

BILATERAL LEG LYMPHEDEMA ASSOCIATED TO SARS-CoV-2 INFECTION. A CASE REPORT

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Introduction

Angiotensin converting enzyme 2 receptors (ACE2) are involved in the entry of SARS-CoV-2 into, among others cells, macrophages from spleen and lymph nodes. SARS-CoV-2 can cause severe damage in lymph nodes from hilum and mediastinum and in spleen (Feng, 2020, Lomoro 2020).

Case description

A 49-year-old female consulted for sudden onset bilateral lower limbs edema.

The edema appeared suddenly 4 months ago when she had a SARS-CoV-2 infection in 2020. She did not require hospital admission, but she had persistent SARS-CoV-2 symptoms, with anosmia and occasional liquid stools.

A Doppler ultrasound showed essential varicose veins. She received elastic compression, but she did not have any response to this treatment.

She complained of legs swelling and heaviness. The swelling did not change with rest or activity.

The general physical examination showed pre-obesity without other notable findings (BMI 27,5 kg/m²).

Lower limbs showed symmetrical bilateral swelling below the knees; the skin was soft and there was no pitting. She had bilateral Stemmer's sign.

The lower limb circumferences were symmetrical, with differences between right and left legs ≤ 2 cm.

There were any valuable pathological findings in the abdominal Doppler ultrasound. After isotopic lymphogammagraphy, the diagnosis was a bilateral lower limb lymphedema; stage II, associated to hypertrophic lymphatic malformation.

She received complex decongestive therapy, including manual lymphatic drainage and multilayered bandage wrapping. Then she used custom-made garments below the knees (CCL2, 30-40 mmHg).

After treatment, the patient reported decrease in volume and decrease in heaviness. At physical examination, the swelling reduced to distal feet only, where bilateral Stemmer sign persisted.

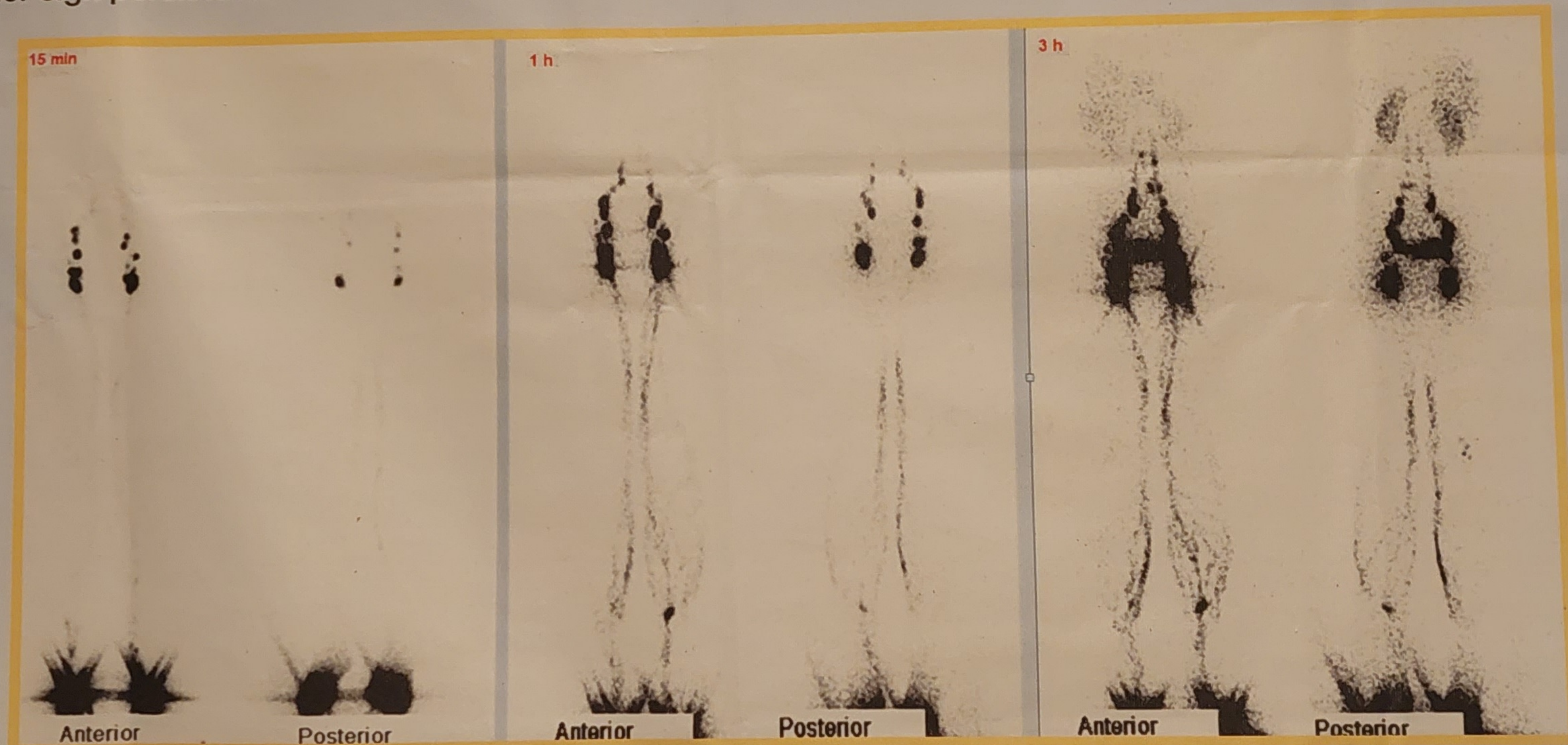


Figure 1. Lymphogammagraphy showed evidence of multiple accessory pathways in the calves and thighs that, even in a context of rapid lymphatic drainage, make it necessary to give the examination as pathological and compatible with lymphedema.

Discussion

This is a patient with sudden onset of bilateral lower limbs swelling, in the context of SARS-CoV-2 infection. Lymphogammagraphy study showed an unusual morphological abnormality of the lymphatic system and supported the diagnosis of lymphedema. Likewise, clinical findings and the good response to treatment also supported the lymphedema diagnosis.

SARS-CoV-2 has pathophysiological mechanisms capable of affecting the lymphatic system. In the present case, the sudden onset of lymphedema with bilateral involvement, coinciding with the SARS-CoV-2 infection, makes the possible causal association reasonable. Future observations are required to elucidate whether there is a relationship between lymphedema and SARS-CoV-2 infection.

Conclusion

To our knowledge, this is the first case of lower extremity lymphedema developed during COVID-19 infection.

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LYMPHEDEMA, PAIN, SHOULDER RANGE OF MOTION AND PRESENCE OF CORDS IN PATIENTS UNDERGOING BREAST CANCER TREATMENT WITH AXILLARY WEB SYNDROME: LATE FOLLOW-UP.



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INTRODUCTION

Axillary web syndrome (AWS) is characterized by the presence of one or more cords, mainly located in the axilla. It may extend to the arm, forearm, and trunk, with significant ROM limitation of shoulder flexion and abduction, and pain on movement.^{1,2} More recent studies suggest that local pathophysiological injury to the lymphatic system is more likely than injury to the venous system.³⁻⁴

Several treatments have been proposed, and spontaneous remissions up to three months have been reported considering AWS as a self-limiting complication. Short and medium-term changes are known, mainly considering the limitation of ROM and upper limb function. On the other hand, few studies describe the long-term progress of AWS, and some consider it as a risk factor for lymphedema. Studies showed that AWS can persist for more than 12 weeks after surgery and may even be diagnosed at follow-up after 18 to 36 months and is not considered a self-limiting condition.^{5,6}

MATERIAL & METHODS

A longitudinal cohort study was conducted at the outpatient clinic of the Division of the Breast Cancer Disease of the Department of Gynecology of EPM/UNIFESP. The patients followed up in this study underwent physiotherapeutic treatment in a adjuvant randomized clinical trial with 73 women, with tissue mobilization therapy and physical exercise (ME group) or only physical exercise (E group). The inclusion criteria were women, older than 18 years; diagnosed with breast cancer (invasive or noninvasive), undergoing surgical treatment for breast cancer (quadrantectomy or mastectomy) with some axillary procedure, such as sentinel lymph node biopsy (SLNB) or axillary lymphadenectomy (AL); who signed the informed consent form (ICF).

The exclusion criteria were patients with bilateral breast cancer, undergoing bilateral axillary approach; previous shoulder, breast, and axillary region surgery; severe orthopedic or rheumatologic changes, such as frozen shoulder, rotator cuff injury, impingement syndrome, or fractures; and patients who had immediate reconstructive surgery.

Patients after three to six years post-surgery were recruited by telephone to return to the Breast Care outpatient clinic for a physical therapy evaluation.

This evaluation updated data on body mass index (BMI), new surgeries and treatments, disease status (presence of recurrence and metastasis), in addition to the standard pain assessment, perimetry goniometer of upper limbs, sensitivity of the breast, axilla, and inner arm, presence of winged scapula was and presence of cords was determined. This reassessment was only performed by the main researcher.

OBJECTIVES

The objective of this study was to investigate the prevalence of AWS, ROM, pain, presence of cords, and the complications associated with AWS, such as lymphedema, from three to six years after breast cancer surgery. The study was conducted at the outpatient clinic of the Division of the Breast Cancer Disease of the Department of Gynecology, Escola Paulista de Medicina (EPM), Federal University of São Paulo (UNIFESP).

RESULTS

Information from 25 patients recalled 90 days after surgery was evaluated, as shown in Figure 1.

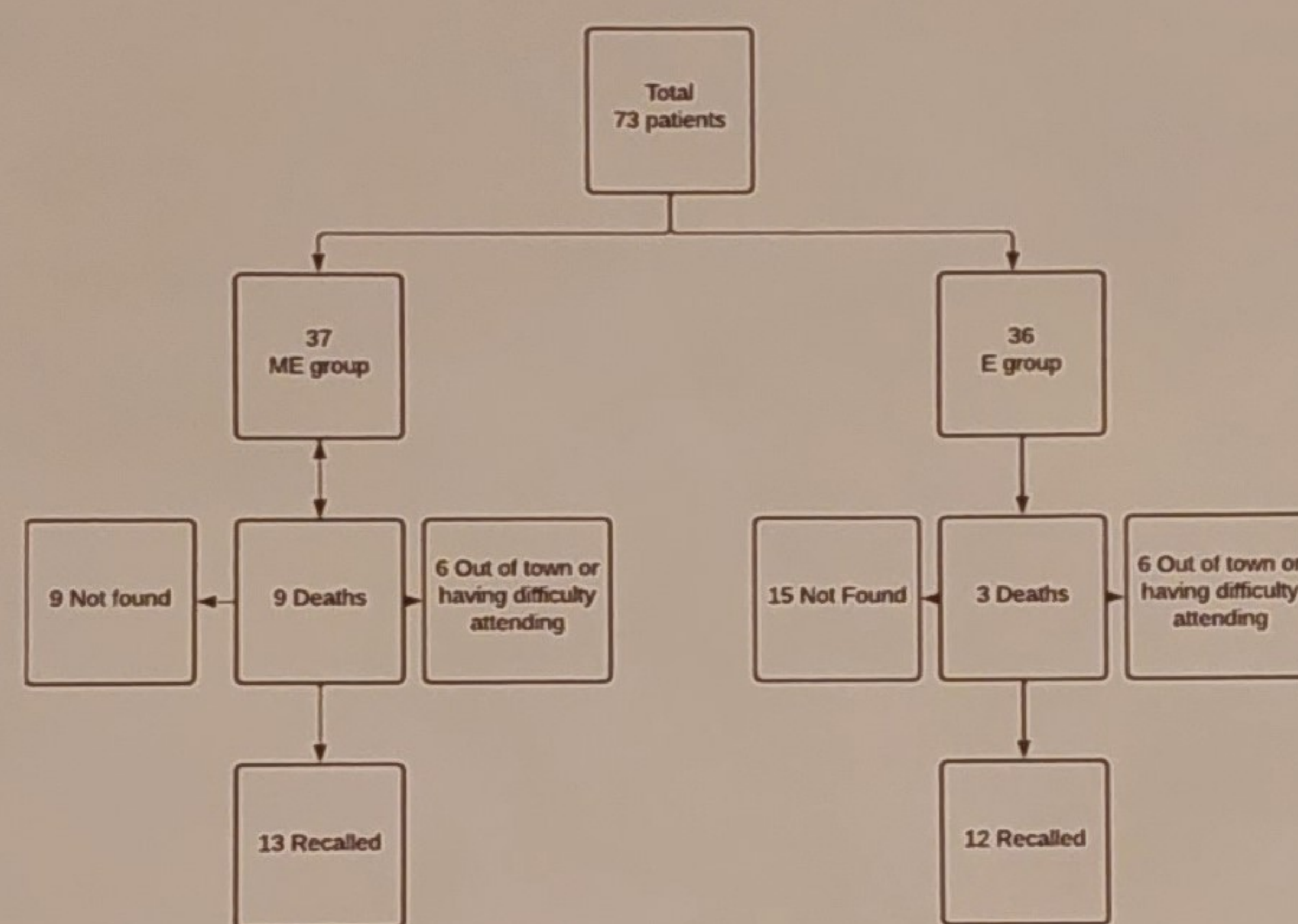


Figure 1- Recall Flowchart.

