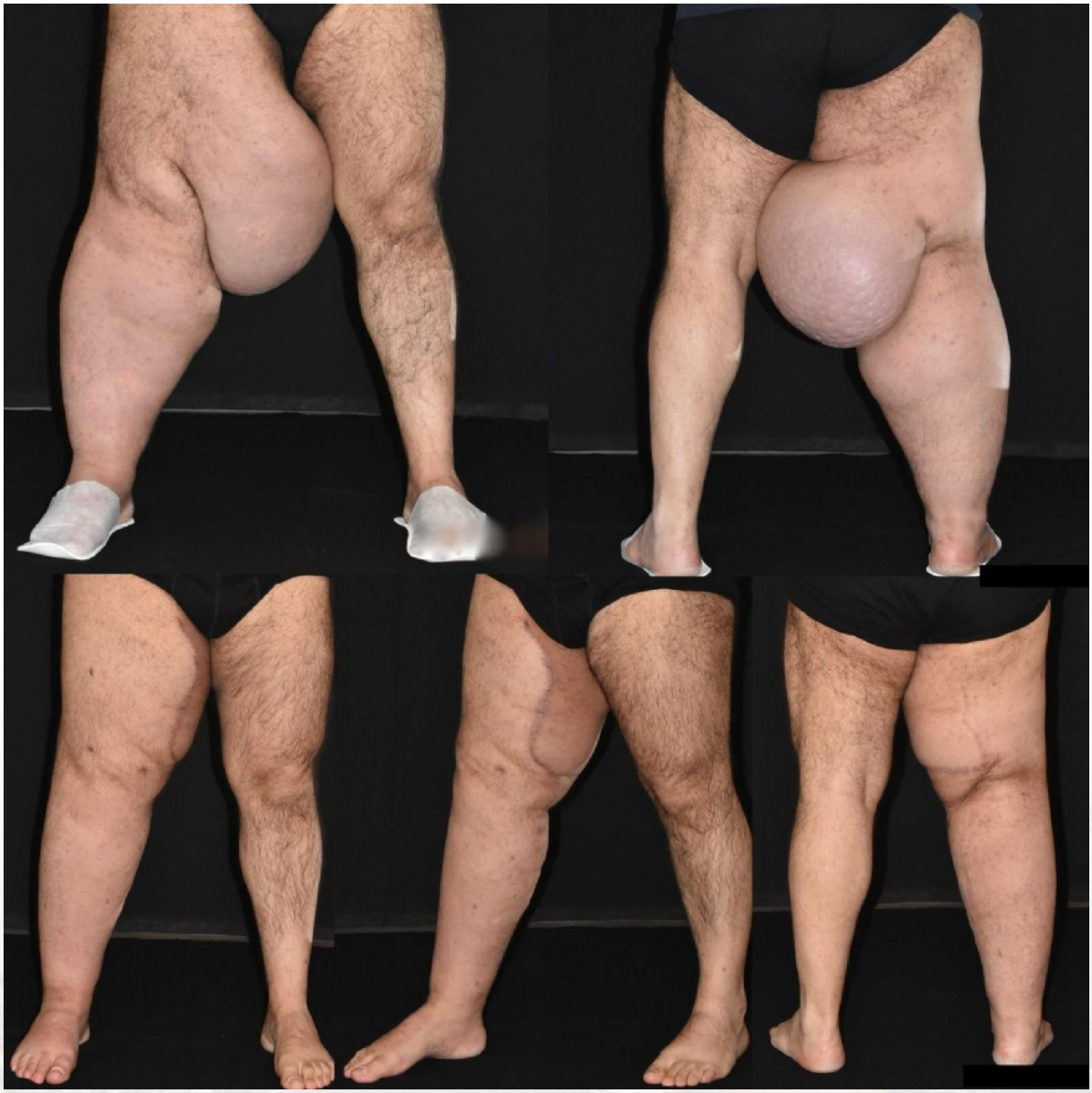
OBJECTIVE: Massive localized lymphedema (MLL) is a rare but progressive disease characterized by large soft tissue masses caused by lymphatic obstruction, most commonly seen in morbidly obese individuals. It primarily affects the medial thigh, lower abdominal region, and groin. MLL leads to hygiene and mobility problems, decreased quality of life, and recurrent infections. Conservative treatments, especially in the long term, show limited efficacy, and surgical excision often is the only effective treatment option.
Classical elliptical excision techniques commonly reported in the literature are associated with complications such as high tissue tension, wound dehiscence, and infection as well as contour deformities. In this study, we describe a novel excision planning and accompanying reconstruction method for medial thigh MLL. We define this as ''functional excision'' combined with reconstruction using a posterior thigh-based fasciocutaneous flap, termed the "book-cover flap."
CASE: A total of 11 patients (7 with unilateral and 4 with bilateral) MLL unresponsive to conservative therapy underwent single-stage, excision of the medial thigh MLL and reconstruction with ''book-cover''flap. Bilateral cases were done 6 months apart between each extremity. 13 of the extremities concomitantly underwent liposuction for subcutaneous debulking of the fibrotic adipose tissue.
Surgical Technique: The MLL mass located in the medial thigh region was positioned freely on the table with the legs abducted. The anterior and medial borders of the mass were included within the excision field, while the posterior portion was planned as a thigh-based flap. After skin incisions, the mass was separated from the thigh using a bimanual "cracking" technique. The deep fascia as well as some deep subcutaneous tissue preserved in order to preserve deeper lymphatic structures, minimize bleeding, and prevent injury to neurovascular structures. The resulting defect was closed with a predesigned posteriorly based flap in a "book-cover" fashion. The flap was designed such that the distance from the anterior stalk of the mass to the posterior stalk equaled the distance from the posterior stalk of the mass to the medial aspect of the mass. Thus a ''book-cover'' was created that could be directly transposed to the defect with complete closure.The final flap size adjustments and were done once the mass was removed. The flap was sutured in multiple layers to the defect. The excised tissues were evaluated histopathologically for the presence of any malignancies.
RESULT: All patients had improvement of quality of life and high satisfaction from the procedure. No flap necrosis, wound dehiscence, or major wound complications were observed. There were no contour deformities or skin texture mismatches in the thigh. During long-term follow-up, no recurrence of lymphedema or development of angiosarcoma was detected at the surgical site.
Functional excision combined with reconstruction using the "book-cover flap" offers a practical, safe, and effective surgical option for closure following excision of large MLL masses, particularly in the medial thigh region. This technique has advantages over conventional methods, including reduced wound complications related to high tissue tension, durable tissue coverage, and prevention of contour deformities.

Keywords: Book-cover flap, fasciocutaneous flap, massive localized lymphedema, obesity, lymphedema reconstruction, lymphatic obstruction

Thigh MLL and Book-Cover Flap



(Upper) Preoperative photos of medial thigh MLL. Anterior and Posterior (Bottom) Postoperative photos of thigh reconstructed with Book-Cover Flap. Anterior, Oblique, and Posterior

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OP-121

Liposuction-Assisted Excisional Surgery in Advanced Lower Extremity Lymphedema

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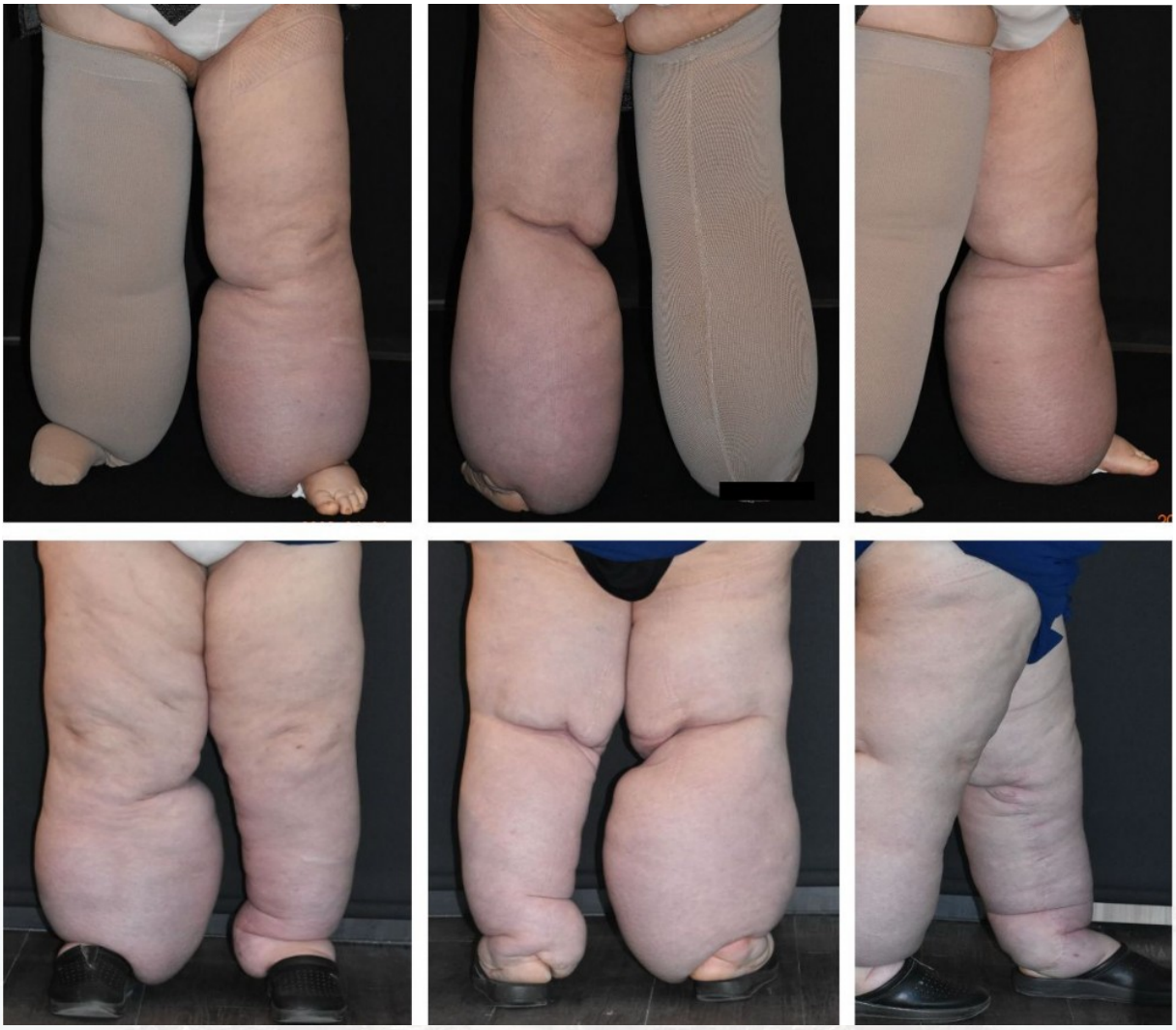
OBJECTIVE: Lymphedema is a chronic, progressive condition that most commonly affects the extremities. In advanced stages, conservative treatment is often no longer effective, and surgery becomes necessary. This study presents a surgical technique for advanced, soft-tissue-predominant lymphedema of the lower limb, combining excisional surgery with liposuction. The goals are to reduce overall limb volume, remove excess skin, improve function, and minimize postoperative complications
CASE: Nine patients with advanced lower limb lymphedema (8 with unilateral and 1 with bilateral involvement) who did not respond to conservative treatment were included. All had a history of oncologic surgery and radiotherapy. Before surgery, limb circumferences were measured at standard anatomical points.
Surgical Technique: Target surgical areas was from the ankle to the midthigh. The procedure began with stepwise tumescent infiltration and liposuction in four defined regions. In addition dorsal foot liposuction was also performed. Once circumferential liposuction was performed there was excess lose skin and subcutaneous tissue mostly in the medial aspect of the leg. This was maximally pulled creating a tight approximation of the skin at the anterior posterior and lateral aspects of the leg. The base stalk of the medial lose skin corresponded to the central media incision sites for the excision. A bimanual exam was performed to assure tension free primary closure. Drains were placed in selected cases. Postoperative care included compression therapy for 4 weeks, physical therapy for 8 weeks, and transition to compression garments starting in the third postoperative month. In bilateral cases, the more affected limb was treated first, with the second surgery performed after a 6-month interval. In total, 10 limbs were operated on. The amount of tissue removed, both liposuction volume and skin excision area, were documented. One-year follow-up measurements were obtained from standardized anatomical landmarks and compared with baseline.
RESULT: Minor wound dehiscence was observed in two patients. There were no cases of seroma or infection. All patients reported clear improvements in quality of life and daily function. Limb circumference was significantly reduced. No recurrences or late infections were seen during follow-up beyond one year. In addition to reduced leg volume, patients also experienced overall weight loss. Some reported a noticeable decrease in heaviness and circumference even in non-operated areas, including the contralateral leg and upper thigh. Quality-of-life improvements were consistently reported across all patients.
For patients with advanced-stage but predominantly soft-tissue lymphedema, liposuction-assisted excisional surgery offers a less morbid, more aesthetically and functionally favorable alternative to classic procedures like the Charles or Homans technique or even liposuction by itself. Moreover, it addresses common issues seen in liposuction-only approaches—such as skin redundancy, seroma, and tissue necrosis. The tissue debulking achieved through liposuction enhances flap mobility, allowing for safer resections. In carefully selected patients, this combined technique reduces complication rates and improves patient satisfaction.