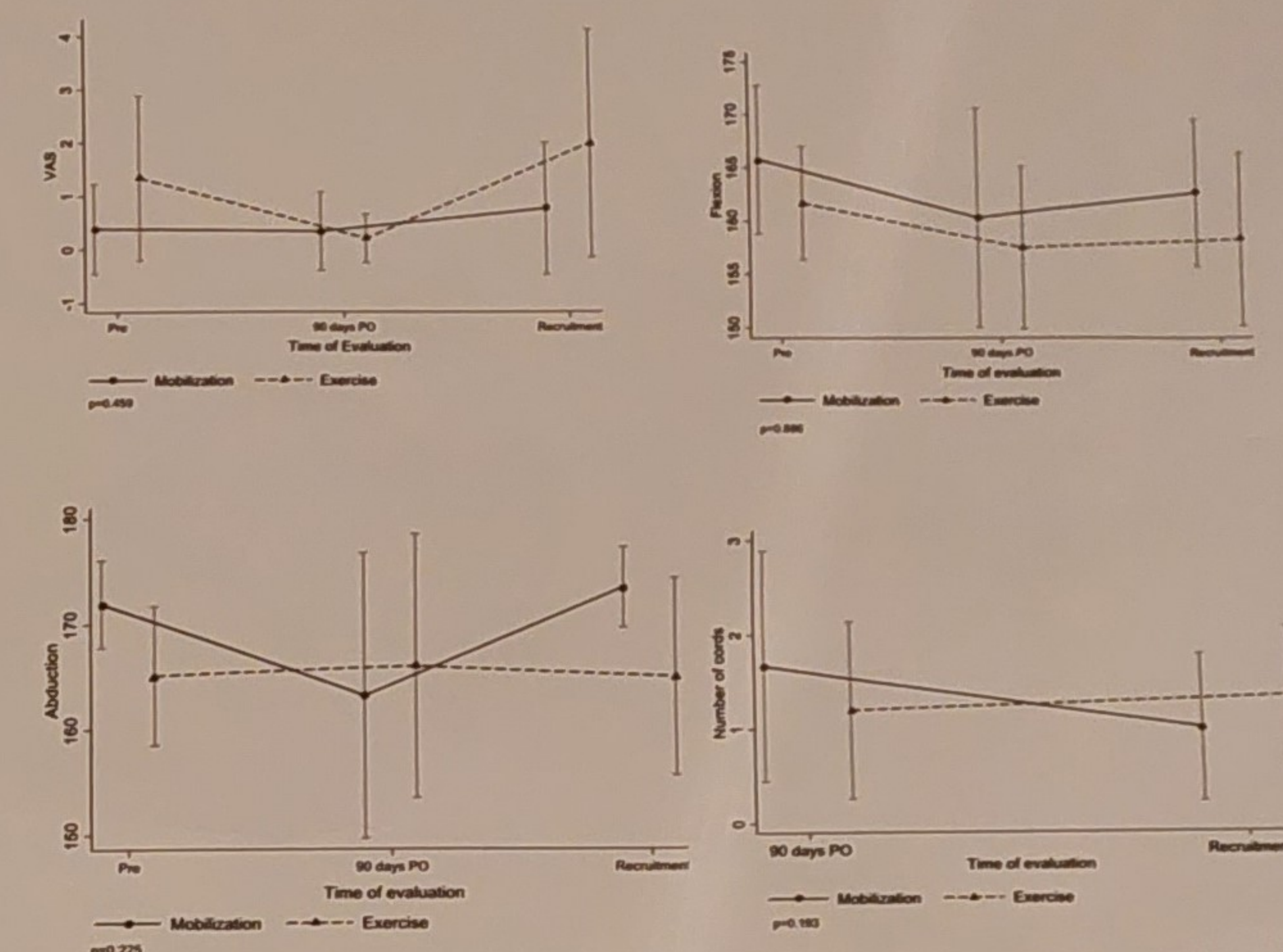
Table 1 shows the distribution of sites, types of pain, location of the cords, and whether the cords were visible and palpable by time of evaluation and treatment. Regardless of the intervention performed, the cords were still present in the patients, even three to six years after surgery. Of the 25 patients analyzed, 64% (16 patients) developed AWS in a mean follow-up of 4.8 years.

This study evaluated only the palpable cords (100%), and 87.5% were located in the axilla, not perceived by the patients.

Table 1 - Distributions of sites and types of pain, location of the cords, visible and palpable, comparing preoperative time, 90 days PO and recall.

	Treatment		Total
	Mobilization	Exercise	
Pain site			
Pre			
Axilla	0 (0,0)	1 (8,3)	1 (4,0)
Breast	0 (0,0)	2 (16,7)	2 (8,0)
Breast and arm	1 (7,7)	0 (0,0)	1 (4,0)
No pain	12 (92,3)	9 (75,0)	21 (84,0)
90 days PO			
Axilla	0 (0,0)	1 (10,0)	1 (4,5)
Breast	1 (8,3)	0 (0,0)	1 (4,5)
No pain	11 (91,7)	9 (90,0)	20 (80,9)
Recruitment			
Breast	1 (8,3)	2 (16,7)	3 (12,5)
Arm	1 (8,3)	1 (8,3)	2 (8,3)
Breast and arm	0 (0,0)	1 (8,3)	1 (4,2)
No pain	10 (83,3)	8 (66,7)	18 (75,0)
Type of pain			
Pre			
Sporadic	1 (7,7)	2 (16,7)	3 (12,0)
On movement	0 (0,0)	1 (8,3)	1 (4,0)
No pain	12 (92,3)	9 (75,0)	21 (84,0)
90 days PO			
Sporadic	2 (16,7)	1 (10,0)	3 (13,6)
No pain	10 (83,3)	9 (90,0)	19 (86,4)
Recruitment			
Sporadic	1 (9,1)	1 (8,3)	2 (8,7)
On movement	1 (9,1)	3 (25,0)	4 (17,4)
No pain	9 (81,8)	8 (66,7)	17 (73,9)
Cords location			
90 days PO			
No cords	5 (41,7)	4 (40,0)	9 (40,9)
Axilla	3 (25,0)	5 (50,0)	8 (36,4)
Arm	2 (16,7)	0 (0,0)	2 (9,1)
Axilla and arm	0 (0,0)	1 (10,0)	1 (4,5)
Axilla, arm, and elbow	1 (8,3)	0 (0,0)	1 (4,5)
Axilla and trunk	1 (8,3)	0 (0,0)	1 (4,5)
Recruitment			
Axilla	6 (85,7)	8 (88,9)	14 (87,5)
Axilla and arm	0 (0,0)	1 (11,1)	1 (6,3)
Axilla, arm, and forearm	1 (14,3)	0 (0,0)	1 (6,3)
Visible or palpable			
90 days PO			
No cords	5 (41,7)	4 (40,0)	9 (40,9)
Visible	0 (0,0)	0 (0,0)	0 (0,0)
Palpable	6 (50,0)	5 (50,0)	11 (50,0)
Visible and palpable	1 (8,3)	1 (10,0)	2 (9,1)
Recruitment			
No cords	6 (46,2)	3 (25,0)	9 (36,0)
Visible	0 (0,0)	0 (0,0)	0 (0,0)
Palpable	7 (53,8,0)	9 (75,0)	16 (64,0)
Visible and palpable	0 (0,0)	0 (0,0)	0 (0,0)

According to graphs 1 to 4, no interaction effects were found between group and time, or time and group for any variables (pain, shoulder flexion, shoulder abduction, and number of cords).



Graph 1-4 - VAS, shoulder flexion, shoulder abduction, number of cords means by time of evaluation and treatment.

As observed in table 2, no differences were found in means of number of cords per lymphedema.

Table 2 - Summary measurements of number of cords per lymphedema p - descriptive level of the Mann-Whitney test.

	Lymphedema		Without lymphedema		p
	N	Mean ± SD	N	Mean ± SD	
7 days PO	2	3,00 ± 0,00	71	2,04 ± 1,63	0,315
15 days PO	2	2,00 ± 0,00	71	2,72 ± 1,70	0,512
30 days PO	2	3,00 ± 0,00	69	2,38 ± 1,69	0,415
60 days PO	2	2,00 ± 0,00	67	1,75 ± 1,56	0,633
90 days PO	2	1,50 ± 2,12	55	1,33 ± 1,48	0,855
180 days PO	1	1,00 ± 0,00	53	1,57 ± 1,58	0,817
Recruitment	1	3,00 ± 0,00	24	1,08 ± 1,18	0,166

CONCLUSIONS

AWS is a chronic complication, and cords are present in the period from three to six years after surgery, with a prevalence of 64%, but without causing functional deficits, such as limitation of ROM of shoulder flexion and abduction and presence of pain significant, at least in patients who received physical exercise with or without tissue mobilization. The correlation with lymphedema was not significant in our study.

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Evaluation and Surgical Management in a Multidisciplinary Lymphedema Center

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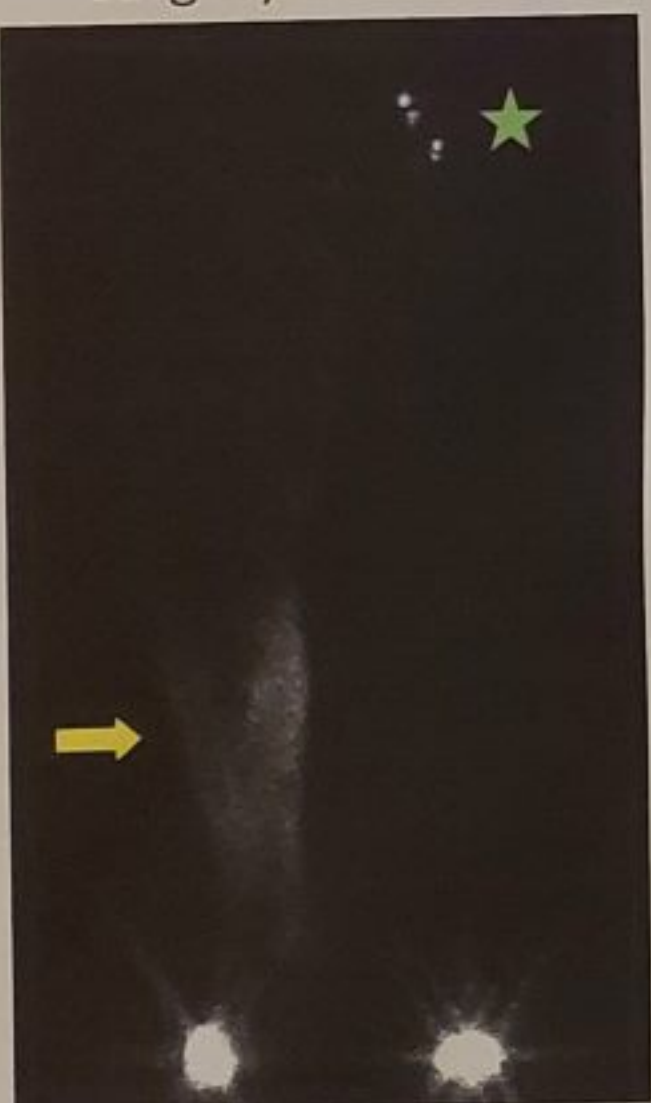
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Introduction

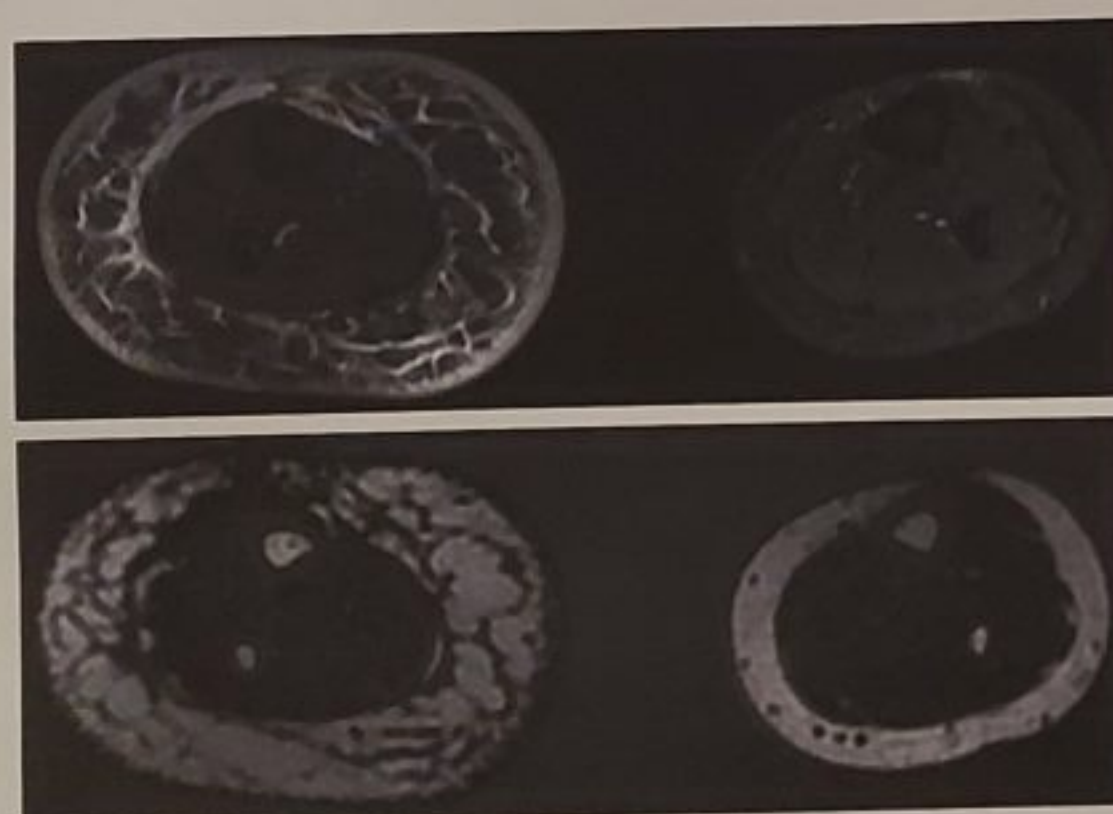
- Lymphedema has traditionally been an underserved disease by the medical community.
- There is a growing emphasis in establishing multidisciplinary centers of excellence to manage lymphedema; however, there are limited data regarding patient evaluation and management at such centers.

Methods

- We retrospectively reviewed patients presenting to our multidisciplinary lymphatic center, which includes members of vascular/lymphatic medicine, plastic/lymphatic surgery, diagnostic and interventional radiology, and lymphatic therapy.
- Total patient volume, diagnostic testing and subsequent lymphatic surgery was reviewed.



Nuclear lymphoscintigram:
Dermal backflow with decreased uptake in inguinal region in LLE with normal uptake in RLE

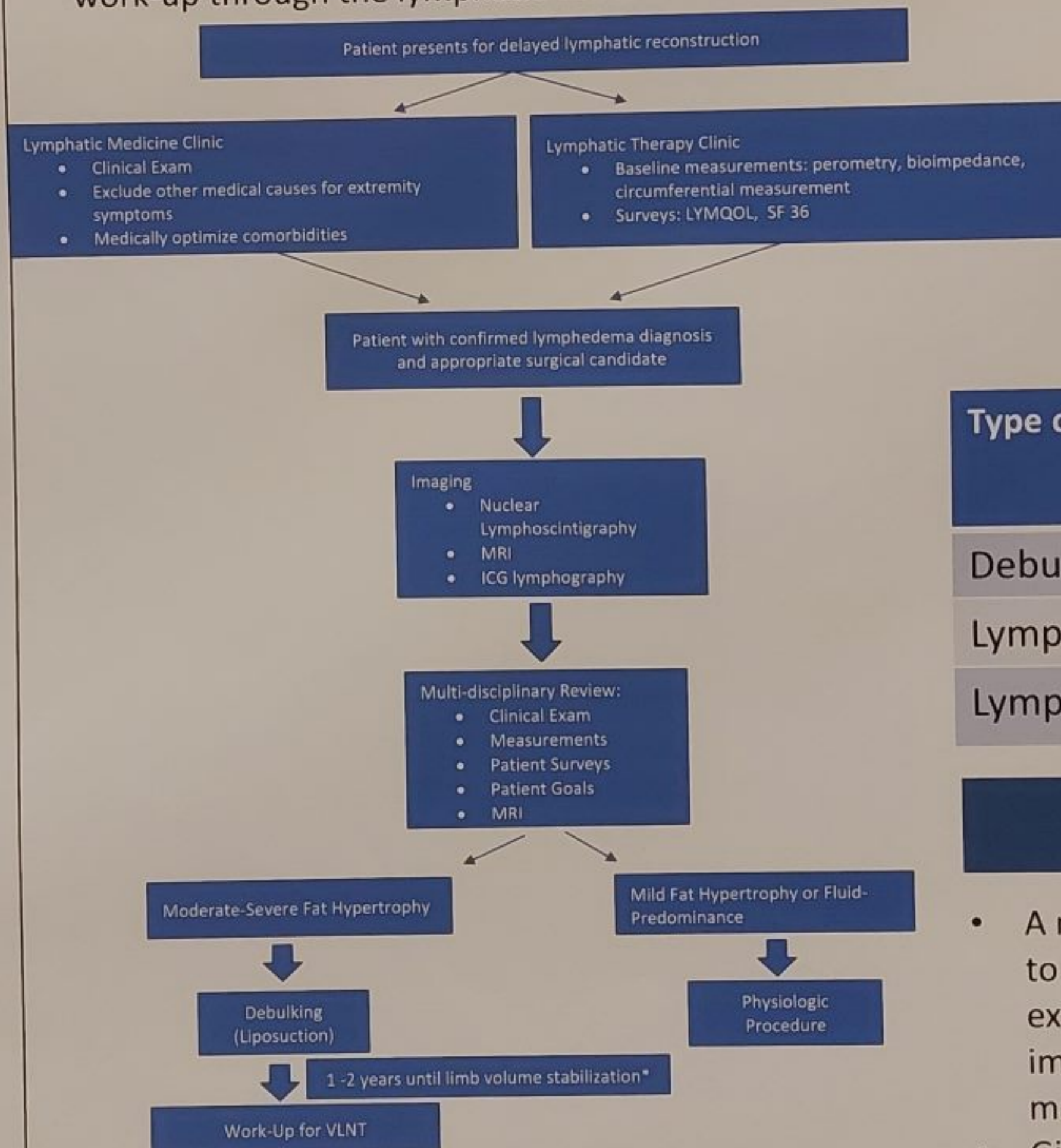


Magnetic Resonance Imaging: Patient with secondary lymphedema of RLE
Edema (top panel), Fat (bottom panel)

Results

- From January 2018 through February 2023, 1,790 patients were referred to the lymphatic medicine clinic for evaluation of edema.
- 77.1% were female with an average age of 59.9 years
- 146 patients (8.2%) ultimately underwent lymphatic surgery.

Figure. Patients with chronic lymphedema: flow and work-up through the lymphatic center.



*1 year for upper extremity, 2 years for lower extremity

Test Performed	Number of Patients Completing Test
Nuclear Lymphoscintigram	355 (19.8%)
Magnetic Resonance Imaging	179 (10%)
Invasive Lymphangiography	17 (0.9%)

*All patients had pre-operative ICG lymphography

Type of Lymphatic Surgery	Number of patients who underwent surgery
Debulking/Liposuction	87
Lymph Node Transplant	43
Lympho-venous Bypass	16

Conclusion

- A multidisciplinary team may be the preferred approach to evaluating patients with lymphedema as it offers expertise in dedicated clinical evaluation, lymphatic imaging, and both conservative and surgical management.
- Given less than 10% of patients ultimately received surgery, a robust non-invasive component to a lymphatic team is essential.

WHERE IS THE ROLE OF INTERMITTENT PNEUMATIC COMPRESSION IN THE TREATMENT OF PATIENTS WITH STAGE II SECONDARY LYMPHEDEMA OF THE ARMS, AFTER TREATMENT BREAST CANCER

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INTRODUCTION: Intermittent pneumatic compression (IPC) is one of the methods of treating patients with lymphedema

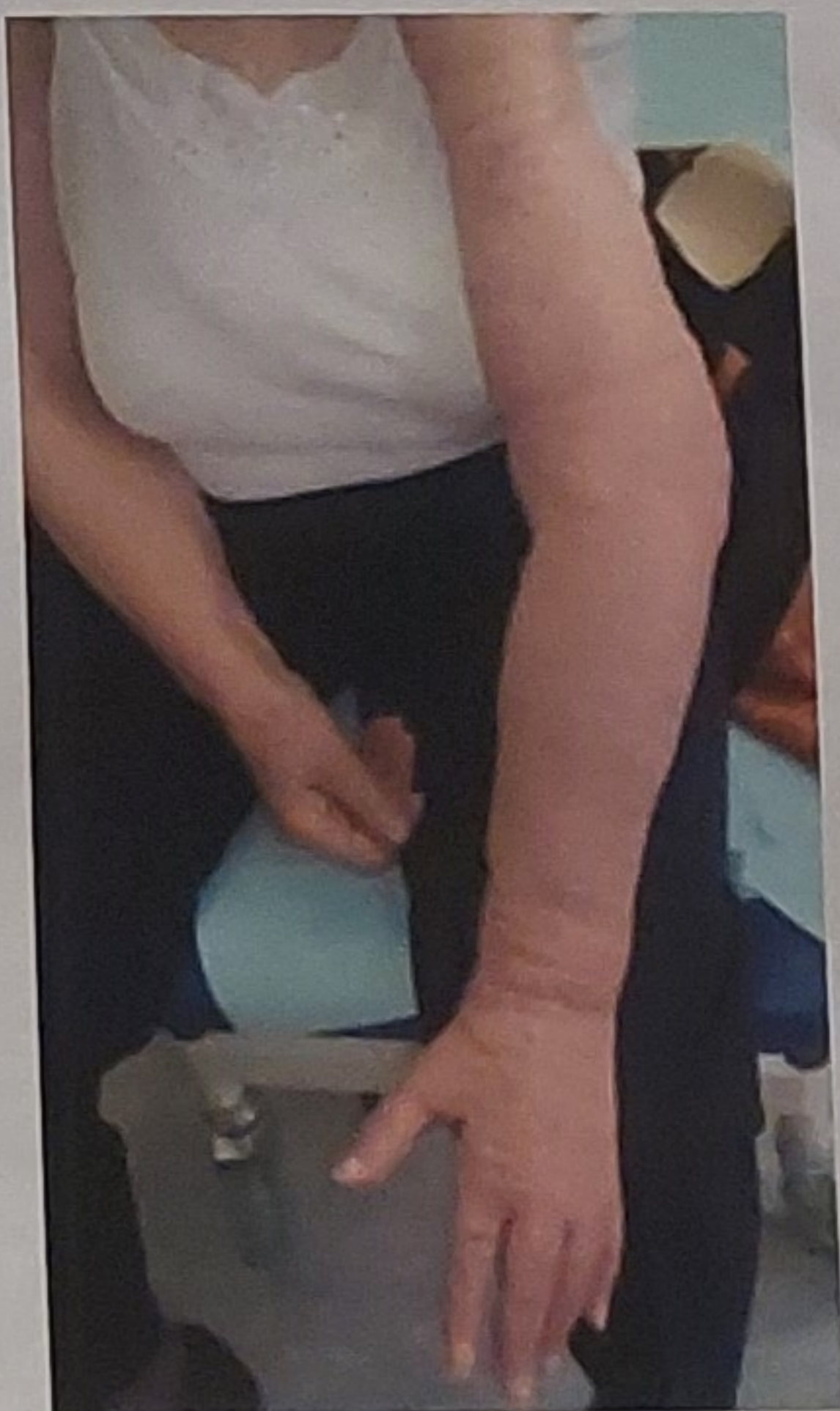
METHODS: In this study, we wanted to evaluate the place of IPC in the treatment of stage II secondary lymphedema of the arms in patients who had surgery for breast carcinoma and axillary lymphadenectomy. The study was conducted retrospectively. We included female patients who were treated at our clinic only with adhesive short-elastic bandages* (AS-SB therapy) to evacuate edema and female patients who were treated with a combination of IPC (50 mmHg, 30 min, 8 chambers, **) and the application of adhesive short-elastic bandages (AS-SB + IPC therapy). We were interested in whether the edema would evacuate faster when using a combination of IPC and compression. The patients in the first group were fitted with adhesive short-elastic bandages and were advised to exercise, while in the second group, IPC was performed before the bandages were applied. The patients went for check-ups once a week, when the therapy was carried out until the edema decreased. Then they continued the maintenance therapy with medical compression sleeves compression class II, circularly woven.

RESULTS: Patients from the first group (compression only) required an average of 3 visits to the day hospital for edema evacuation, while patients from the second group (IPC and compression) only required an average of 2.1 visits (Tables).

CONCLUSION: IPC is a good adjunctive therapy to compression with short elastic bandages for edema evacuation in patients with stage II arm lymphedema after breast carcinoma treatment.

	Nb. of patients	Mean age	Initial average working pressure	Working pressure after one week	Average Nb. of visits
AS-SB therapy	36 females	62.14 years	59 mmHg	35 mmHg	3
AS-SB + IPC therapy	40 females	61.1 years	58 mmHg	36 mmHg	2.1

	Stage II arm lymphedema	
Number of visits of each patient	% of visits at AS-SB therapy	% of visits at AS-SB + IPC therapy
1 x	13,9	20
2x	30,6	43,3
3x	22,2	30,0
4x	19,4	6,7
5x	8,3	0
6x	2,8	0
7x	0	0
8x	2,8	0



*Panelast™, Lohmann&Rausche

** Bio Compression System, Inc. Moonachie, model SC-3008-D

RED FLAGS IN LYMPHEDEMA. ALGORITHMIC DESIGN OF DECISIONS IN TREATMENT.

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JUSTIFICATION:

Red flags are a set of signs and symptoms presented by patients alerting us that they are not susceptible to treatment. This does not necessarily imply the existence of a serious health issue, only a different approach or more information in some cases.

POPULATION TARGETED:

Community of physiotherapists working in the approach to lymphedema

CONTENT DESCRIPTION:

A descriptive study based on a bibliographic review has allowed us to develop the algorithm of red flags in each one of the pillars of lymphedema treatment. In manual lymphatic drainage, multilayer bandaging, and presotherapy.



OBJECTIVE:

To identify red flags in the treatment of primary and secondary lymphedema in its approach.