Keywords: Excisional surgery, lymphedema, liposuction, Charles operation, Homan's operation, reductive techniques

Liposuction assisted Reductive Excision of Lower Extremity Lymphedema



(Upper Case) Preoperative photo. Bilateral lower extremity lymphedema (Lower Case) Postoperative photo of operated left lower extremity.

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OP-122

Compliance and Adherence to lymphedema treatment - challenges and solutions

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OBJECTIVE: Lymphedema is a chronic and progressive - in case of absence of correct treatment - disease, requiring long-term, multidimensional management, that affects around 300 millions patients all over the world. And despite existing various modern treatment options, both conservative and surgical, still one of the main problems is to maintain the results of the treatment. Patient compliance is critical in both conservative and surgical treatment pathways, yet adherence remains low due to a complex interplay of factors. This study aimed to systematically identify and categorize the barriers to compliance in lymphedema treatment and propose evidence-based strategies to improve long-term adherence.
MATERIAL AND METHODS: A comprehensive review of published literature, clinical guidelines, and real-world patient data was conducted, supported by clinical experience from multidisciplinary lymphedema care teams. Compliance factors were analyzed across patient, disease, treatment, and healthcare system domains. Specific attention was given to adherence during the two phases of Complete Decongestive Therapy (CDT), as well as pre- and post-operative compliance in surgical interventions. Practical recommendations were developed from both evidence and observed clinical outcomes.
RESULT: Multiple key barriers to compliance were identified:
• Patient-related: psychological fatigue, unrealistic expectations, lack of disease understanding, physical limitations, and poor patient–provider communication.
• Disease-related: severity and visibility of symptoms, comorbidities, and functional impairment.
• Treatment-related: complexity of CDT regimens, side effects of compression therapy, inadequate garment fit, and accessibility of trained providers.
• Healthcare system-related: cost of treatment and garments, lack of insurance coverage, long waiting times, and limited access to qualified care.
In Phase I of CDT, non-compliance was frequently linked to discomfort from bandaging, poor technique, or unclear treatment goals. In Phase II, self-management challenges, garment-related issues, and motivational decline were predominant.
In surgical management, compliance with conservative protocols before and after intervention was found to significantly influence surgical outcomes. Miscommunication between team members and unrealistic patient expectations further impaired adherence.

The findings highlight that non-compliance in lymphedema management is not simply patient disobedience but a multifactorial issue requiring coordinated solutions. Tailored patient education, structured treatment pathways, and long-term psychological and clinical support are essential. Compression garment adherence, in particular, requires professional selection, regular supervision, and patient-centered adjustments. Furthermore, systemic efforts are needed to improve access to care and align clinical recommendations among providers.

Patient motivation and understanding were identified as modifiable predictors of adherence, emphasizing the need for better communication tools, video education, and engagement with patient communities. Importantly, where structured support systems existed, compliance and treatment outcomes improved significantly.

CONCLUSION: Compliance and adherence in lymphedema care must be actively cultivated through education, accessible resources, systemic supports and tructured team-based approaches, where a patient is an active part of the team. Clinicians must prioritize realistic goal setting, reinforce patient autonomy, and ensure continuity of care to maintain long-term adherence. Addressing barriers at all levels - from individual to institutiona l - is essential to maximize treatment efficacy and improve patient quality of life.

Keywords: compliance, adherence, lymphedema, maintenance, results, solutions

OP-123

State of the Art in CDT

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OBJECTIVE: This study aims to present the current state of the art in Complete Decongestive Therapy (CDT) for lymphedema treatment, focusing on its overall efficacy and the contribution of individual components: Manual Lymphatic Drainage (MLD), compression therapy, exercise and adjunct Intermittent Pneumatic Compression (IPC).
MATERIAL AND METHODS: A structured literature search (PubMed, Cochrane Library, Embase and Medline databases) targeted English-language articles from 2020 to April 2025. Inclusion criteria comprised systematic reviews, meta-analyses, randomized clinical trials (RCTs) and expert guidelines evaluating the efficacy of CDT or its individual or combined components. Outcomes assesed included limb volume reduction, symptom relief, limb function and patient reported QoL. The review follows a narrative synthesis due to variability in study design and endpoints.
RESULT: CDT is the most effective conservative strategy for managing lymphedema, with moderate-quality evidence supporting its effectiveness in volume reduction, symptom relief, improved function and enhanced QoL. MLD is safe and effective in reducing arm volume in mild breast cancer-related lymphedema (BCRL), but shows no added benefit in advanced cases. MLD has been associated with reductions BCRL incidence, pain and other symptoms, particularly when applied consistently and over extended periods. Compression therapy is the most important component in both phases of CDT. In addition, it decreases and maintains limb volume, prevents erysipelas, reduces the risk of recurrent episodes, and may also reduce the incidence and delay the onset of BCRL. Exercise therapy has limited efficacy in reducing limb volume but does not exacerbate lymphoedema symptoms or contribute to increased arm volume. Structured exercise programmes significantly enhance upper limb function and quality of life. IPC may serve as a useful short-term adjunct in selected patients, though long-term efficacy remains uncertain without continued treatment.
CONCLUSION: CDT, as a comprehensive approach, remains the gold standard for conservative lymphedema management. Compression therapy is the most critical component in achieving and maintaining limb volume reduction. Although MLD and exercise have limited impact on limb volume reduction, they significantly contribute to reducing pain and improving limb function and quality of life. IPC represents a valuable short-term adjunctive therapy in select patients, although sustained benefits likely require ongoing treatment. Further standardized, long-term research is needed to refine CDT protocols and validate component-specific roles.

Keywords: complete decongestive therapy, lymphedema, manual lymphatic drainage, compression, intermittent pneumatic compression, volume reduction.

OP-124

Oral Presentation: Managing scar tissue after breast cancer surgery and radiotherapy

Emma Holly

Emma Holly, Restore Scar Therapy Training

OBJECTIVE: Explore the benefits of scar massage for common complications after breast cancer surgery and radiotherapy
CASE: Breast cancer surgery and radiotherapy can result in significant scar tissue formation, leading to pain, restricted mobility, fibrosis, and emotional distress. Using a holistic scar massage method to give a patient-centered, integrative approach to post-surgical scar management, combining manual therapy, myofascial release, and diaphgramatic techniques to promote optimal healing. This method aims to improve tissue pliability, reduce adhesions, enhance circulation, and support emotional well-being and is ideal alongside lymphoedema treatment.

This presentation will explore the mechanisms behind scar formation, the impact of radiotherapy on tissue integrity, and common complications that can be treated such as axillary web syndrome (cording) and capsular contracture. Looking at the role of specialized massage techniques in restoring movement and comfort.
RESULT: Case studies and preliminary outcomes will be discussed to highlight the method's effectiveness. The Restore approach empowers patients by providing a gentle, non-invasive solution to scar-related challenges, improving both physical function and quality of life in breast cancer survivors.

Keywords: breast cancer, scar tissue, capsular contracture, cording, axillary web syndrome, scar management

OP-125

ULTRASOUND FINDINGS OF RELAPSE CELLULITIS.HEMODYNAMIC ASPECTS

Javorka Markovic Delic

Javorka Markovıc Delıc,Hc Vızım; Zdravka Čelara !$;Belgrade; Serbıa

OBJECTIVE: Cellulitis is a inflammatory infiltrative disease aroused by ordinary germs.
Target zones of cellulitis are subcutaneous soft tissues and peripheral lymph system.If cellulitis is aroused by Haemolitycus Steptoccocus it is named erysipelas.

Cellulitis is formed as consequences of dermatoses,lymphoedema and tissues trauma, vascular or nonvascular origine. It is kind of acute compartment syndrome,with haemodynamic consequences (edema,infiltration and specific dermatoses and/or soft fibrous tissue).
MATERIAL AND METHODS: Aim of this stady is a exam of leg veins system at patients with relapse cellulitis.

Method. We used Color Dupllex Scan for a examination of 57 patients,31 male,26 female,average aged 54,with one or more relapses of cellulitis and lymphoedema.
RESULT: .Dominant echosonographic finding is a dilatation and insuffititienty of V.Poplitea (40 patients, 70% of all), mostly postthrombotic etiology.
Two patients had a complete opstruction V.Popliteae by the thromb

Others patients (15) had a insuffitienty of direct perforantes veins on the calf and dilatation of Venae Saph. Magnae and Parvae or only varicose branches of superfitial veins.
CONCLUSION: V.Poplitea is very burdened vein because of great number of foot and calf veins flow into it.
Relapse of cellulitis leads to the development the elephanthiasis.

Color Duplex scan findings points to significance the disturbance of V.Poplitea as a risk factor in cellulitis etiology.
It also points that preventive treatment this haemodyanamic disturbance (veins stasis, edema) have importante role on the cellulitis prevention.