SIGNS AND SYMPTOMS	MANUAL LYMPHATIC DRAINAGE	MULTILAYER BANDAGING	PRESOTHERAPY
SHARP PAIN	✗	✗	✗
CHRONIC PAIN	✓ 🔔 If it does not increase	✓ 🔔 If the bandage is tolerated	✗
HEAT, REDNESS, FEVER AND GENERAL MALAISE (Signs of infection: assess erysipelas, cellulitis y lymphangitis)	✗ 🔔 1st treat the infection	✗ 🔔 1st treat the infection	✗
BRACHIAL PLEXUS NEUROPATHIES, SEVERE PERIPHERAL NEUROPATH, LACK OF SENSITIVITY	✓	✗	✗
FIBROSIS, ABSENCE OF PITTING	✓ 🔔 Break up fibrosis	✓	✗
PHEBOLYMPHEDEMA	✓	✓	✓ 🔔 Pitting positive
LIMB ROOT EDEMA GENITAL EDEMA	✓ 🔔 Work anastomosis, drain to healthy side	✓ 🔔 Look out limb root edema	✗
KIDNEY FAILURE AND SEVERE HEART FAILURE (Evaluate cough due to pulmonary edema)	✗ 🔔 1st stabilize disease	✗ 🔔 Bandage smaller areas-look out	✗
OPEN WOUNDS. VENOUS ULCERS.	✓ 🔔 Wear gloves	✓ 🔔 Protec the wound	✗
FUNGUS (treat with antifungals)	✓ 🔔 Wear gloves	✓	✓ 🔔 Prevent infections
UNSTABLE HYPERTENSION	✗ 🔔 1st control disease	✗	✗
SUDDEN INCREASE IN EDEMA (Important alarm sign, send to specialist for possible recurrence)	✗	✗	✗
CONTACT DERMATITIS (Treat with corticosteroids, see if the area increases)	✓ 🔔 Take care of the affected area	✓ 🔔 Protect the area with a cotton bandage and remove if itching increases	✓
HYPERKERATOSIS PAPILLOMATOSIS	✓	✓	✓
PERIPHERAL ARTERIAL DISEASE	✓	✗	✗
DEEP VENOUS THROMBOSIS	✗ 🔔 1st stabilize thrombus	✗ 🔔 1st solve thrombus	✗

Female breast cancer survivors: How can physical activity and grip strength impact the development of Lymphedema?

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Introduction

- In recent years, there has been a remarkable increase in the number of breast cancer survivors, highlighting advances in treatment and care (Sung et al., 2021). In many situations, this means living with chronic complications of treatment, such as pain, loss of upper limb strength, lymphedema (LE), and others, which can significantly impact the function, active participation, and overall quality of life of these individuals (Dieli-Conwright et al., 2016).
- It is imperative to gain a deeper understanding of the most effective strategies for preventing and treating the sequels of breast cancer treatment (Naghbi & Varshoe Tabrizi, 2018).
- Promoting active and healthy lifestyle by instilling behavioral changes and addressing modifiable risk factors plays an important role in preventing cancer recurrence and increasing survival (Paxton et al., 2016).

Objective

Analyze the relationship between physical activity (PA) with grip strength and lymphedema volume in female breast cancer survivors.

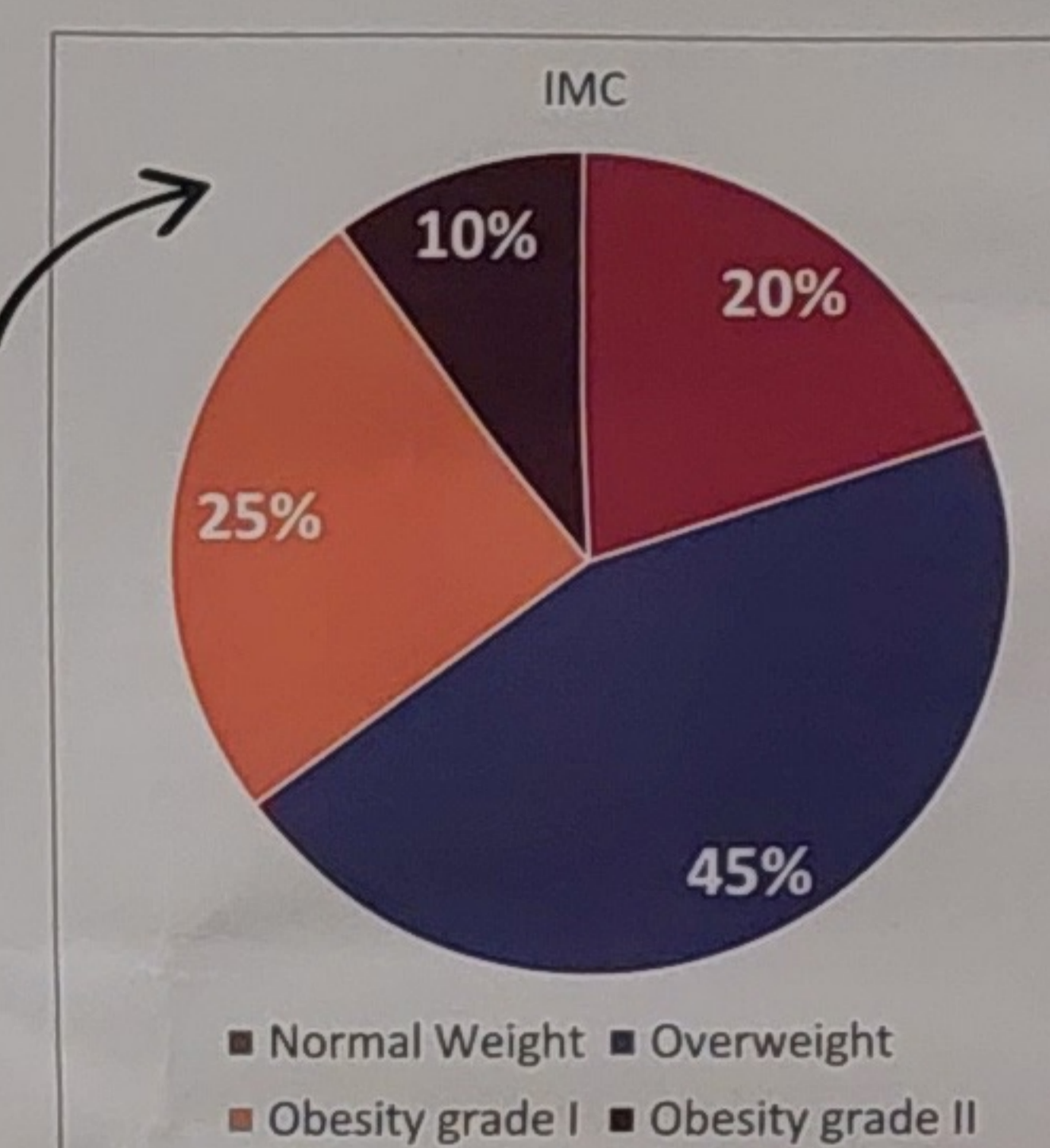
Materials and methods

- A cross-sectional analytical study was conducted.
- Women who survived breast cancer between 1 and 5 years after surgery were selected. Women with bilateral surgery and who had not completed the active phase of treatment were excluded.
- A characterization questionnaire was performed, upper limb lymphedema volume was measured with tape measures, PA levels were assessed with International Physical Activity questionnaire (IPAQ-SF) and the handgrip strength was evaluated with the JAMAR dynamometer.

Results

- A group of 20 women with a mean age 61 ± 8 years and an average of 39 months after breast surgery participated in the study. Six underwent mastectomy and 14 underwent axillary surgery. Most participants underwent sentinel node biopsy (16) and only 4 underwent axillary lymph node dissection.
- 80% were overweight**, of which **35% were obese**.
- There was an average volume of 2100 cm^3 in the affected upper limb and an average of 2013 cm^3 in the unaffected side. **The difference between the two limbs presented an average of 87.3 cm^3 .**

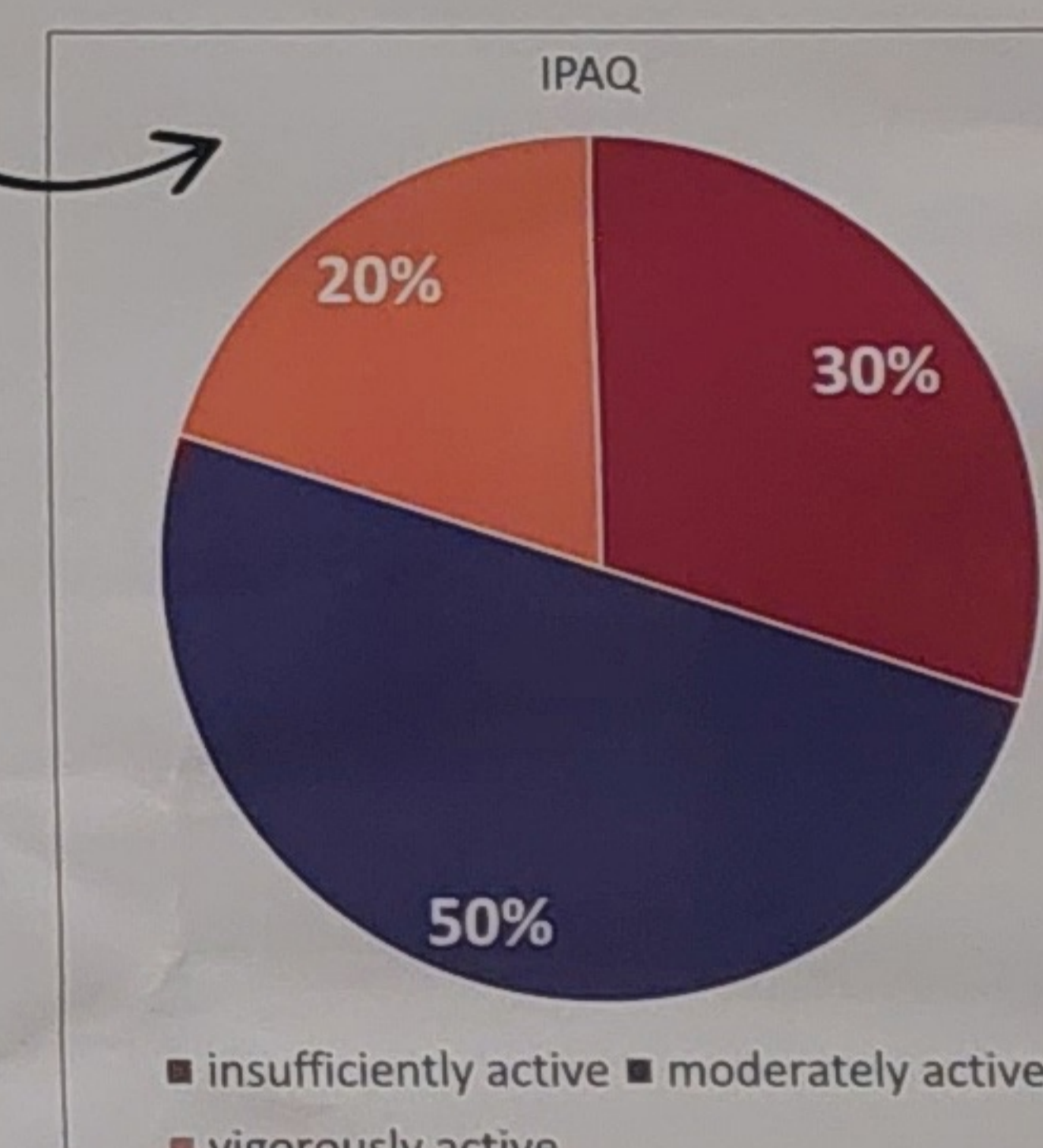
→ None of the participants showed a significant difference between limbs (greater than 10% difference). Despite this, 45% of participants have subclinical LE (difference between both upper limbs of 5 to 10%).



Graph 1: Characterization of the sample according to the body mass index

- Mean grip strength was 20.5 ± 1.2 and 21.4 ± 1.2 on the nondominant and dominant side, respectively. It was found that only **25% of the women included are within the normative values of grip strength on the dominant side** according to their age. As for the **nondominant side, 40% of the sample is within the normative values** for their age.

- In the present study, 30% of the sample were insufficiently active, 50% moderately active, and 20% vigorously active, with a weighted average of 5 ± 0.6 hours of sitting per day.



Graph 2: Characterization of the sample according to the physical activity levels

- No significant associations were found between the LE and PA** ($r_s=0.231$; $p=0.3$) nor between **LE and the number of hours sitting** ($r_s=0.291$, $p=0.213$). There was **no significant correlation between PA levels and grip strength** on the dominant side ($p=1$; $r_s<0$) and non-dominant side ($r_s=0.062$; $p=0.796$) or **between grip strength and volume difference between members**. *

- A **strong positive correlation was found between Body Mass Index (BMI) and limb volume difference** ($r_s=0.583$; $p=0.007$). *

* Statistically significant $p<0.05$.

Conclusions

- In this sample, it is concluded there is no relationship between limb grip (dominant or non-dominant), LE volume and PA. However, it indicates a **correlation between body mass index (BMI) and lymphedema**, and **higher BMI is identified as a risk factor for the development of lymphedema**.
- Moreover, engaging in **physical activity** can contribute to the control and management of BMI, revealing the influence of PA in BMI. Consequently, PA indirectly serves as a preventive strategy against lymphedema and loss of upper limb strength.
- By incorporating PA as part of a comprehensive approach to managing BMI, the **risk of developing lymphedema may be reduced**. In summary, the observations suggest that while PA may not directly prevent lymphedema, it can play an important role in indirectly preventing its development by helping to control BMI.

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Does the gastrointestinal system impact the effectiveness of complete decongestive therapy?

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BACKGROUND

It is generally accepted by clinicians that there is a strong relationship between anatomical structure and function. Lymphedema is an abnormal stagnant fluid accumulation in the interstitial spaces due to impaired lymphatic structure and or function. The relationship between the cardiovascular and lymphatic systems is well-established in research. The literature does not clearly represent the relationship between the lymphatic and gastrointestinal systems¹. Obesity can negatively impact the lymphatic system and is a risk factor for lower extremity lymphedema, known as obesity-induced lymphedema². Complete decongestive therapy (CDT) is a standard technique that physical therapists utilize for treating lymphedema of the trunk and extremities. What is not known is if an impaired (hypomobile) gastrointestinal system decreases the effectiveness of CDT.

PURPOSE

The purpose of this study was to determine whether a patient's reported frequency of bowel movements is associated to the volumetric changes in their lower limbs after receiving comprehensive decongestive therapy for lower extremity lymphedema unrelated to cancer.

METHODS

A retrospective convenience sample was collected from medical records between 2016 to 2023 at a physical therapy clinic. Ninety-seven charts met the inclusion requirements of noncancer related lower extremity lymphedema for patients with obesity. The chart review collected data on the patient's report of their frequency of bowel movements at intake, initial volumetrics of the lower extremities, change in volumetrics of lower extremities, and the total number of physical therapy sessions.

RESULTS

This descriptive study demonstrates that complete decongestion effectively decreases volumetrics of the lower extremities regardless of the number of bowel movements reported by the patient at intake.

WHAT IS ALREADY KNOWN ON THIS TOPIC?

The gastrointestinal tract is an organ system crucially dependent on healthy lymphatic function. The interstitial tissue level of hydration, external compression forces produced by gut motility (extrinsic), and lymphatic contractile (intrinsic) forces are only a few variables that affect lymph flow. While gastrointestinal lymphatics typically regulate interstitial fluid volume by clearing fluid entering the mucosal and submucosal tissue layers, lymphatic clearance is insufficient during pathological inflammation to avoid the accumulation of excess interstitial fluid, resulting in edema and dilation of lymph vessels.¹ Due to reduced baseline lymphatic clearance and a higher propensity for inflammation in response to injury, obese people are more likely to develop lymphedema. In response to lymphatic damage, obesity enhances inflammation, fibrosis, and adipose deposition, showing that obese people have a higher chance of developing lymphedema.²⁻⁴ A clinical trait of people with lower extremity lymphedema is obesity.⁵

Normal lymphatic structure and function support the digestive tract's absorptive and immunological activities. A congested lymphatic system makes the GI tract more susceptible to edema, poor perfusion, inflammatory damage, and immune system dysregulation, all of which exacerbate gastrointestinal disease.¹ Constipation and other chronic gastrointestinal diseases are closely linked to obesity.⁶

Obesity, especially abdominal obesity, reduces the effectiveness of complete decongestive therapy in patients with upper extremity lymphedema caused by breast cancer.⁷ When extrapolating results from a breast cancer population to a group of people with lower limbs, care should be taken because the mechanisms generating edema and how they respond to treatment may differ. Lymphedema therapies had a positive impact despite the severity of lower extremity lymphedema in non-cancer-related cases.⁸

WHAT THIS STUDY ADDS?

Constipation and obesity are intimately associated, and both conditions frequently coexist in people with lower extremity lymphedema unrelated to cancer. This study was to see whether patients who had reported constipation would react differently to complete decongestive therapy from patients who had not. This study found patients who reported a decrease in gastrointestinal motility benefited the same from comprehensive decongestive treatment than those who reported normal motility.

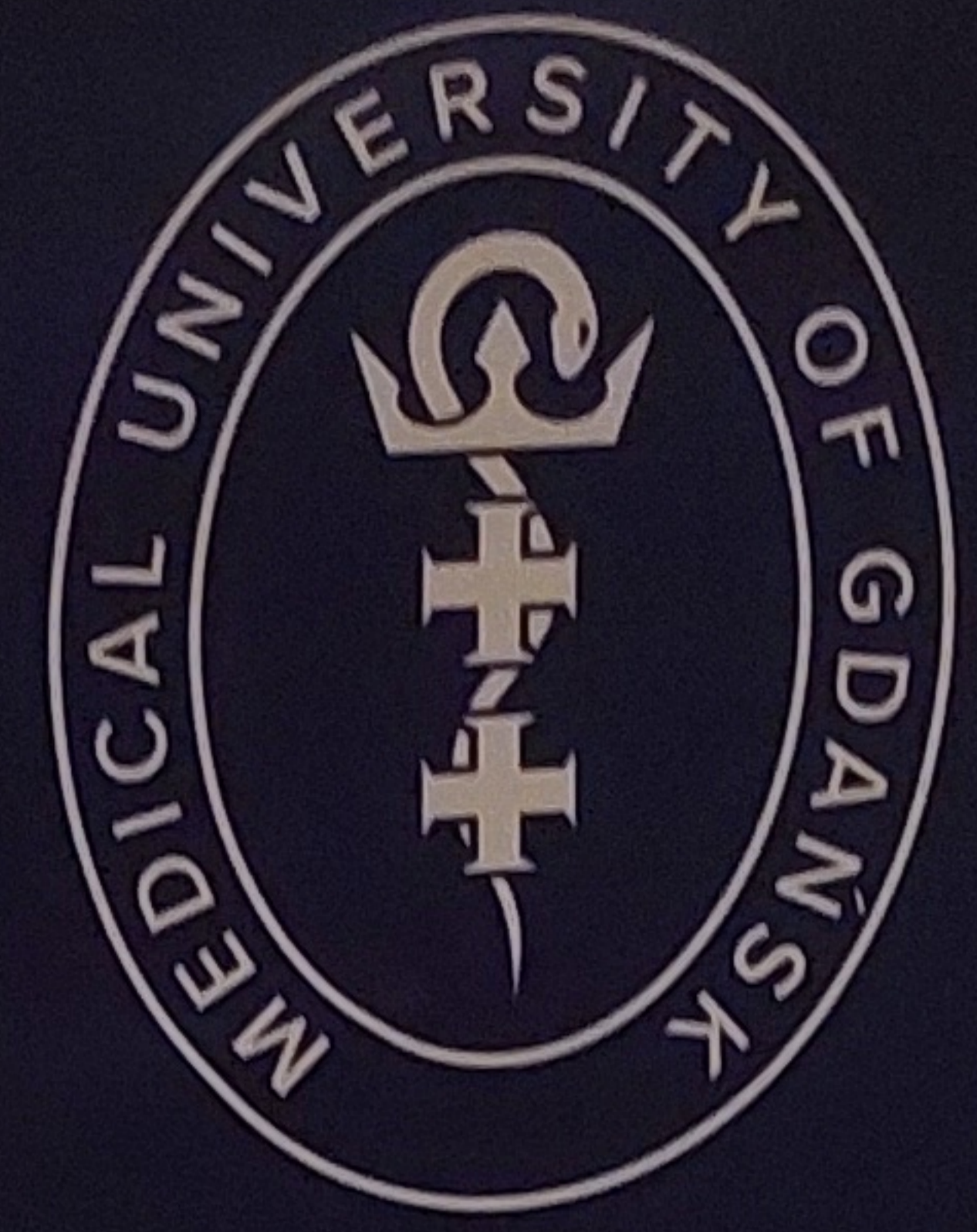
HOW MIGHT THIS STUDY AFFECT RESEARCH, PRACTICE OR POLICY?

More research on the effectiveness of CDT interventions, comparatively with or without gastrointestinal interventions, is needed to treat patients with obesity-induced lymphedema effectively. Additional research would assist clinicians in developing a comprehensive care plan that would consider the circulatory, lymphatic, and gastrointestinal systems of patients with obesity-induced lymphedema. Further research is needed to investigate whether adding gastrointestinal motility techniques and dietary counseling to optimize clinical outcomes for patients with lower extremity lymphedema.

REFERENCES



Exploring the characteristic features of lipedema and the effectiveness of physical activity among lipedema and non-lipedema patients-preliminary study



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Abstract

Even though lipedema has been gaining more interest among researchers in recent years, there are still some misconceptions about this condition and its treatment. Our study aims at presenting characteristic lipedema features and presenting the effects of exercises on lipedema patients compared to non-lipedema patients. The participants of exercises on lipedema patients compared to non-lipedema patients. The participants (n=10) were divided into 2 groups A-with lipedema and B-without lipedema, and all of them underwent 6-week exercise program. Results showed a reduction in BMI, WHR, pain, and circumference in both groups, however, the reduction was higher among non-lipedema patients.

Background

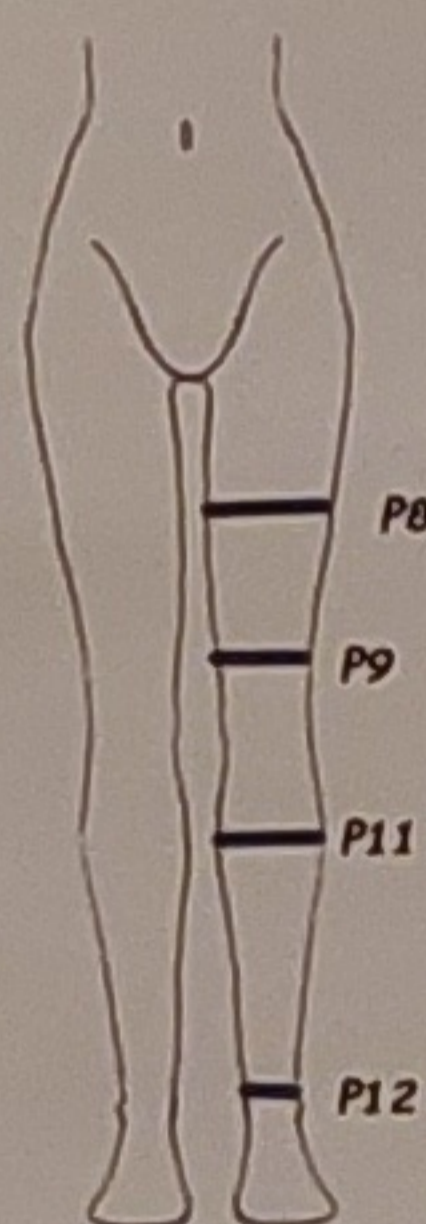
Lipedema is a disease, which is characterized by excessive accumulation of adipose tissue in the lower and/or upper extremities. Its onset is associated with periods of hormonal changes among women i.e. puberty, pregnancy, and menopause.[1] In recent years lipedema has been gaining more interest among scientists, however, there are still some misconceptions regarding this condition.[2] Differentiating lipedema from overweight or obesity requires extensive knowledge regarding specific lipedema symptoms.[3] Lipedema adipose tissue was previously thought to be resistant to traditional weight reduction methods such as diet and physical activity, however, more research confirms the coexistence of lipedema and obesity and the positive impact of physical exercises in lipedema patients.[2,4]

Objectives

- Presenting the presence of characteristic features of lipedema among women with excessive body weight
- compare the differences in the effectiveness of physical activity among lipedema and non-lipedema patients by assessment of BMI, WHR, pain in VAS scale, and leg circumference
- Assessing the accuracy of the protocol before conducting a larger-scale study

Material and methods

The study assessed 10 women with excessive body weight (BMI above 25) for the presence of lipedema symptoms. Based on the primary examination women were divided into 2 groups A- with lipedema and B-without lipedema symptoms. All of the participants underwent an exercise program. During the first 4 weeks, patients exercised 3 times per week with one of the three pieces of training under the supervision of a physiotherapist. In the remaining 2 weeks, participants were asked to perform exercises independently at home (3 times per week). Assessment of BMI, WHR, pain (VAS), and leg circumference at 4 reference points (P12-above the knee, P11-the widest point of the calf, P9-above the knee, and P8-the widest point of the thigh) was taken at baseline, after 4 weeks, and after 6 weeks. The ethical consent was obtained from the Medical University of Gdańsk Ethical Committee (Approval number-912/2021-2022).