Keywords: RECIDIVANTE CELLULITIS;VARICOSE VEINS; LYMPHOEDEMA

OP-126

Building LE&RN Center of Excellence in Russia

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OBJECTIVE: Lymphedema is a chronic disease that progresses without a proper treatment and affects more than 300 million patients worldwide. One of the keys to successful management is the establishment of professional centers offering effective solutions alongside advanced diagnostic and therapeutic approaches. The LE&RN Centers of Excellence (COE) represent a geographically diverse network of multidisciplinary clinical care centers for individuals affected by lymphatic diseases. These centers also provide professional education, engage in clinical research, and collaborate with LE&RN locally and internationally to improve the lives of patients and their families.
The Russian lymphology team at PhysioLympha set a goal to reach these high standards and provide the best support and treatment solutions across the CIS countries region.
CASE: A comprehensive system was developed at PhysioLympha to meet the highest international standards.
The multidisciplinary clinical team includes general practitioners/pediatricians, oncologists, surgeons, rehabilitation doctors, and physiotherapists. This allows the clinic to serve a broad spectrum of patients—children and adults—with cancer related lymphedema, malignant lymphoedema, obesity related lymphoedema and lipedema. Full rehabilitation programs are also offered for those experiencing movement difficulties, pain syndromes, and related conditions.
Medical personnel are trained in Complete Decongestive Therapy (CDT) at Germany's Foeldi College and through Klose Training. Continuous professional development is ensured through regular participation in advanced courses.
The clinic uses top-quality European bandages during the first phase of treatment, and custom-made RAL-standard compression garments during the second. The maintenance phase is closely supervised.
Initial and follow-up assessments are conducted using PeriKit and the LymphScanner moisture meter. Ultrasound and ICG-lymphography are also available when prescribed. For more advanced diagnostics—such as MR lymphography, lymphoscintigraphy, and angiography—the clinic collaborates with partner hospitals.
When surgical treatment is indicated, PhysioLympha works with two reconstructive and plastic surgeons trained at RMES (reconstructive Microsurgery European School by Dr Jaume Masia), offering nearly all forms of lymphatic surgery. The clinic manages pre-operative preparation and post-operative follow-up.
In addition to clinical services, PhysioLympha engages in scientific research (e.g., BioBridge combined with conservative therapy, Resistance exercise in lymphedema management) and contributes to national medical guidelines for lymphedema treatment.
One of its key educational initiatives includes a School for patients offering prevention and treatment

education, knowledge sharing via Telegram channels and a free support chat answered by the specialists at PhysioLympha. Patients can ask questions, access written/ video resources, lectures, exercise guides, and daily care tips. Aleksandra Rovnaya, CEO of PhysioLympha and Chair of the LE&RN Russian Chapter, leads annual event for World Lymphedema Day for the patients of CIS region and promotes awareness through campaigns like LE&RN's "Run and Walk to Fight Lymphatic Diseases."

PhysioLympha is also deeply involved in training healthcare professionals throughout Russia and the CIS, delivering dedicated courses on lymphedema treatment.

RESULT: In 2024, PhysioLympha was certified as a LE&RN Center of Excellence in conservative management of lymphatic diseases. The team remains committed to maintaining the highest standards of care while further developing a robust, patient-centered treatment network.

Keywords: LE&RN, Center of Excellence, Awareness, education, treatment

OP-127

Novelties in Pressure Garments: Results of a New Hybrid IPC Pump Device

Shashi Bhushan Gogia

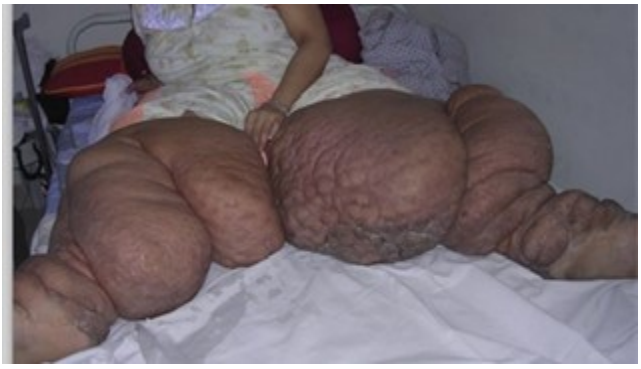
Sanwari Bai Surgical Centre, New Delhi, India

OBJECTIVE: Intermittent Pneumatic Compression (IPC) devices have been in use for lymphedema care since 1950. Existing IPC machines are classified as Single Chambered, Multichambered (peristaltic) and Multichambered (sequential).
Single chambered pumps are felt to be slower and less effective than multichambered caused by retrograde flow from the region with the maximum circumference.1 which is more proximal. Multi-chambered IPC pumps are preferred, but only for mild to moderate disease as complications in the form of swelling of proximal areas (Figure 1), opposite limb and even signs and symptoms of fluid overload have been reported. There is a feeling that high pressures are the reason.2
Our specialised lymphedema clinic started in the mid-90s. We had moderate outcomes with the single chambered pump, but without complications even in fibrotic and filarial limbs3,4, even while using 180 mmHg pressure. Results improved after 2010 following a shift to a special slow cycle sequential pump (Bio-Compression® 2004, 2008 and 3008), which was made almost exclusively for our needs. However this pump is no longer available, and unaffordable for long term home care. We are now testing a new indigenous and inexpensive multi-chambered pump which is as safe as a single chambered ones,
OBJECTIVES: To present historically comparable outcomes of a new type of IPC machine described as hybrid, Each sequential pressure cycle uses low (50 -80 mm Hg) pressures and the later cycle converts the inflation to a single chambered mode using high pressures of 150-180 mmHg. We describe outcomes, patient feedback and testimonials with a hypothesis of low complication rate and suitability in all grades of edema.
MATERIAL AND METHODS: METHODS: Therapy initiation at the clinic includes counselling, Complex Decongestive Therapy (CDT) and Penicillin along with IPC, followed by standard home based maintenance including IPC for those who can afford 5. MLD was offered only for patients having proximal edema. Retrospective data was analysed from the Electronic Medical Record system with time-based classification of cohorts of previous pump and the new model. Volumes were assessed using a software after perimetry and further calculations by the stacked cylinder method. Photographs as well as patients feedback was noted.
RESULT: Measurable outcomes from 12/50 treated after launch of new model in March 2023 showed 11.0% volume reduction during the initiation phase as apposed to 12.3%. for those in the previous period (non-significant). Long term results available for 2 patients only seem better with the new machine, these cannot be conclusive due to less number of patient and many from the older group had recurrences. The machine being unaffordable, was used less often.
CONCLUSION: Initially, many patients complained of pain on filling of chambers 1 and 2. This improved with decreasing the pressure and timings for lower chambers. On full inflation higher pressures are tolerated well. For fibrotic limbs, the pressure and time needs to be increased for the area of fibrosis and sustained with further rise with the higher chamber sets. At present we recommend the final pressure sets as shown in table 1

Preliminary results seem to be better, however this machine has been in use only for 2 years and long term outcomes are awaited.

Keywords: Intermittent Pneumatic Compression, IPC, Lymphedema, Home care maintenance

1



Complications in the form of thigh swelling with inability to walk due to a peristaltic pump

1

Limb	Chamber 1 Pressure	Chamber 1 time	Chamber 1+ 2 Pressure	Chamber 1+2 time	Chamber 1+2+3 Pressure	Chamber 1+2+3 time	All 4 Chambers Pressure	All 4 Chambers Time	Emptying time	Total Cycle time	Treatment time
	mmHg	Seconds	mmHg	Seconds	mmHg	Seconds	mmHg	Secs	Secs	Secs	minutes
Leg	60	30	70	60	80	90	120	90	30	300	90
Arm	50	20	60	30	70	90	80	90	30	260	90
Custom	40-60	20-30	Increase as per need								

Showing the final recommended time and pressure settings for the current pump

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OP-128

Comparison of the Effects of Systemic, Local, and Combined Ozone Therapy on Clinical and Ultrasonographic Findings in Patients with Lipedema

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[2]Lösante Çocuk ve Yetişkin Hastanesi

OBJECTIVE: This study aimed to compare the effects of systemic, local, and combined systemic+local ozone therapies on pain levels and ultrasonographic measurements in individuals diagnosed with lipedema.
MATERIAL AND METHODS: A total of 45 female patients diagnosed with lipedema were included in the study. Patients were randomized into three groups according to the treatment protocols applied:

Group 1: Patients who received systemic ozone therapy

Group 2: Patients who received local ozone therapy

Group 3: Patients who received combined systemic and local ozone therapy

Demographic data, pain levels (VAS, PainDETECT), and ultrasonographic thickness measurements (thigh, medial femoral condyle, and cruris regions) were evaluated. Data were assessed at two time points: baseline and after 1 month.
RESULT: There were no statistically significant differences among the three groups in terms of age, body mass index, family history of lipedema, educational status, and employment status ($p>0.05$).
In the assessment of pain levels, a significant decrease was observed in VAS and PainDETECT scores in all groups at the end of the first month ($p<0.01$). No significant difference was found between the groups regarding the magnitude of this decrease (VAS $p=0.34$, PainDETECT $p=0.62$).
In ultrasonographic measurements, a significant reduction was observed particularly in the right thigh thickness ($p=0.01$) and in some lower extremity regions within the groups:
In Groups 2 and 3, a significant reduction in right thigh thickness was detected at 1 month ($p=0.003$, $p=0.001$).
Significant improvements within groups were also observed in some areas of the medial femoral condyle and cruris thickness.
Between-group comparisons revealed a significant difference in right thigh thickness ($p=0.01$).
CONCLUSION: Ozone applications in the treatment of lipedema showed positive effects on both pain levels and ultrasonographic thicknesses. In particular, combined systemic+local applications appeared to be more effective in certain parameters. These findings suggest that ozone therapy may be used as a supportive method in the management of lipedema.

Keywords: lipedema, ozone, complementary medicine

OP-129

A novel approach to lymphedema treatment combining the BioBridge collagen scaffold with and complex decongestive therapy: first outcomes

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OBJECTIVE: Effective treatments for lymphedema are limited. Traditionally, the golden standard of care is the Complete Decongestive Therapy (CDT) which includes manual lymph drainage, multilayer short stretch bandaging/flat knit compression garments, exercise, skin care. While CDT has been shown to successfully reduce excess limb volumes, it cannot restore the functional capacity of the lymphatic system. The challenges of CDT are that it requires patient commitment to a life-long diligence to limit the progression of the disease and maintain treatment results and creates a costly and time-consuming dependency on compression garments/ongoing CDT sessions.
Microsurgery for lymphedema treatment has shown promising results but has many limitations and requires highly qualified personnel and specific equipment, and may not be easily accessible and affordable. Combination of microsurgery with BioBridge® Collagen Matrix (BioBridge) - aligned nanofibrillar collagen scaffold - has already demonstrated its safety and efficacy in further reducing limb volume and tissue fibrosis, but still has similar issues with accessibility and cost because includes microsurgery.
Aim of the study is to develop a new therapeutic approach to complement and improve the long-term outcome of CDT through utilization of recent advancements in diagnostics and research on lymphatic drainage by combining CDT with a minimally invasive implantation of BioBridge. To develop and validate a treatment protocol to evaluate the efficacy of the combination therapy and to serve as a basis for application in clinical practice.
MATERIAL AND METHODS: 20 patients are in implantation group and 20 patients are in control group. ICG lymphography is used to map the lymph drainage pattern in lymphedema patients, and BioBridge scaffolds are implanted to enhance the existing and/or create a complementary drainage routes and to direct the flow of extracellular fluid along the BioBridge to the regions with identified viable lymphatic system with the help of CDT. Identification of the functional lymph drainage route increases the efficacy of CDT; BioBridge scaffold implantation increases lymph drainage along the scaffold, therefore the efficacy of this approach will be evaluated by comparing pre- and post-treatment lymph flow pattern by ICG lymphography and limb volume with the help of Perometer, as well as QOL will be evaluated with the help of questionnaire before surgery and one year after surgery. The control group to be checked with the same protocol – ICG lymphograpy, perometer and QOLQ initially and after 1 year. During this year both groups continue the same CDT treatment as they had before study.
RESULT: A single-arm, prospective, open-label pilot study has been designed to evaluate efficacy of combining CDT with the BioBridge implantation in patients with unilateral secondary lymphedema of

the upper limb, based on ICG lymphography, volumetric analysis and QOL assesment. A treatment protocol has been developed to implement the combination of CDT with BioBridge in clinical practice. First 10 patients out of 20 went through the implantation and were examined a year after surgery. 20 patients from the control group were initially checked in 2024 and examined after one year, in 2025. **CONCLUSION:** The study is still ongoing, but first results look promising: though there were almost no differences in ICG pattern, in implantation group the scores in QOLQ improved significantly, 6 out of 10 patients were able to stay longer hours not wearing compression without edema recurrence, 3 out of 10 patients managed to discontinue to wear compression glove, wearing only sleeve (before implantation wearing a sleeve without a glove led to almost immediate edema of hand). In control group there were no changes in QOF questionnaire and patients had to continue the same regime of wearing compression garment as before implantation. To make proper conclusions more data is needed with precise analysis in 2026.

Keywords: BioBridge, lymphedema, collagen scaffold, CDT

OP-130

Clinical utility of L-dex technology in assessing incidence and risk factors for upper and lower limb lymphedema in melanoma patients

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OBJECTIVE: Bioimpedance spectroscopy (BIS) derived L-Dex scores are used extensively in breast cancer survivorship and have been shown to reduce incidence of chronic breast cancer-related lymphedema (cBCRL) as part of prospective surveillance monitoring in conjunction with early intervention [1]. This study examines the incidence of melanoma related lymphedema based on the location of the limb at risk and evaluates the utility of L-Dex in detecting lymphedema in a melanoma cohort.

MATERIAL AND METHODS: Retrospective analysis of prospectively collected data was performed for all patients undergoing cancer treatment at risk of developing lymphedema in the Melanoma Clinic between February 2019 and Jan 2025. Pre-cancer treatment baseline L-Dex scores were measured using the SOZO BIS device (ImpediMed Ltd, Brisbane, AU). Patients were followed-up post-surgery and at regular 3-monthly intervals for up to 6 years with L-Dex and clinical assessments. Clinical lymphedema diagnosis was defined as the presence of visible symptoms in combination with >7 in L-Dex score from the pre-cancer treatment baseline on the at-risk limb. The cumulative incidence of clinical lymphedema was calculated to include patients that were diagnosed with lymphedema at any time during the follow-up period. Baseline characteristics including age, sex, BMI, cancer stage, and at-risk region (upper vs. lower limb) were recorded. Additional risk factors assessed include side of cancer relative to limb dominance, cancer stage, location of melanoma, BMI, age, number of nodes removed and number of positive nodes.

For each risk factor, incidence was stratified by at-risk region and summarized in contingency tables. Crosstabulations were generated for each subgroup comparison. Row-based and column-based chi-square tests (Fisher's exact test where n<5) were used to assess statistical differences by region within each risk factor level, and across levels within each region. Two-sided p-values < 0.05 were considered statistically significant.

RESULT: Ongoing follow-up data was available for 294 patients, 180 (61.2%) at-risk of upper limb lymphedema and 114 (38.8%) at-risk of lower limb lymphedema. The mean age was 62.8 ± 14.2 years (IQR: 54-73 years) and the mean BMI was 27.6 ± 6.7 kg/m2 (IQR: 23.9-30 kg/m2). There were 155 (52.7%) males, 139 (47.3%) females and Caucasian participants made up 94.2% of the population. The median follow-up time was 216 days (7.2 months).

Clinical lymphedema as defined, was identified in 76 (25.9%) patients cumulatively. Using L-Dex thresholds only, 117 (39.8%) patients flagged for subclinical lymphedema and 103 (35.0%) patients flagged for visible symptoms.

Total lymphedema incidence was substantially higher in the lower limb compared to the upper limb (45.8% vs. 11.5%, $p < 0.001$). This was true even when accounting for a variety of risk factors. Incidence in lower limbs was significantly higher than in upper limbs for healthy weight (38.1% vs 5.9%, p<0.001) and overweight (59.1% vs 12.6%, p<0.001) patients, but no difference was observed in obese patients. Patients aged >40 years also had higher LE rate in the lower limb vs. the upper limb (40-60 years: 42.2% vs 5.8%, p<0.001, 60+ years: 47.2% vs 15.0%, p<0.001). Lower limb incidence was higher than upper limb regardless of the side of the cancer in relationship to the dominant limb

(Dom: 49.0% vs 10.5%, p<0.001, Non Dom: 48.9% vs 15.1%, p<0.001) and all cancer stages I-III (Stage I: 38.1% vs 10.3%, p<0.001, Stage II: 60.9% vs 15.2%, p<0.001, Stage III: 53.9% vs 23.1%, p<0.023).

CONCLUSION: This study demonstrates the higher incidence of lower extremity lymphedema in melanoma patients in relationship to upper limb. This difference is significant across a variety of risk factors. The use of BIS derived L-Dex scores provides for a rapid method to assess these patients and identify them for further treatment, especially in the sub-clinical phase.

Keywords: Bioimpedance Spectroscopy (BIS), L-Dex, Melanoma, Lymphedema

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OP-131

Comparison of Compression Therapy Approaches in Lymphedema Treatment: Clinical Effectiveness of Complete Decongestive Therapy and Circaid® Reduction Kit Systems

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OBJECTIVE: Lymphedema is a chronic, progressive disorder resulting from impaired lymphatic drainage, characterized by the accumulation of protein-rich fluid in the interstitial space.Complete Decongestive Therapy (CDT) has long been considered the gold standard forconservative management; however, its daily implementation is often limited by complexity and patient dependency. Recently, Velcro-based alternatives such as the circaid® ReductionKit have gained popularity, offering adjustable compression and improved usability. This study aimed to compare the short-term clinical efficacy of CDT and the circaid® Reduction Kit in patients with upper or lower extremity lymphedema.
MATERIAL AND METHODS: This single-center, retrospective, case-control study included 70 patients treated between 2022 and 2025. Patients were divided into two groups: Group 1 received CDT (n=35), and Group 2 received the circaid® Reduction Kit (n=35). All participants underwent a standardized conservative treatment protocol including self-manual lymphatic drainage, compression therapy, exercise, dietary counseling, and skin care. Sociodemographic characteristics and clinical data were collected, and limb volumes were calculated using Limb Volumes Professional v5.0. BMI and limb volumes were compared pre- and post- treatment using appropriate statistical tests.
RESULT: The mean age was 58.96 ± 10.26 years, with 88.6% of patients being female. Sociodemographic and clinical characteristics were statistically similar between groups ($p>0.05$). In Group 1 (CDT), BMI decreased from 29.78 ± 5.38 to 29.28 ± 5.09 ($p<0.001$), right limb volume from 3102.0 ml to 2972.0 ml ($p=0.036$), and left from 3479.0 ml to 3177.0 ml ($p<0.001$). In Group 2 (circaid® Reduction Kit), BMI decreased from 29.69 ± 7.62 to 28.78 ± 7.61 ($p=0.024$), right limb volume from 3901.0 ml to 3578.0 ml ($p=0.001$), and left from 3808.0 ml to 3604.0 ml ($p=0.001$). Treatment duration was significantly longer in Group 2 (median 6 weeks vs. 3 weeks; $p<0.001$). Both interventions resulted in statistically significant and clinically meaningful reductions in BMI and limb volume.
CONCLUSION: Both CDT and the circaid® Reduction Kit demonstrated comparable short-term effectiveness in reducing limb volume and BMI in lymphedema patients. Although the circaid® system required a longer treatment duration, it offered advantages in ease of use and patient independence. These findings support the clinical use of both approaches and highlight the need for individualized compression strategies. Further prospective studies are needed to evaluate long-term outcomes and cost-effectiveness.

Keywords: Lymphedema,Compression Therapy, Complete Decongestive Therapy,CircAid® Reduction Kit, Case-Control Study,Physical Medicine and Rehabilitation

OP-132

Could Rhythmic Frequency Electrical Stimulation (PhyBack PBK-2C) Be a Hope for the Treatment of Breast Cancer Related Lymphedema (BCRL)?

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OBJECTIVE: Although complex decongestive therapy (CDT) is the gold standard, it cannot provide a cure for lymphedema, and the search for alternative treatments to CDT continues. In recent years, treatments that promote lymphangiogenesis, restore the dysfunctional lymphatic system, and increase vascular endothelial growth factor (VEGF) levels have come to the forefront in BCRL treatment. One such treatment that increases VEGF levels is electrical stimulation (ES). In vivo and in vitro studies investigating the effects of ES in lymphedema have shown that ES increases VEGF levels, which trigger lymphangiogenesis, stimulates the proliferation and migration of lymphatic endothelial cells and increasing lymphatic flow. There is one publication investigating the effect of rhythmic frequency electrical stimulation (PhyBack PBK-2C) on VEGF, which reported that it increases VEGF levels. The aim of our study is to investigate the clinical effects of rhythmic frequency electrical stimulation (PhyBack PBK-2C) applied in addition to CDT in patients with BCRL.
MATERIAL AND METHODS: This was a prospective cohort study using a paired control design. Twenty-six BCRL patients were assigned to the treatment group (14 cases) and the control group (12 cases). Demographic data of the patients were recorded. Both groups received 15 sessions CDT treatments. In addition to the treatment group, rhythmic frequency electrical stimulation (PhyBack PBK-2C) (1-9 microseconds width, 1-420 Hz frequency, 30-120 V strength) was applied for 10 minutes daily before CDT. At the start of treatment (Week 0), at the end of treatment (W3), and at 8 weeks (W8), the patients' limb volumes were marked and recorded at 5 cm intervals. The thickness of the epidermis and subcutaneous tissue above and below the elbow was measured using ultrasound. The patients' quality of life was assessed with the Lymphedema Quality of Life Questionnaire and EuroQol-5D, the patients' own health status was assessed with visual analog scale (VAS), Jenkins Sleep Scale was used for sleep quality, Clinical Global Impression (CGI-I) questionnaire for clinical impairment.
RESULT: The mean age of the treatment group was 60.73±10.90, and that of the control group was 56.91±8.08 ($p>0.05$). The mean lymphoedema limb volumes in the treatment group were 3254.68±796.54 ml at W0 and 3003.25±834.53 ml at W3 ($p=0.02$), sleep quality was 10.8±6.47 at W0, 5.8±5.32 points at W3 ($p=0.005$), and mean VAS scores 60±28.75 at W0 and 100±0.00 at W8 ($p=0.03$). An improvement trend was observed in quality of life scores ($p>0.05$). Patients' clinical improvement levels were significantly better at W3 than at W0 ($p=0.004$). The mean lymphoedema limb volumes in the control group were 3030.91±508.21 at W0 and 2981.50±545.80 ml at W3 ($p=0.034$). The average percentage difference in the lymphoedema-affected extremity between W0 and W3 was 10.45% in the treatment group and 3.72% in the control group ($p=0.033$). Between W0 and W8, these rates were 10.15% and 3.31%, respectively ($p=0.008$). The average subcutaneous tissue thicknesses in the ultrasound measurements 10 cm above the elbow were 21.89±4.87 mm in the treatment group and 14.46±5.32 mm in the control group at W0, 19.27±4.80 mm and 13.90±5.23 mm at W3, respectively ($p=0.01$). Clinical improvement scores were higher in the treatment group compared to the control group at W3 and W8 ($p=0.023$, $p=0.028$, respectively). Mean VAS scores at W8 were 100±0.00 in the treatment group and 68±11.35 in the control group ($p=0.030$). No side effects

were observed in patients during either treatment.
CONCLUSION: Rhythmic frequency electrical stimulation (PhyBack PBK-2C) may be a safe and effective method with no side effects that can be used alongside CDT, with its continuing effect in reducing lymphedema volume at W3 and W8. We think that this effect may be due to increased lymphangiogenesis facilitated by elevated VEGF at the molecular level.