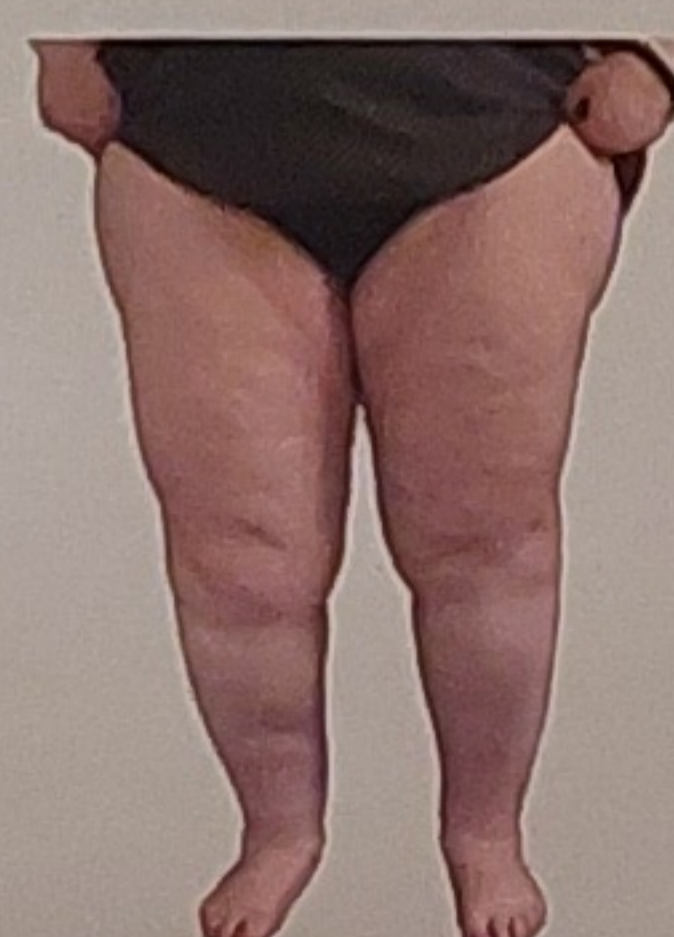
Results

Variable	Total (n=10)	Group A (n=5)	Group B (n=5)
Age, mean	37.6	37.4	37.8
BMI, mean	32.42	33.44	31.39
Weight, mean	92.9 kg	98.5 kg	87.28 kg
Lipedema symptoms			
Heaviness in lower extremities	6 (60%)	5 (100%)	1 (20%)
Pain at palpation	4 (40%)	4 (80%)	0
Disproportion between slimmer trunk and enlarged lower limbs	4 (40%)	4 (80%)	0
Easy bruising	4 (40%)	4 (80%)	0
Accumulation of fat tissue mostly around legs	4 (40%)	4 (80%)	0
Characteristic fat cuffs above the ankles	3 (30%)	3 (60%)	0
Swelling around the ankles	4 (40%)	2 (40%)	2 (40%)
Patients lost at follow up	1 (10%)	0	1 (20%)

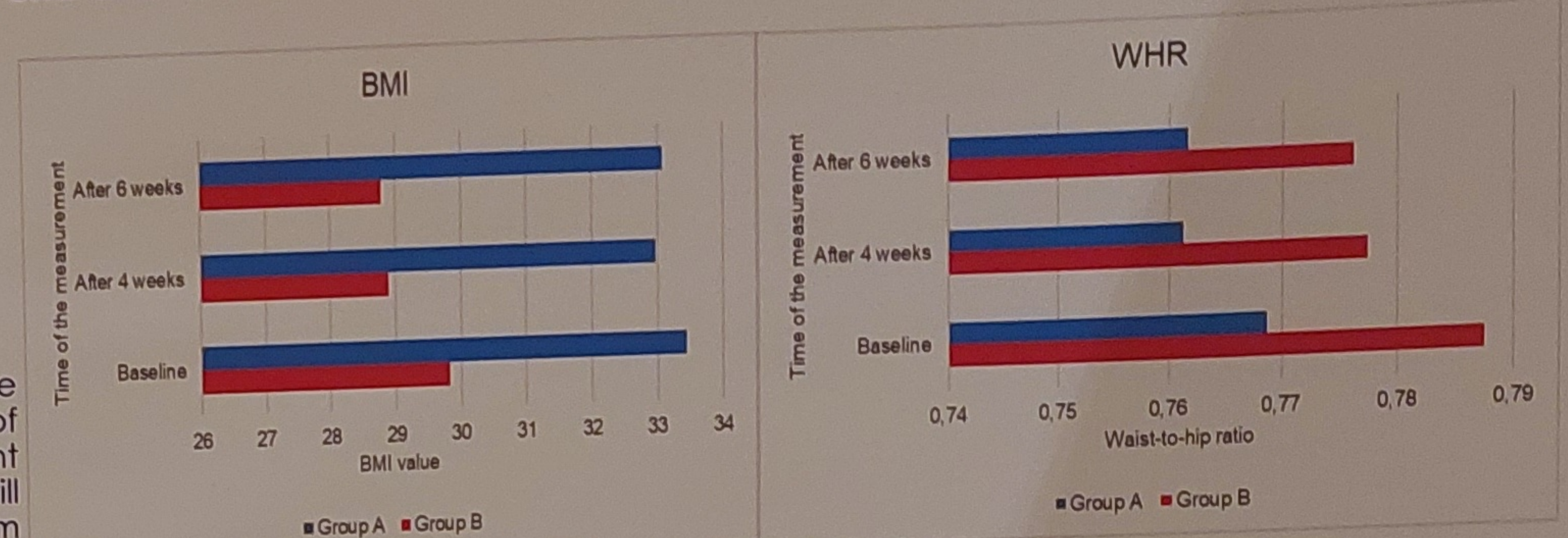


Obesity

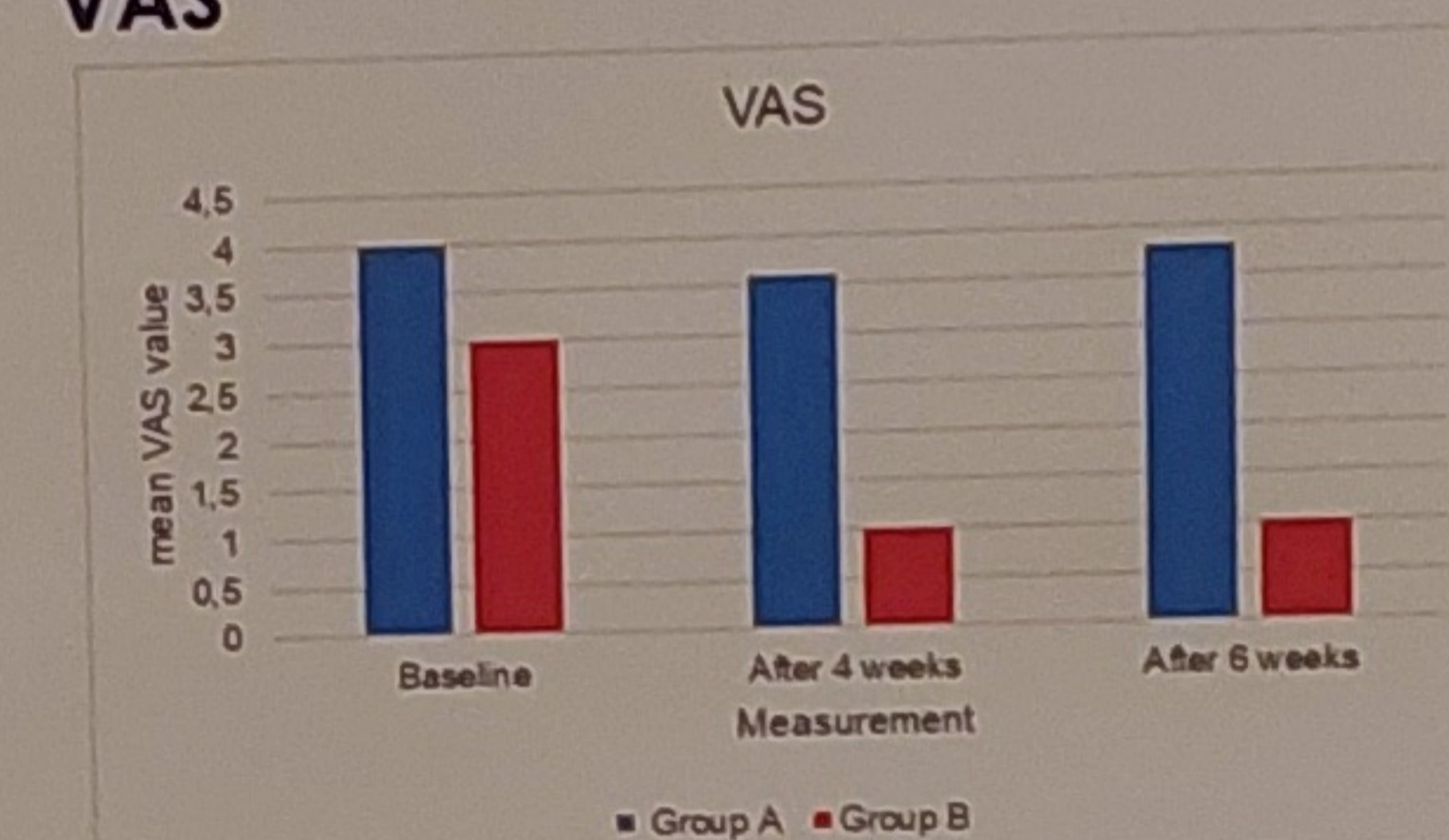
Lipedema



BMI and WHR

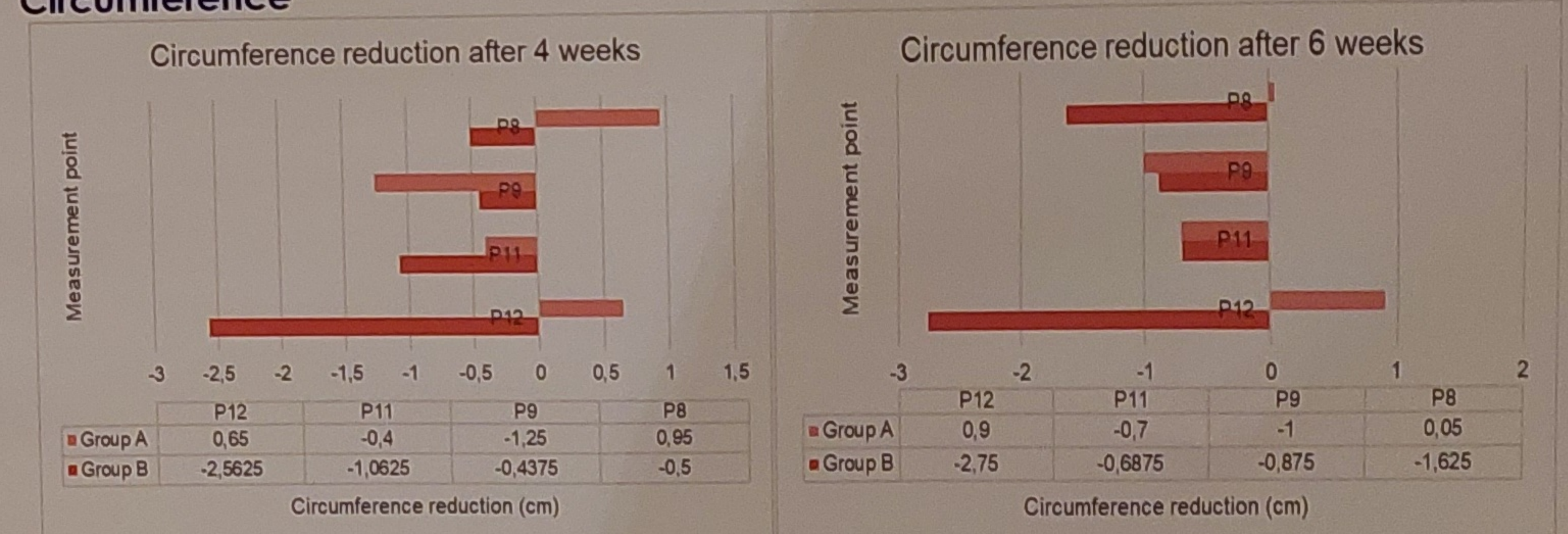


VAS



The level of experiencing pain in the VAS scale was overall higher in the lipedema group compared to non-lipedema women. The reduction of VAS post-treatment was lower among lipedema patients than in the non-lipedema group.

Circumference



Discussion

Diagnosis and treatment of lipedema patients still remain a big challenge.[1, 5] Previously widely recommended Complex Decongestive Therapy is being replaced by physical activity, compression, weight management, and psychological support.[2] More and more researchers emphasize the positive impact of physical activity on lipedema patients. Formerly lipedema was thought to be resistant to diet and physical activity, however since the majority of lipedema patients are also overweight, weight management is highly recommended in decreasing the severity of symptoms.[1, 2, 5] Our study revealed that there was a reduction of BMI, pain, and circumference (above the knee and on the calf) among lipedema patients after the exercise program, however, it was lower than in women without lipedema symptoms.

Conclusion

- Lipedema patients experience various ailments that are not present in non-lipedema women.
- The reduction of leg circumference after undergoing an exercise program is higher in women without lipedema compared to women with lipedema.
- Conducting a larger scale study should be considered to fully validate the results.

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Influence of Edema on the Efficacy of Resistance Exercise in Breast Cancer Patients

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In treating cancer, exercise is imperative as it promotes cardiovascular fitness and promotes quality of life during cancer treatment. Exercise enhances the cancer treatment effects and has been associated with better treatment outcomes. However, exercise studies are mostly based on self-administered aerobic exercise that the effect of resistance exercise is rarely reported. Moreover, the effect of edema on resistance training has not been reported.

Among post-op breast cancer patients on isokinetic resistance training, those with results of bioimpedance analysis such as skeletal muscle mass, percentage body fat, and functional assessments for balance and gait speed were collected for this retrospective review. Patients were on resistance exercise twice weekly for at least 8 weeks until the follow-up assessments.

Based on the bioimpedance analysis, patients were grouped into the edema group (total n=25, edema group 14). Although there was a significant age difference between groups, the peak torque power and total work of knee extensors were not different between groups at baseline (Table 1). Both groups showed improved peak torque power and total work of knee extensors on follow-up. Greater muscle power and work improvement were observed in the non-edema group than in the edema group. Interestingly, there was greater improvement in the speed of the edema group after the resistance exercise (Figure 1). The degree of edema showed a negative correlation with the amount of skeletal muscle mass change ($r=0.641$, $P=0.001$) and a positive correlation with the change of percentage body fat ($r=0.410$, $P=0.047$).