Keywords: Lymphedema, Rhythmic frequency electrical stimulation, PhyBack

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OP-133

ultrasound assessment of fascial remodeling following conservative therapy in lipedema

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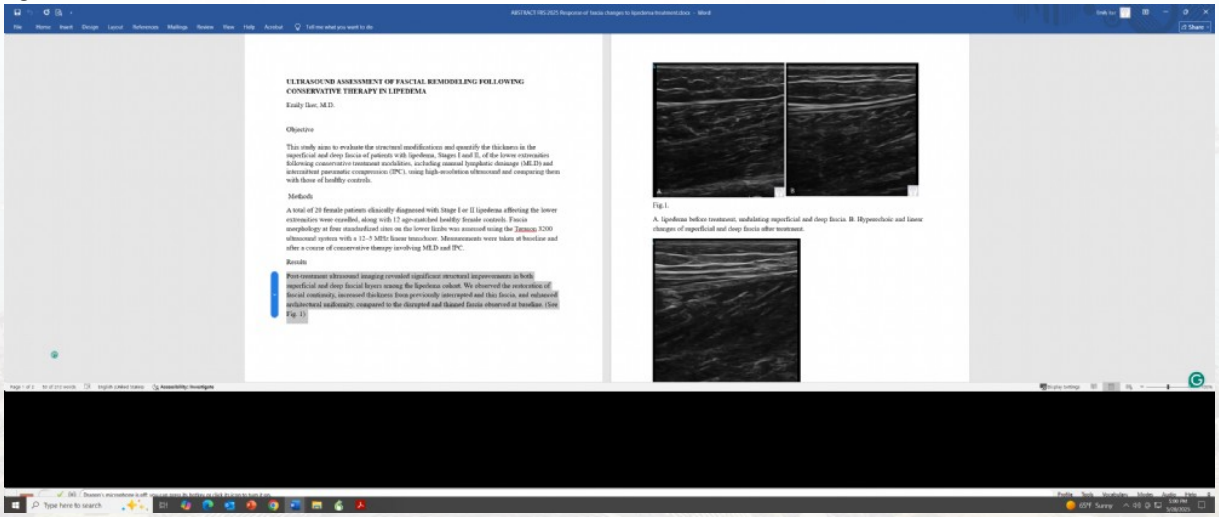
Lymphedema Center

OBJECTIVE: This study aims to evaluate the structural modifications and quantify the thickness in the superficial and deep fascia of patients with lipedema, Stages I and II, of the lower extremities following conservative treatment modalities, including manual lymphatic drainage (MLD) and intermittent pneumatic compression (IPC), using high-resolution ultrasound and comparing them with those of healthy controls.
CASE: A total of 20 female patients clinically diagnosed with Stage I or II lipedema affecting the lower extremities were enrolled, along with 12 age-matched healthy female controls. Fascia morphology at four standardized sites on the lower limbs was assessed using the Terason 3200 ultrasound system with a 12–5 MHz linear transducer. Measurements were taken at baseline and after a course of conservative therapy involving MLD and IPC.
RESULT: Post-treatment ultrasound imaging revealed significant structural improvements in both superficial and deep fascial layers among the lipedema cohort. We observed the restoration of fascial continuity, increased thickness from previously interrupted and thin fascia, and enhanced architectural uniformity, compared to the disrupted and thinned fascia observed at baseline. (See Fig. 1)

Keywords: Lipedema, ultrasound, superficial fascia, deep fascia

figure 1



A. lipedema before treatment, undulating superficial and deep fascia. B. Hyperechoic and linear changes of superficial and deep fascia after treatment.

OP-134

Lipoedema: contribution of lymphoscintigraphy to three-dimensional tissue ultrasound diagnostics

Marina Cestari

Marina Cestari - Pianeta Linfedema Study Centre -Terni, Italy

OBJECTIVE: OBJECTIVE: The diagnosis of Lipoedema is based on clinical examination, however, the three-dimensional (3D) ultrasound is very useful, in all clinical stages, in the evaluation of structural assessment of adipo-fascia, having a view on three planes of space with possible processing of the image with suitable software.
Furthermore, also lymphoscintigraphy exam of the lower limbs can be useful for the evaluation of transit of the radiotracer (normal or delayed), in order to explain some ultrasound features in different clinical stages.
CASE: Material and Method
It was decided to apply 3D ultrasound diagnostics in the tissue evaluation using an adequate instrument (SonoScape 20-3D) and an
adequate probe (17 MHz- 52 mm wide) placed directly on the skin, with plenty of gel, through longitudinal-transversal scans on constant bilateral symmetric marker points (abdomen: lower quadrants - buttock - anterior-posterior thigh, medial-posterior leg, medial supra-malleolar area) in not obese females with Lipoedema, aged 18-55 years, (35 stage 1, 40 stage 2, 30 stage 3 - all type III) who had arrived at the Pianeta Linfedema Study Center.
Chronic venosus disease, due to primary varicose veins or post-DVT disease, Lymphedema primary or secondary to oncological disease, post-trauma, post-inflammatory, systemic or due to pharmacological treatment, were absent in all patients.
Moreover, lymphoscintigraphy exam of the lower limbs was required (subcutaneous injection with 99mTc Nanocoll®, colloidal particles of human albumin) for the evaluation of radiotracer transport in each stage.
RESULT: 3D ultrasound diagnostics, regardless of the clinical stage, has highlighted a normal ultrasound representation of the epidermis-dermis complex as well as the increased thickness of the subcutaneous tissue, due to hypertrophy of the adipose lobules, not adherent to each other but separated by thickened connective septa, both more marked in stage 2 and stage 3, as well as the thickness of the fibres that connect the derma to superficial fascia; an irregular profile of the junction dermo-hypodermis was also noted.
Furthermore, the lobules in a non-homogeneous way, show inside an increased anechogenicity, which according to the author is partly due to free fluid, but also linked to glycosaminoglycans in gel form.
In addition, in view of the presence of increased anechogenicity, already in stage 1, due to fluid along the superficial fascial path, as well as the deep one too, the author has carried out an experimental study, awaiting publication, that has showed that the fluid is bound to the fascia and not free.
Besides in the septa it was noted the presence in stage 2 and stage 3 of increased anechogenicity due to free fluid, probably due to increased fluid upstream as well as the slower radiotracer flow highlighted by lymphoscintigraphy exam, reabsorbed and even if slowly removed by pre-collectors present in the septa.
High-quality three-dimensional (3D) ultrasound diagnostics resulted in being considerably useful in the evaluation of Lipoedema tissue, because it provides important structural details of adipo-fascia, while

lymphoscintigraphy exam could explain some ultrasound features in the 2 stage and 3 stage not evident in this study in stage 1.

Keywords: Lipedema, three-dimensional (3D) ultrasound diagnostics, Lymphoscintigraphy

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OP-135

Assessment of Skin Fibrosis in Patients with Lipedema Using the SkinFibroMeter: A Pilot Study

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OBJECTIVE: Lipedema is a chronic adipose tissue disorder characterized by symmetrical and disproportional fat accumulation, often accompanied by pain and sensitivity. While fibrosis has been histologically observed in lipedema tissue, objective quantification of skin fibrosis in clinical settings remains limited. This pilot study aims to assess the feasibility and utility of the SkinFibroMeter, a handheld device for measuring skin stiffness, in women diagnosed with lipedema.
MATERIAL AND METHODS: Twelve female patients clinically diagnosed with Stage I–III lipedema were included in this observational pilot study. Measurements were conducted at standardized anatomical sites (medial malleol, medial knee, medial thigh, lateral thigh) using the SkinFibroMeter (Delfin Technologies, Finland). Data were compared with measurements from a matched control group without lipedema. Stiffness values were expressed in Newtons (N), and statistical analysis was performed using the Mann-Whitney U test due to non-parametric distribution.
RESULT: Preliminary results indicate significantly higher skin stiffness values in the lipedema group compared to controls, particularly in the medial thigh region ($p < 0.05$). Skin fibrosis was more pronounced in patients with Stage II–III lipedema. The device showed high intra-rater reliability (ICC = 0.91) and was well-tolerated by all participants.
CONCLUSION: The SkinFibroMeter appears to be a promising non-invasive tool for the quantification of skin fibrosis in lipedema patients. These preliminary findings support its potential application in clinical monitoring and staging. Larger studies are warranted to validate its diagnostic utility and correlation with disease severity.

Keywords: Lipedema, fibrosis, skin stiffness, SkinFibroMeter, instrumental assessment, subcutaneous tissue

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OP-136

Lipedema Pain and Volume Reduction Through an Individualized Protocol Including Manual Lymphatic Drainage, Compression, and Vega-Test Nutrition

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OBJECTIVE: Lipedema is a chronic and progressive adipose tissue disorder that predominantly affects women, often presenting with disproportional fat accumulation, pain, edema, and reduced quality of life. Despite its prevalence, there is no universally accepted standard treatment. In our outpatient clinic, we have developed a standardized, yet individualized, multimodal protocol aiming to reduce lipedema-related symptoms and improve functional outcomes.
MATERIAL AND METHODS: Aim of this study was to evaluate the clinical effectiveness of a combined therapeutic approach including Vega test-guided nutrition planning, manual lymphatic drainage (MLD), and compression therapy (bandaging and garments) in women diagnosed with lipedema.
This observational case series includes lipedema patients (Stage I–III) treated at our clinic between 2023 and 2025. Each patient followed an individualized nutrition plan based on Vega test findings to reduce inflammatory load and food intolerance-related exacerbations. All patients received regular MLD sessions (5 per week) and were fitted with appropriate compression bandages and/or flat-knit compression garments. Outcome measures included pain intensity (Visual Analog Scale), limb circumference, subjective body image, and patient-reported quality of life (QoL).
RESULT: Preliminary data from 24 patients indicate significant improvements after a 6–12 week intervention period. Mean pain scores reduced from 8.1 to 3.2 ($p < 0.01$). Most patients reported visible reduction in swelling and softening of fibrotic tissue, particularly in thighs and medial of the knee. Patient adherence was high, and no adverse effects were recorded.
CONCLUSION: This integrated protocol combining Vega test-based anti-inflammatory nutrition, MLD, and compression therapy appears effective in reducing pain, limb volume, and discomfort in women with lipedema. Our results support the need for individualized, multimodal care models and further controlled studies to validate efficacy and long-term benefits.

Keywords: Lipedema, manual lymphatic drainage, compression therapy, Vega test, individualized nutrition, pain management

OP-137

Physical activity level, exercise capacity and balance in patients with lipedema

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OBJECTIVE: This study aimed to compare the physical activity levels, exercise capacities and balance status of patients with lipedema with healthy individuals.
MATERIAL AND METHODS: Thirty female patients diagnosed with lipedema and 30 healthy women aged between 18 and 65 years were included in the study. Timed Up and Go Test was used to evaluate dynamic balance, while One-Leg Standing Test, and Functional Reach Test were used to evaluate static balance. The exercise capacity of the patients was evaluated with the 6-minute walking test, and the physical activity level was evaluated with the International Physical Activity Questionnaire-Short Form (IPAQ). Visual analog scale was used for pain assessment.
RESULT: It was found that the physical activity levels and exercise capacities of patients with lipedema were significantly lower compared to the control group (<0.001). Dynamic balance assessments of patients with lipedema were also found to be significantly impaired compared to the control group ($p<0.05$).
CONCLUSION: It was observed that physical activity levels and exercise capacities were decreased in patients with lipedema compared to healthy individuals, and their balance levels were also impaired. Rehabilitation programs for patients with lipedema should be designed to increase their physical activity and balance levels.