Table 1. Baseline characteristics of participants

	Non-Edema (n=11)	Edema (n=14)	P value
Age (years)	49.2±7.3	56.6±7.7	0.024
Gender (M/F)	0/11	0/14	
Affected side (R/L)	4/7	5/9	0.648
Between assessment duration (days)	70.4±27.3	78.4±19.7	0.403
Body weight (kg)	59.0±10.2	56.6±10.3	0.559
BMI (kg/m ²)	23.3±3.2	22.9±4.3	0.788
Skeletal Muscle Mass (kg)	20.9±3.3	20.4±2.4	0.617
Body percentage fat (%)	30.2±6.2	30.9±8.8	0.847
Berg Balance Scale	55.1±1.5	54.1±2.6	0.261
TUG (sec)	8.3±1.7	7.6±2.2	0.412
10-meter walk test (sec)	8.0±1.8	8.9±1.6	0.225
Mean knee extensor peak Torque	46.7±24.4	35.4±12.0	0.180
Mean Knee extensor total work	232.8±132.9	153.6±53.0	0.086

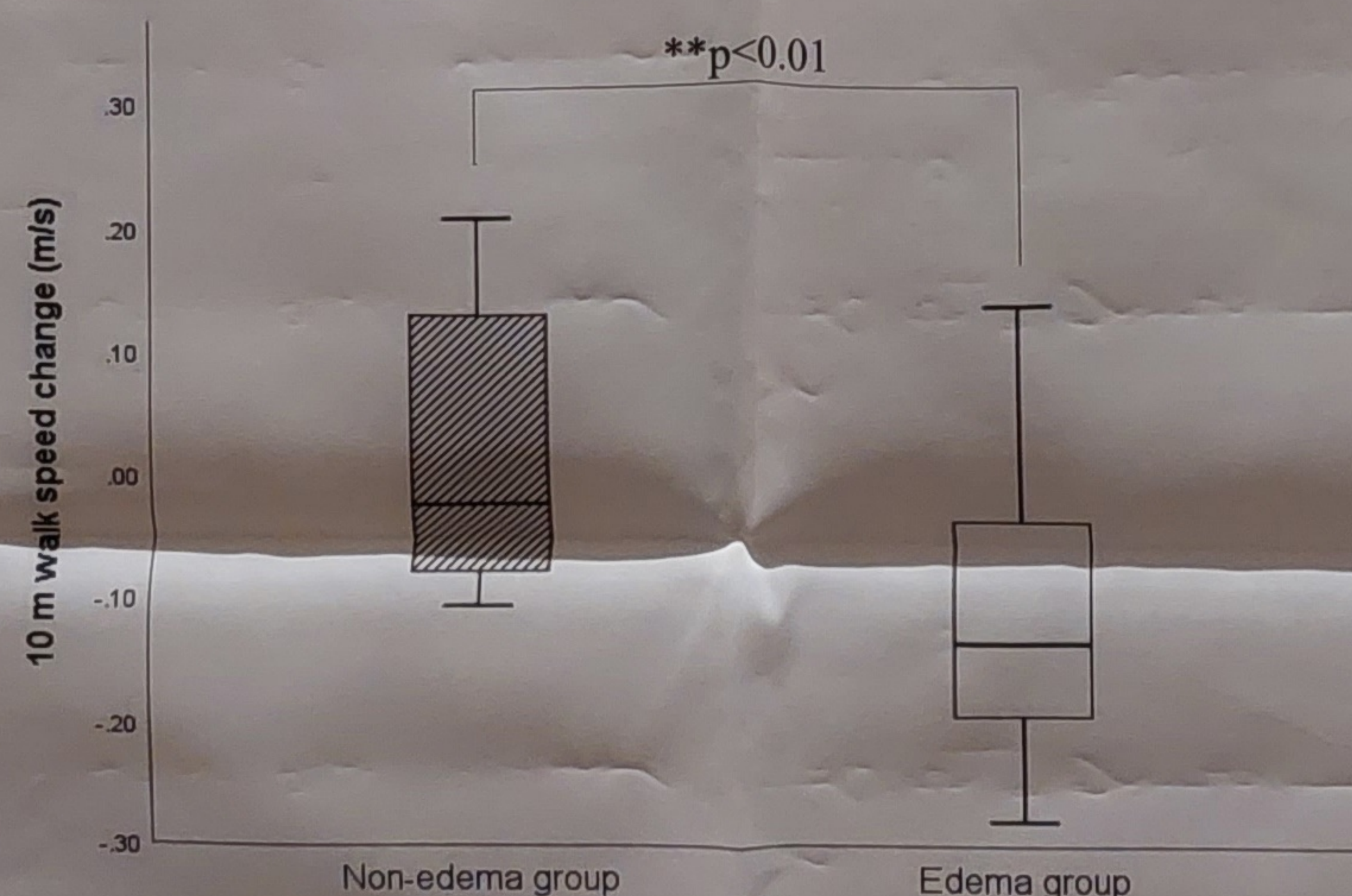
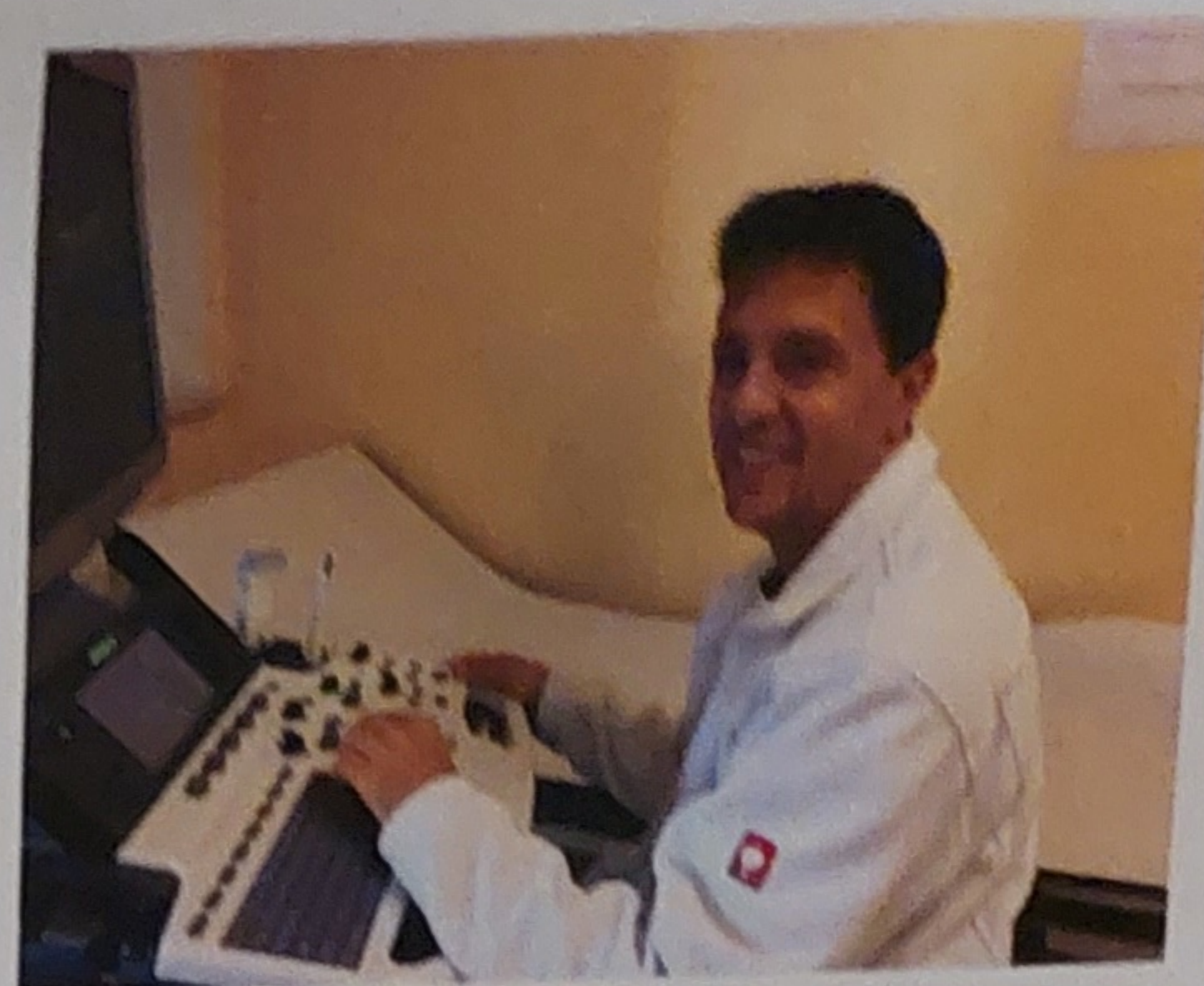


Figure 1. Change of 10m walk speed according to groups

This result suggests that the lesser edema, the better improvement in the muscle mass and that the edema state is greatly associated with body fat content. It appears the resistance exercise benefits regardless of age and the edema status at baseline may provide clues for the improvement in skeletal muscle training.



Hautarztpraxis Friedberg D-61169 Germany
Drs med Janet M. Massey, H. Wilfried Jungkunz



Dr H. Wilfried Jungkunz ready to use High Resolution Doppler Ultrasound to find calf perforators and determine the effect of probe pressure on them in patients with chronic venous hypertension, lymphoedema and lipoedema

Photo: Dr Janet M. Massey

Pain from perforators – in lipoedema, hold tight; it feels so right

Introduction

Based on extensive anatomical dissections (Uhl J-F et al. 2021 ref1), a perforating vein is defined as one joining the deep to the superficial venous system, which perforates the deep fascia. Perforating veins are provided with one-way valves along the whole limb, and are physiologically oriented from superficial to deep, except for the foot. Valves are not described at the point of perforation.

The reason for calf pain and tenderness in lipoedema is still unexplained. Clinical observations in a dermatology/lymphology practice providing continuity of care over 30 years with over 30,000 high resolution and doppler ultrasound records, suggested pain threshold differences between lipoedema and lymphoedema patients. Specifically when examining calf perforating veins, it was becoming apparent that locally applied pressure with the ultrasound probe caused pain at the site of perforators in lipoedema patients but not in lymphoedema patients. Constructing extra compression at the site of the maximum tenderness for the relief of pain in practice lipoedema patients has been routine. However only recently have perforators been sought out as a possible initiating factor for tenderness, pain and aching.

Objective

To determine whether perforators are associated with calf tenderness.

Method

A scoping exercise had indicated calf tenderness exactly at the site of perforators in some patients but not in others. High resolution (up to 18 MHz) doppler ultrasound was used to record the site, appearance and direction of the perforator blood flow and size of the fascial gap (Figs 1,2). Deep finger pressure was then applied at the gap of the deep fascia associated with the site of the perforator (Fig 3) with recording of the reaction (tenderness/no tenderness). Patients with chronic venous insufficiency were available as controls but the objective was to quantify differences between lipoedema and lymphoedema sufferers.

Results

Over a six-month period (Winter 2022/3), Doppler high resolution ultrasound pictures of calf perforating veins were collected. Direction of blood flow was variable. No valves were ever seen or recorded at the site of vein perforation. The average diameter of the fascial gap was 4.1 mm varying between 1.7 mm and 7.9 mm. Perforators in chronic venous hypertension were usually visible near the skin surface, with associated signs of varicosities (pigmentation, induration, inflammation etc) and typical symptoms if inflamed, thrombosed or infected. Perforators in lymphoedema were not associated with pain on localized pressure at the site. In contrast, lipoedema patients immediately responded to localized fingertip pressure with "that's it!", "that's exactly where I feel pain!". Extra targeted compression was then incorporated into the compression hosiery. With this extra localised support, lipoedema patients reported considerable relief, being able to work/stand for longer in the day and having less evening discomfort.