Keywords: lipedema, physical activity, pain

OP-138

Effects of Acupuncture on Pain, Functional Status, and Quality of Life in Patients with Lipedema: A Prospective Controlled Study Protocol

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OBJECTIVE: Lipedema is a chronic and progressive disorder of subcutaneous adipose tissue that predominantly affects women and it is characterized abnormal accumulation of fat deposition in the lower extremities, often accompanied by pain, tenderness, easy bruising, and resistance to weight loss despite dietary and physical activity interventions. The disease can significantly impair mobility, daily functioning, and quality of life, contributing to psychosocial distress.
The etiology of lipedema remains unclear; however, hormonal and genetic factors are implicated. Conservative management, including compression therapy, manual lymphatic drainage, exercise, and skin care, remains the standard of care, while liposuction is reserved for advanced cases.
Acupuncture, a well-established therapeutic modality within traditional and complementary medicine, involves the stimulation of specific anatomical points—referred to as acupoints—along meridians to restore physiological balance. Evidence from clinical studies suggests that acupuncture may alleviate pain, reduce edema, and improve functional status in patients with lymphedema. However, there is currently no robust clinical evidence evaluating its role in the management of lipedema.

OBJECTIVE: This study aims to determine the effects of acupuncture, in addition to standard conservative therapy, on pain, functional status, and quality of life in patients with lower-extremity lipedema.
MATERIAL AND METHODS: This prospective, controlled clinical trial will be conducted at the Lymphedema Clinic, Ankara Bilkent City Hospital, Department of Physical Medicine and Rehabilitation. Adult female patients diagnosed with lower-extremity lipedema will be recruited based on clinical diagnostic criteria.
Participants will be allocated into two groups: Control group: Standard conservative management (diet and exercise program) and Intervention group: Standard conservative management plus acupuncture therapy. The acupuncture protocol will consist of once-weekly sessions of 30 minutes for 4 consecutive weeks, targeting bilateral Sp6(Sanyinjiao), Sp15(Daheng), St25(Tianshu), Ki8(Jiaoxin), and Lu9(Taiyuan) points.
Assessments will be conducted at baseline, week 4, and week 8: Visual Analog Scale (VAS), Lower Extremity Functional Scale (LEFS), Lymphedema Quality of Life Questionnaire (LYMQOL), Limb circumference: Measured at the ankle, 10 cm below the patella, and 10 cm above the patella.
The sample size was calculated using G*Power 3.1.9.4 based on previous data from acupuncture interventions in lymphedema, indicating a required sample of 36 patients per group to achieve 80% power at a 5% significance level.
RESULT: Expected Outcomes
We hypothesize that the addition of acupuncture to standard conservative management will result in greater reductions in pain, improved functional capacity, and enhanced quality of life compared to standard management alone.
CONCLUSION: If efficacy is demonstrated, acupuncture may be incorporated as an adjunctive therapy in the multidisciplinary management of lipedema, potentially improving clinical outcomes and

patient satisfaction. Recruitment for this study is nearly complete, and final data collection is expected to conclude by October.

Keywords: Lipedema, acupuncture, pain management, complementary medicine

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OP-139

Could lipedema and obesity be different in terms of osteoporosis?

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Health Science Univercity Ankara Education And Research Hospital

OBJECTIVE: Historically, obesity has been thought to protect against osteoporosis, but recent publications have shown that abdominal fat, low-grade systemic inflammation, and increased bone marrow adipogenesis may lead to a decrease in bone mass in obese individuals. Patients with lipedema, however, may be at a lower risk of osteoporosis compared to obese patients, as they have localized fat deposits primarily in the lower extremities, with subcutaneous fat accumulation being more prominent than abdominal fat accumulation. The aim of this study was to compare postmenopausal obese and lipedemic patients with similar age and body mass index (BMI) in terms of bone mineral density (BMD). To our knowledge, there are no similar studies in the literature.
MATERIAL AND METHODS: The study included 32 postmenopausal obese women with lipedema and 14 postmenopausal obese women without lipedema. Demographic data were recorded for both groups. The distinction between the lipedema and obesity groups was based on clinical examination (extremity symmetry, swollen feet, pain, skin sensitivity, easy bruising) and ultrasound measurements of skin and subcutaneous thickness. Bone mineral density was assessed using X-ray absorptiometry, quality of life was evaluated using the Short Form-12 Survey (SF-12) scale, and pain levels were measured using the Visual Analog Scale (VAS) for both groups.
RESULT: The mean age of the lipedema group was 59.0±7.19, and the mean age of the obesity group was 57.85±6.21 (p>0.487). Body mass index measurements were 38.2±5.3 on average in the lipedema group and 35.01±3.17 on average in the obesity group (p=0,066). There was no significant difference between the groups in terms of SF-12 and VAS scores (p>0,05). When comparing bone mineral density between the lipedema and obesity groups, the mean L1-L4 total t-score was -1.20±1.28 in the lipedema group and -2.21±1.64 in the obesity group (p=0.049). The mean femur total BMD score (g/cm²) was 0.8979±0.122 in the lipedema group and 0.6011±0.51 in the obesity group (p=0.008). The lumbar and femur bone mineral densities of the obesity group were found to be significantly lower than those of the lipedema group. In addition, the mean bone mineral densities in both groups were found to be below normal levels and were classified as osteopenic (t score<-1.5).
CONCLUSION: The finding that bone mineral density was reduced in both the obese and lipedema groups of postmenopausal female patients suggests that adipose tissue has a negative effect on bone health. Additionally, when comparing bone mineral density between postmenopausal obese individuals and lipedema patients of similar age and body mass index, it was found that obese individuals had lower bone mineral density than lipedema in both femoral and lumbar region measurements. Lipedema, which is characterized by fat tissue accumulation in the subcutaneous region of the lower extremities rather than abdominal fat, may provide an advantage in preserving bone mass by inducing a lower systemic inflammatory response compared to obese individuals without lipedema. In addition to having better femoral bone density than obese individuals, the fat tissue accumulations surrounding the femoral region in individuals with lipedema may act as a barrier against falls, thereby preventing fractures.

Keywords: lipedema, bone mineral densitometry, osteoporosis

OP-140

Correlation of Shear Wave Elastography with Quantitative Ultrasound in the Diagnosis of Lipedema and Its Relationship with Clinical Parameters

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OBJECTIVE: This study aims to evaluate the correlation between shear wave elastography and quantitative ultrasound and clinical diagnosis in patients with lipedema, as well as its relationship with quality of life, anxiety and depression, pain, and lower extremity function.
MATERIAL AND METHODS: This prospective cross-sectional study was conducted at the Department of Physical Medicine and Rehabilitation, Medipol Mega University Hospital. The study included 35 patients with lipedema, 31 overweight/obese individuals, and 30 normal- weight healthy control participants, all of whom were women aged 18 years and older. Participants were evaluated using detailed medical history, physical examination, Beighton hypermobility score, anthropometric measurements, bioelectrical impedance analysis (BIA), lower extremity circumference measurement, and cutaneous ultrasound, shear wave elastography (SWE). Participants were administered quality of life (EQ-5D-3L), pain (PainDETECT, LANSS, VAS), functional (LEFS), and psychological status (HADS) scales, as well as a lipedema screening questionnaire (LSQ). The statistical significance level was set at 0.05. Analyses were performed using MedCalc Statistical Software version 12.7.7.
RESULT: Significant differences were found between the groups in terms of sociodemographic characteristics, clinical symptoms, quality of life, and pain levels. The burden of chronic disease was more common in the lipedema group (especially hypothyroidism), while hypertension and diabetes were more common in the overweight group. There were no differences in smoking, alcohol consumption, or oral contraceptive drug use. Lipedema was most commonly detected in Stage 2 (n=16, 45.7%) and Type 2–3 (each n=13, 37.1%). Pain (80%), bruising (88.6%), increased weight sensation with movement (71.4%), and history of unsuccessful dieting (91.4%) were common in the lipedema group. In ultrasound measurements, subcutaneous fat thickness followed the order lipedema>overweight>control; lateral leg (13.9 mm) and thigh (21.1 mm) were the most discriminating parameters. Echogenicity and shear wave elastography showed no difference, only supra-malleolar elastography was found to be moderately discriminating. BIA revealed high fat mass and fluid distribution and low muscle mass in the lipedema and overweight groups ($p<0.001$). The extracellular fluid volume was highest in the overweight group. Although PainDETECT(8±7) and LANSS (9±7) scores did not reach neuropathic levels in lipedema, they showed a negative correlation with LEFS. Quality of life (EQ-5D-3L) was lowest in the lipedema group, and LSQ scores were highest. The LSQ score was positively correlated with stage, pain, and psychological stress, and negatively correlated with functional capacity. Anxiety and depression were higher in the obese group.
CONCLUSION: SWE has limited benefit in the diagnosis of lipedema; in contrast, thickness measurements performed with ultrasound, especially in the lateral leg and thigh, are more effective in diagnosis and staging. Soft tissue thickness is associated with increased pain and loss of function. Since lipedema differs not only in physical findings but also in psychosocial and functional characteristics, a multifaceted approach is required for diagnosis. Therefore, in addition to imaging, subjective tools such as quality of life, anxiety/depression assessments, functional tests, and LSQ scores should also be included in the process.

Keywords: lipedema, shear wave elastography, ultrasound, subcutaneous fat thickness, echogenicity, bioelectrical impedance analysis

Measurements

The ultrasound device used in the study (a), subcutaneous adipose tissue thickness measurement (b), elastography measurement (c).

ROC analysis results of statistically significant thickness measurements

Measurement	AUC	p	Cut-off
Right thigh thickness	0.705	0.001	2.330
Left thigh thickness	0.731	<0.001	2.110
Right lateral leg thickness	0.768	<0.001	1.390
Left lateral leg thickness	0.732	<0.001	1.120

In our study, we identified the subcutaneous tissue thickness measurement of the lateral leg as the parameter with the highest discriminative power, with a cut-off value of 13.9 mm. The thigh region was determined as the second strongest parameter, with a cut-off value of 21.1 mm.

OP-141

Combined microvascular breast and lymphatic reconstruction with deep inferior epigastric perforator flap and gastroepiploic vascularized lymph node transfer for postmastectomy patients with and without lymphedema

Pedro Ciudad

Pedro Ciudad MD, PhD

OBJECTIVE: The combination of microvascular breast reconstruction (MBR) and vascularized lymph node transfer (VLNT) in a single-stage procedure is a surgical option for women who desire breast reconstruction and postmastectomy lymphedema surgery. Herein, we present a series of patients who underwent simultaneous lymphatic and MBR with the gastroepiploic VLNT (GE-VLNT) and the deep inferior epigastric perforator (DIEP) flap respectively. In addition, we present for first, the use VLNT for lymphedema prevention combined with MBR using GE-VLNT the DIEP flap in a single-stage-procedure.
MATERIAL AND METHODS: Between 2018 and 2024, all consecutive patients diagnosed with and without lymphedema who opted to pursue simultaneous MBR with DIEP flap and GE-VLNT were included in this study. Patient characteristics, surgical outcomes and complications were collected and analyzed.
RESULT: : Eleven patients underwent simultaneous unilateral MBR with DIEP flap and GE-VLNT. The mean age was 51.5± 9.4 years. Flap survival rate was 100%. One patient required re-exploration due to venous congestion of the lymph node flap but was successfully salvaged. There was no donor-site morbidity at the donor or recipient site for the DIEP flap were seen. The mean circumference reduction rate was 28.0%±6.3% (P<0.001). One patient received simultaneous MBR and VLNT for lymphedema prevention successfully at three-years-follow-up
CONCLUSION: The combined use of DIEP flap and GE-VLNT flaps in a single-stage procedure is a safe and reliable surgical option for patients with postmastectomy lymphedema who desire and are suitable for lymphatic and autologous MBR. The use of GE-VLNT for lymphedema prevention will require further studies to validity the success of the findings.

Keywords: breast, lymphatic reconstruction, deep inferior epigastric perforator flap, gastroepiploic vascularized lymph node transfer,postmastectomy patients, lymphedema

OP-142

Clinical Application of Personalized ICG-Guided Manual Lymphatic Drainage (MLD) for Activating Compensatory Lymphatic Pathways in Chronic Severe Secondary Lymphedema Following Breast Cancer Surgery: A Case Report

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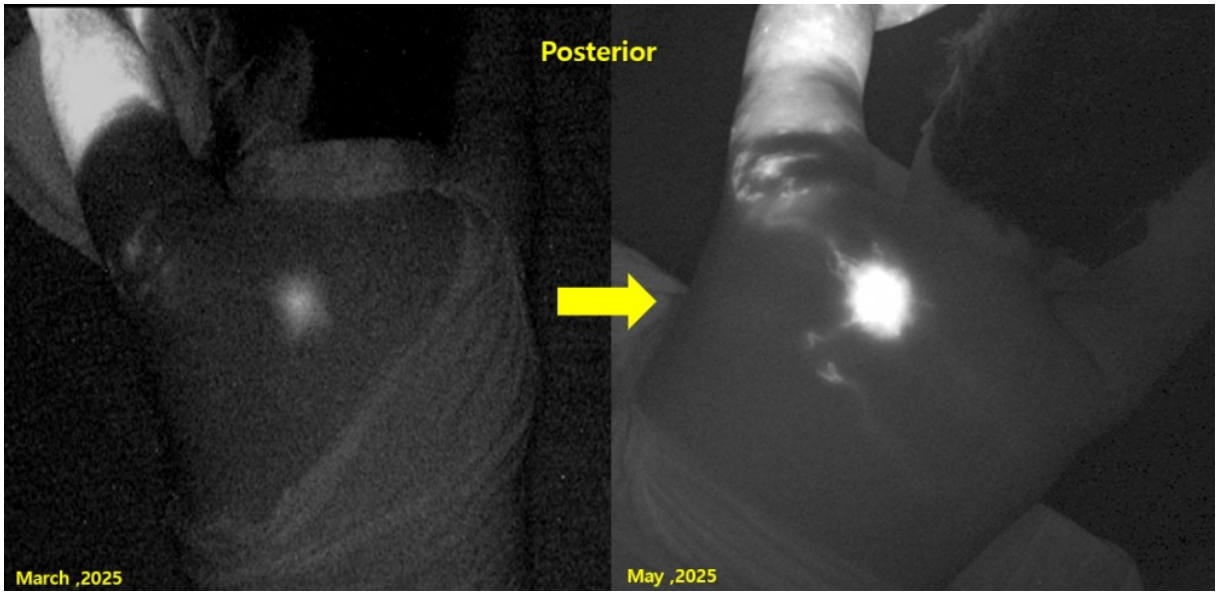
OBJECTIVE: Indocyanine Green (ICG) lymphography is an emerging technique that enables real-time visualization of superficial lymphatic flow. In patients with secondary lymphedema, ICG-guided manual lymphatic drainage (MLD) may facilitate the identification and activation of compensatory lymphatic pathways—alternative routes formed in response to lymphatic obstruction. This study aimed to explore the clinical utility of ICG-guided MLD in visualizing and enhancing compensatory lymphatic pathways, and to assess its effectiveness when applied as a personalized therapeutic strategy.
CASE: A sixty-nine-year-old patient with secondary lymphedema following breast cancer surgery was enrolled. Lymphedema developed five years ago and currently classified as International Society of Lymphology stage III, ICG lymphography was performed to assess lymphatic flow patterns, and a total of twenty MLD sessions were administered based on the imaging results. Changes in lymphatic flow before and after MLD, as well as the formation and enhancement of compensatory lymphatic pathways, were analyzed. ICG lymphography revealed obstruction in the primary lymphatic drainage pathways and newly formed compensatory drainage routes toward the ipsilateral paravertebral lymph nodes in the upper thoracic region. These alternative pathways were further enhanced following ICG-guided MLD. Post-treatment evaluation showed improved lymphatic flow and activation of these compensatory pathways. Limb circumference was reduced by 0.5–1.0 cm. The patient also reported subjective symptom relief, including reduced swelling, decreased pressure, and improved comfort. These findings suggest that enhancement of compensatory pathways through ICG-guided MLD may promote functional lymphatic remodeling.
RESULT: ICG-guided MLD is an effective strategy for identifying and activating compensatory lymphatic pathways in patients with secondary lymphedema. By enabling real-time visualization of lymphatic flow, this technique supports the development of patient-specific drainage protocols, moving beyond standardized approaches toward personalized care. This case report highlights the clinical value of ICG lymphography not only as a diagnostic tool but also as a dynamic guide for therapeutic intervention, reinforcing the importance of imaging-based planning in lymphedema management

Keywords: Indocyanine Green Lymphography, Chronic Secondary Lymphedema, Manual Lymphatic Drainage, Compensatory Lymphatic Pathway, Personalized Therapeutic Approach

Figure 1. Compensatory drainage pathway: pre-MLD (left) and post-MLD (right) views



OP-143

Simultaneous DIEP flap, Gastroepiploic Lymph node transfer and Lymphovenous bypass for Breast reconstruction and management of BCRL- Case series

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OBJECTIVE: To see the feasibility and outcomes of simultaneous DIEP flap, Gastroepiploic lymph node transfer and Lymphovenous bypass for whole breast reconstruction along with secondary lymphedema management
CASE: Case- Gastroepiploic lymph nodes are becoming the donor site of choice for many Lymphedema surgeons because of minimal risk of iatrogenic lymphedema as well as good Lymph node yield. Many authors have reported favorable results with Gastroepiploic Lymph node transfer for Lymphedema management. Patients with breast cancer related lymphedema wanting to undergo secondary breast reconstruction provide an unique opportunity to simultaneously perform the DIEP flap along with Gastroepiploic Lymph node transfer where Gastroepiploic lymph nodes can be harvested from the DIEP incision itself. We present a case series of three patients in whom we performed DIEP flap, Gastroepiploic Lymph node transfer as well as lympho-venous bypass simultaneously.
Case1- o/c/o carcinoma left breast 2 years back. Left mastectomy with axillary clearance was done and reconstruction was done with LD flap with implant. Now she presented with carcinoma right breast. For ca rt breast, wide local excision was planned by Breast surgeons. Reconstruction was planned with wise pattern reduction mammoplasty. She also had grade 3 lymphedema of left hand and complained of pain and tightness at implant site due to capsular contracture. So implant removal and reconstruction with DIEP flap was done for left side. Gastroepiploic Lymph node transfer and 1 lympho-venous bypass were done for Lymphedema management.
Case 2- O/c/o rt mastectomy with axillary clearance followed by radiotherapy 17 months back. Now presented with grade 2 lymphedema rt hand and wanting secondary breast reconstruction. DIEP flap for breast reconstruction along with Gastroepiploic Lymph node transfer and 2 lympho-venous bypass were done.
Case 3- o/c/o BCS with axillary clearance followed by radiotherapy 4 years back. Now presented with recurrence. Mastectomy with DIEP flap for breast reconstruction along with Gastroepiploic Lymph node transfer and 2 lympho-venous bypass were done.
RESULT: Average age of the patients was 48.66 years. There were no immediate post operative complications. All patients were discharged 6 days after the surgery. Average Follow up was 1.5 years. Mean pre-operative volume difference was 26.34%. It was reduced to 14.87% at one year follow-up. Average annual episodes of cellulitis was 2. None of the patients had any cellulitis after surgery. All three patients reported symptomatic improvement in tightness and heaviness. On Breast Q Reconstruction module, Psychosocial well being (Average Preop score 26. It improved to 36 postoperatively. Sexual well being (Preop score)- Average score was 13 with Equivalent Rash Transformed score- 36. Post op average score was 23. Equivalent Rash Transformed score- 63. The score increased from 36 to 63. Satisfaction with breast- preop Rash transformed score was 34. It improved to 58 postoperatively.
Conclusion- Simultaneous DIEP flap and gastroepiploic Lymph node transfer is feasible and The

gastroepiploic lymph node transfer along with lympho-venous bypass is effective in management of breast cancer related lymphedema

Keywords: gastroepiploic lymph node transfer, DIEP flap, Lympho-venous bypass, breast cancer related lymphedema

OP-144

Robot-Assisted Lymph Node-to-Vein Anastomosis: Lessons from the First 22 Cases at a High-Volume Lymphatic Supermicrosurgery Center

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OBJECTIVE: Lymphedema is a common but underrecognized sequela of cancer treatment. Supermicrosurgical procedures such as lymphaticovenular anastomosis (LVA) and, more recently, lymph node-to-vein anastomosis (LNVA) have emerged as effective options for fluid-predominant disease. In 2024, we began performing robot-assisted LNVA using a next-generation microsurgical robot. This study describes our initial experience, technical insights, and the potential for robotics to extend the boundaries of supermicrosurgery.
MATERIAL AND METHODS: Twenty-two consecutive robotic LNVAs were performed by a high-volume supermicrosurgeon at a tertiary center. Preoperative imaging with standard and ultra-high frequency ultrasound was used to identify optimal lymph nodes and veins. Robotic LNVA was performed using the Symani Surgical System, with adaptations for motion scaling, ergonomics, and console control. Intraoperative patency was confirmed by direct washout and/or indocyanine green (ICG) transit.
RESULT: All 22 procedures were technically successful, with 100% intraoperative patency. Anastomosis time improved from 37 to 18 min. Robotic assistance enhanced precision, eliminated tremors, and reduced the technical burden of operating at extreme submillimeter scales.
CONCLUSION: Robotic LNVA is safe, feasible, and efficient. It optimizes current techniques, offering the potential to extend surgical access below the 0.1 mm threshold, with implications for future treatment of lymphatic and possibly intracranial disease.

Keywords: Robotic surgery, lymphedema, LNVA, lymphatic reconstruction, supermicrosurgery, cancer survivorship

OP-145

Patient Selection and Personalized Treatment Algorithm in Lymphedema Surgery

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OBJECTIVE: Lymphedema is a chronic and progressive disease with substantial impact on function, appearance, and psychosocial well-being. Although surgical options have expanded in recent years, patient selection and treatment planning remain challenging. This study aimed to evaluate the effectiveness of lymphedema surgery on quality of life and to present a personalized stage-based algorithm for surgical decision-making.
MATERIAL AND METHODS: A prospective cohort of 30 patients with lymphedema (21 female, 9 male; mean age 41.8 ± 19.9 years; 18 primary, 12 secondary) was operated between January 2019 and December 2023. All patients underwent a structured preoperative preparation including complex decongestive therapy and indocyanine green (ICG) lymphatic mapping. Surgical planning was carried out according to a simple personalized algorithm:
Stage I – lymphovenous anastomosis (LVA);
Early Stage II – staged or combined LVA and liposuction;
Late Stage II – LVA and liposuction, with vascularized lymph node transfer (VLNT) if required;
Stage III – liposuction with immediate contouring.
Patients were assessed with demographic and disease characteristics, surgical details, number of anastomoses, and Lymphedema Quality of Life (LymQOL) questionnaire scores preoperatively and at 3 months postoperatively.
RESULT: The mean follow-up was 20.7 ± 12.6 months. In LVA cases, the mean number of anastomoses was 3.1 ± 1.7. Postoperative LymQOL scores demonstrated significant improvement across all domains (function, body image, symptoms, and mood) compared to baseline. These improvements were consistent regardless of age, disease duration, disease stage, surgical technique, or number of anastomoses. The algorithmic approach allowed precise targeting of disease severity and improved reproducibility of surgical outcomes.
CONCLUSION: Surgical treatment of lymphedema, when guided by a personalized stage-based algorithm and supported by structured perioperative care, results in significant and clinically meaningful improvements in patient-reported quality of life. This algorithm provides a reliable framework for patient selection and individualized surgical planning.

Keywords: lymphedema, lymphovenous anastomosis, vascularized lymph node transfer, liposuction, quality of life

OP-146

Changes in Limb Circumference with LymphoTouch® in Patients with Lymphedema: A Retrospective Analysis

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OBJECTIVE: The aim of this study was to evaluate the effect of the LymphoTouch® device, applied in addition to standard therapy, on changes in limb circumference measurements in patients with lymphedema.
MATERIAL AND METHODS: This study is a retrospective presentation of existing clinical data from 201 lymphedema patients followed in our clinic. All patients received LymphoTouch® in addition to standard lymphedema treatment. In unilateral cases, the affected limb was analyzed; in bilateral cases, the mean of both limbs was used. Circumference measurements were obtained at the wrist, MCP/MTP joint level, and at 10 cm, 20 cm, 30 cm, and 40 cm from the reference point before and after treatment. Differences between pre- and post-treatment measurements were compared, and correlations between these differences and clinical/demographic variables were analyzed.
RESULT: Of the 201 patients included (180 women, 21 men), 35.8% had upper extremity involvement, 63.2% had lower extremity involvement; 26.9% had right-sided, 27.4% had left-sided, and 45.8% had bilateral involvement. The distribution of diagnoses was primary (7%), secondary (80.1%), lipolymphedema (8%), and lipedema (5%). The mean changes from pre- to post-treatment were 0.90 ± 1.14 cm for the wrist, 0.64 ± 1.13 cm for MCP/MTP, 1.41 ± 4.52 cm for 10 cm, 1.23 ± 2.46 cm for 20 cm, 1.20 ± 1.63 cm for 30 cm, and 1.34 ± 2.17 cm for 40 cm levels. All reductions were statistically significant ($p<0.001$). BMI showed a significant negative correlation with changes at the wrist ($r=-0.201$, $p=0.004$), MCP/MTP ($r=-0.171$, $p=0.015$), 10 cm ($r=-0.203$, $p=0.004$), and 30 cm ($r=-0.175$, $p=0.013$) levels. Age was also negatively correlated with changes at the 10 cm ($r=-0.156$, $p=0.027$) and 20 cm ($r=-0.150$, $p=0.033$) levels.
CONCLUSION: LymphoTouch®, when applied in addition to standard lymphedema therapy, achieved significant reductions in circumference at all measurement levels. The changes were found to be weakly and negatively correlated with age, BMI, and symptom duration.

Keywords: Lymphedema, lymphatic diseases, rehabilitation

OP-147

The Impact of Flavonoids, Vit D, and Selenium in Lipedema

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OBJECTIVE: This pilot study aimed to asses therapeutic efficacy of a combination treatment comprising Micronized Purified Flavonoid Fraction (MPFF), Vitamin D, and Selenium in alleviating symptoms of lipedema, with a focus on pain reduction and changes in subcutaneous fat layer thickness.
CASE: Lipedema is a chronic, progressive adipose tissue disorder predominantly affecting women, characterized by bilateral, symmetrical fat deposition primarily in the lower extremities. It is often misdiagnosed as obesity or fibromyalgia, despite affecting approximately 11% of the female population. Current treatment options are limited, underscoring the need for adjunctive therapeutic strategies to improve symptom management and enhance patient quality of life.

Fifty female patients diagnosed with clinical stage I or II lipedema and twenty-seven healthy control subjects were enrolled in the study. All patients received standard care, including Manual Lymphatic Drainage (MLD) and compression therapy, and were administered twice daily oral supplementation with MPFF, Vitamin D, and Selenium. Ultrasound imaging was used to assess changes in skin and subcutaneous fat layer thickness and echogenicity before and after intervention. Pain severity was quantified using a validated 11-point numeric rating scale (0–10).
RESULT: Post-treatment assessments revealed a statistically significant reduction in both subcutaneous fat layer thickness and self-reported pain levels among lipedema patients receiving the MPFF-based regimen. No comparable changes were observed in the control group.

The results suggest that MPFF, in combination with Vitamin D and Selenium, and alongside conventional therapies, may offer beneficial effects in the management of lipedema by reducing pain and adipose tissue volume. These preliminary findings warrant larger, randomized controlled trials to further elucidate the efficacy and mechanisms of this integrative therapeutic approach.

Keywords: Lipedema, Micronized Purified Flavonoid Fraction, Vitamin D, Selenium, Pain Management, Subcutaneous Adipose Tissue

OP-148

The Impact of Serum 25-Hydroxyvitamin D Levels on Complex Decongestive Therapy Outcomes in Patients with Breast Cancer-Related Lymphedema: A Retrospective Analysis

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OBJECTIVE: Breast cancer-related lymphedema (BCRL) is a chronic complication that significantly impairs patients' quality of life. Various clinical and treatment-related factors influence the severity and progression of lymphedema. Vitamin D deficiency has been implicated in impaired immune regulation, muscle weakness, and increased inflammation, potentially affecting lymphedema outcomes. This study aimed to investigate the relationship between serum 25-hydroxyvitamin D (25[OH]D) levels and the outcomes of complex decongestive therapy (CDT) in patients with BCRL.
MATERIAL AND METHODS: This retrospective study included patients diagnosed with unilateral BCRL who underwent CDT at the Department of Physical Medicine and Rehabilitation in Gazi University Faculty of Medicine, between 2024 and 2025. Inclusion criteria were age ≥18 years, available pretreatment and posttreatment limb volume measurements, and documented serum (25[OH]D) levels prior to treatment.
Recorded variables included: age, body mass index (BMI), affected side, smoking status, regular exercise, history of radiotherapy (RX) and chemotherapy (Cx), lymphedema severity (mild, moderate, severe), pain score using the Visual Analog Scale (VAS), and time since lymphedema diagnosis. Limb volume was routinely computed based on a simplified truncated cone formula, which relied on circumferential measurements of the limbs taken at 4-cm intervals. Excess volume was calculated as the difference between the affected and unaffected limbs, expressed in both milliliters (ml) and percentage (%). Treatment response was evaluated by calculating improvement detected in excess volumes (ml) and improvements detected in excess volumes (%).
Serum 25(OH)D levels were categorized as normal (≥20 ng/mL) or deficient (<20 ng/mL). Continuous variables were expressed as median (min–max) and compared using the Mann–Whitney U test. Categorical variables were compared using the Chi-square or Fisher's exact test. Statistical significance was set at $p<0.05$.
RESULT: A total of 26 patients (12 with vitamin D deficiency, 14 with normal vitamin D levels) were included. The groups were similar in terms of age, BMI, affected side, smoking, exercise habits, RX, and Cx history (all $p>0.05$).
Serum 25(OH)D levels were significantly lower in the vitamin D-deficient group compared to the normal vitamin D group (15 [10–19] ng/mL vs. 36 [24–69] ng/mL, $p<0.001$).
Pretreatment affected limb volume was significantly higher in the vitamin D-deficient group compared to the normal vitamin D group (3538.5 [1998–6449] ml vs. 2718 [1900–4164] ml, $p=0.012$).
Pretreatment excess volume (%) was also higher in the deficient group (52.8 [16–94] vs. 19.8 [5.5–69.6], $p=0.016$).
Posttreatment affected limb volume remained higher in the deficient group (3318.5 [1865–5530] ml vs. 2543 [1778–3562] ml, $p=0.009$), and posttreatment excess volume (%) was also significantly greater (30.5 [5.3–69.2] vs. 9.65 [1.6–49.50], $p=0.010$).
There was no significant difference between groups regarding improvement detected in excess volumes (ml) ($p=0.410$) or improvements detected in excess volumes (%) ($p=0.571$). Pain scores

(VAS) were comparable (p=0.251). Although not statistically significant, severe lymphedema was more frequent in the vitamin D-deficient group (p=0.051).
CONCLUSION: Vitamin D deficiency in BCRL patients was associated with higher affected limb volumes and excess volume percentages both before and after CDT. While serum 25(OH)D levels did not significantly influence the degree of improvement in limb volume following therapy, the higher baseline severity observed in the deficient group suggests a potential role of vitamin D in lymphedema pathophysiology. These findings highlight the importance of assessing serum 25(OH)D status in BCRL patients and warrant further prospective studies to evaluate whether vitamin D supplementation can improve therapeutic outcomes.

Keywords: breast cancer lymphedema, treatment, vitamin d

Table 1. Baseline characteristics and treatment outcomes of patients with breast cancer-related lymphedema according to vitamin D status

Table 1. Baseline characteristics and complex decongestive therapy outcomes of patients with breast cancer-related lymphedema according to serum 25-hydroxyvitamin D status

	25-hydroxyvitamin D Status		
	Deficient	Normal	P Value
Age (years)	58,5 (43-83)	36 (39-74)	0,699*
25-hydroxyvitamin D level (ng/ml)	15 (10-19)	36 (24-69)	<0,001*
Body Mass Index (kg/m^2)	29,7 (21,8-41,4)	26,2 (23,2-37,9)	0,247*
Duration of lymphedema (months)	24 (3-180)	24 (3-240)	NA
Affected side			
Right	5	6	0,951†
Left	7	8	
Smoke			
Yes	1	1	0,720§
No	11	13	
Exercise habit			
Yes	4	6	0,619§
No	8	8	
Radiation therapy			
Yes	11	13	0,720§
No	1	1	
Chemotherapy			
Yes	10	14	0,203§
No	2	0	
Severity of lymphedema			
Mild	2	7	0,051†
Modarate	3	5	
Severe	7	2	
Visual analog scale	0 (0-8)	1,5 (0-8)	0,251*
First Volume (ml)	3538,5 (1998-6449)	2718 (1900-4164)	0,012*
Last Volume (ml)	3318,5 (1865-5530)	2543 (1778-3562)	0,009*
Pretreatment Excess Volume (%)	52,8 (16-94)	19,8 (5,5-69,6)	0,016*
Posttreatment Excess Volume (%)	30,5 (5,3-69,2)	9,65 (1,6-49,50)	0,01*
Improvement detected in excess volume (ml)	303 (25-1142)	187 (32-438)	0,410*
Improvement detected in excess volume (%)	10,65 (1,5-47,4)	7,55 (1,3-21,1)	0,571*

*Mann Whitney U
†Chi square
§Fisher Exact Test

OP-149

Role of STEM CELLS for Lymphatic Regeneration for Both Primary & Secondary lymphoedema

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OBJECTIVE: The importance and therapeutic value of Stem cells in lymphatic Regeneration are poorly understood due to lack of specific lymphatic molecular makers and non-availability of experimental models. We are evaluating the potential Human Mesenchymal stem cells (MSCs) or Autologous adipose tissue Stem cells.
MATERIAL AND METHODS: We selecting four rabbits in deferent colours.we desected rabbit animal tiles circumferentially,to produced acute and ochronic lymphedema and injected multiple doses of human mesenchymal stem cells or autologus adipose tissue stem cells.
RESULT: Lymphedema is Infant medical disease neglected in INDIA for a long time. It is very important TROPICAL disease (communicable disease) Even though 41% of the cases are present in India, no study has been done for Lymphatic regeneration. The adult warm live in Lymphatics and causes its obstruction. The adult warm Wuchereria bancrofti lives in Lymphatics and obstructs and destroy them. There is no Drug detected so far to kill the adult warm. The DEC we are using only helps to control the microfilaria.The Lymphatics plays major role to drain High Protein Lymph. This accumulated High protein lymph in our body parts causes all the delirious effects. We are using STEM CELLS to Regenerate the distroyed Lymphatics.
CONCLUSION: After studying the lymphatic regeneration in the rabbit models,we are injecting multiple does of stem cells and taking skin biopsy and Lymphangiogram,for evalution of the results.

Keywords: lyphedema, Stemcells Regeneration, plastic surgery


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