Conclusion

Objective investigations on the characterisation of pain/tenderness as one of the diagnostic criteria for lipoedema are in progress (Hucho T. ref2,3). em Prim Döller (ref4) pointed out the effectiveness of pressure for reduction of discomfort in lipoedema patients but offered no explanation. As regards the name lipoedema, as oedema is never if ever found, Lipohyperplasia dorosa (LiDo) may better as a descriptive term, as it incorporates the characteristics of excess lipid deposition along with tenderness on pressure, discomfort, spontaneous pain and feeling of heaviness particularly in the evening. However the reason for the pain and tenderness is still unexplained. Could perforators be key, and if so, why? While further investigations proceed, the present conclusion for clinical care has to be *hold tight; it feels so right!*

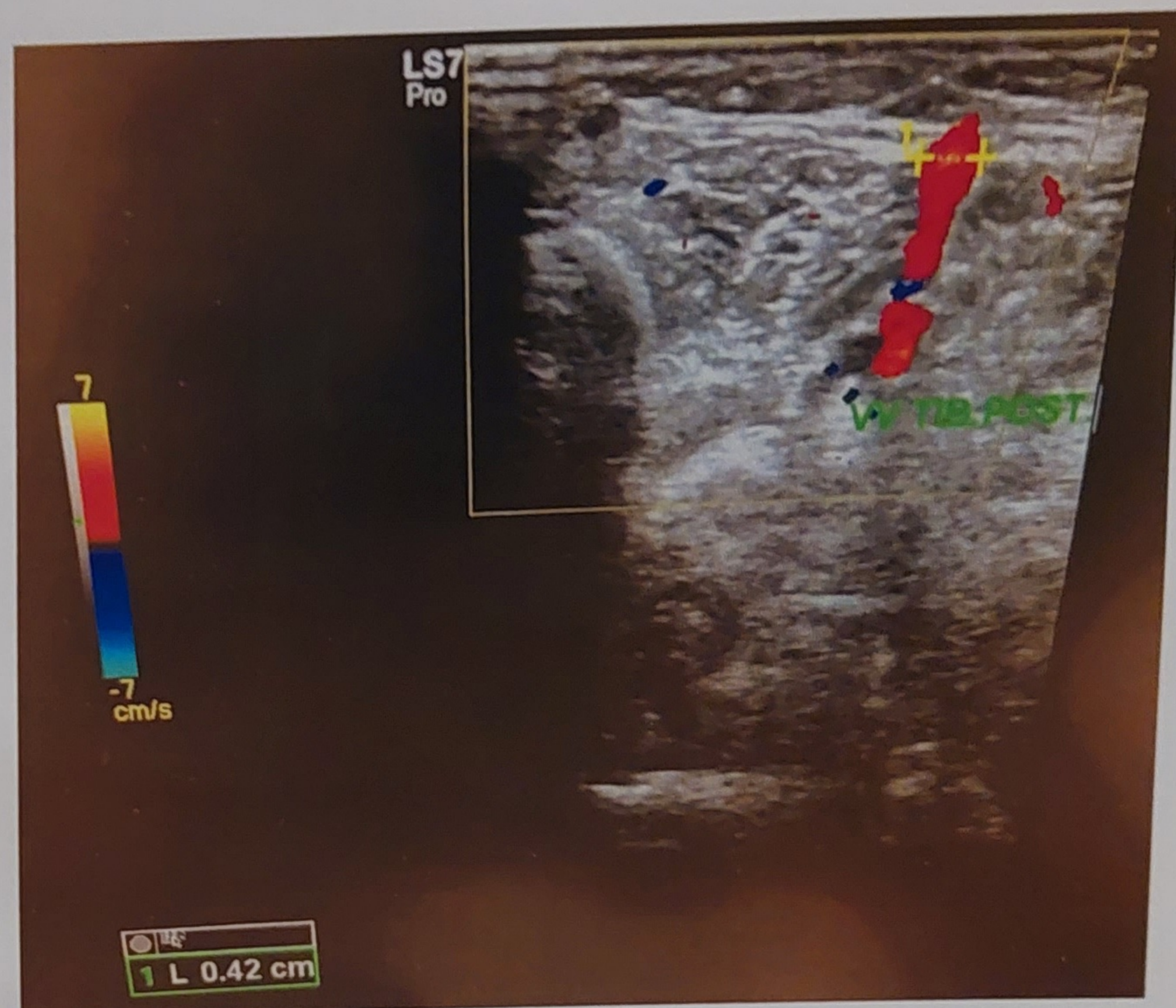


Fig.1

Doppler high resolution ultrasound finding in patient with lipoedema. This shows Venae tibiales posteriores (VV TIB POST) Right perforating vein Cockett 3 which has a measurement of 0.42 cm (4.2 mm) at the deep fascial gap.

Fig.2
Higher resolution of perforator in Fig 1 at fascia in patient with lipoedema
Right Perforator vein.

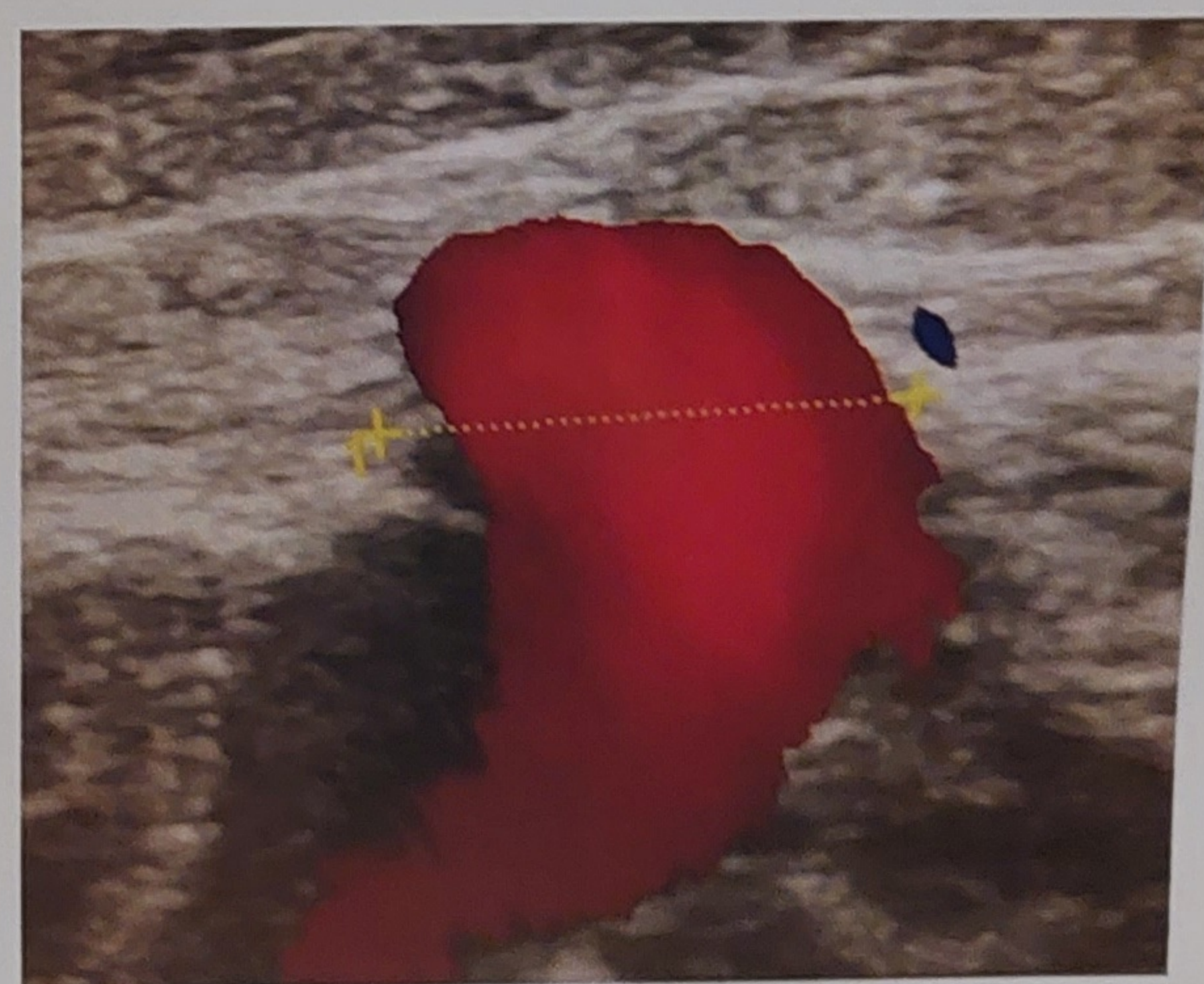
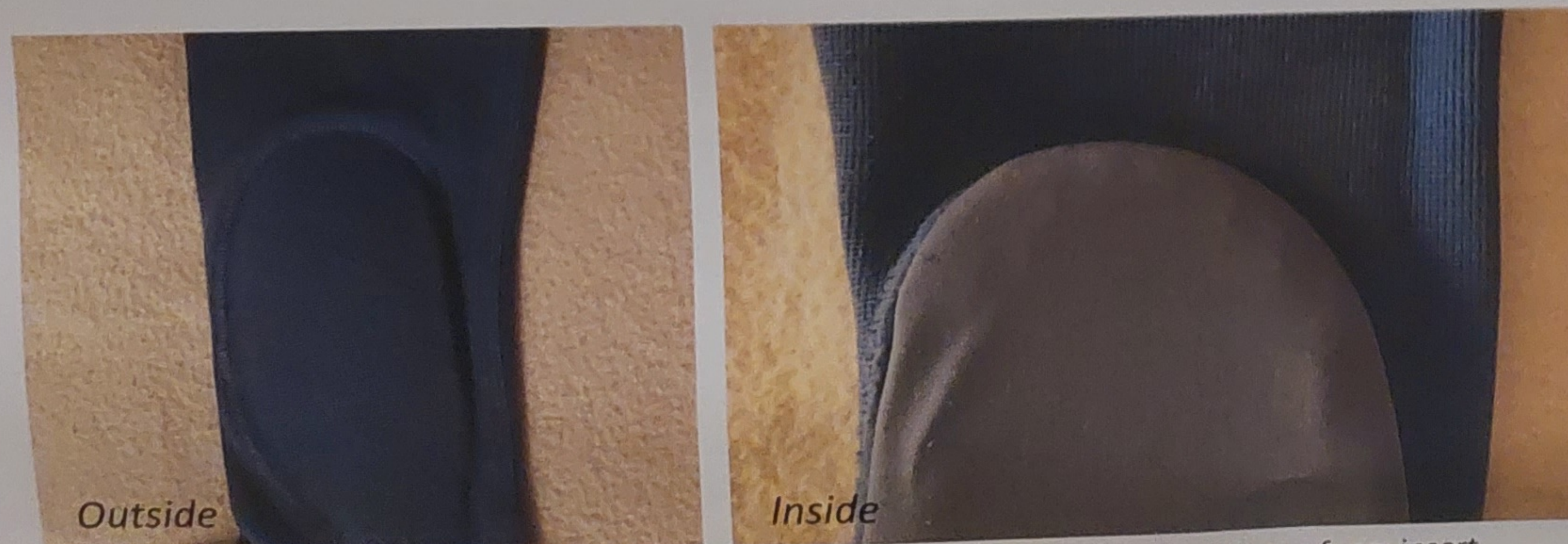
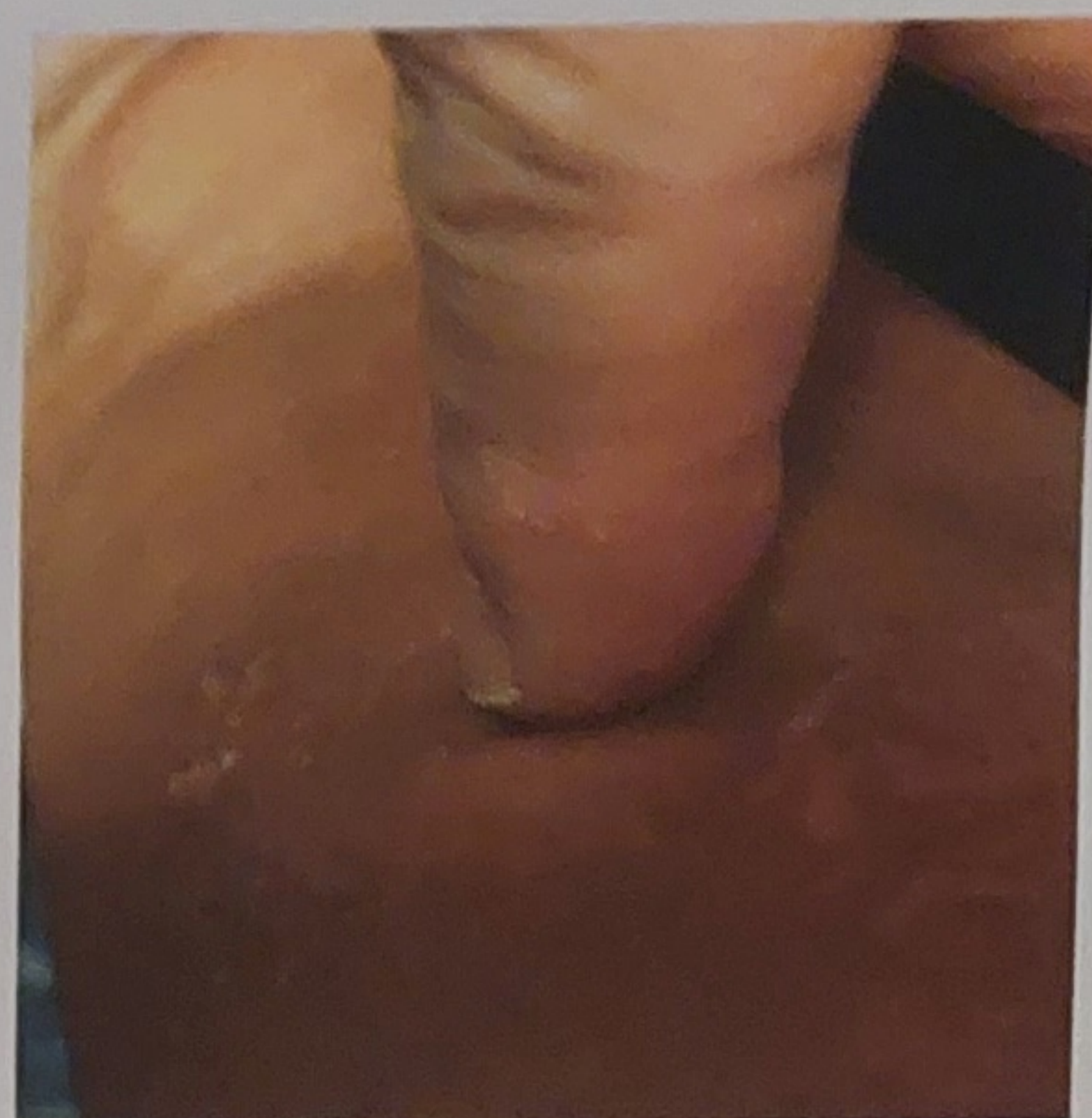


Fig.3
Index finger pressure at exact site of calf perforator shown by Doppler ultrasound. Patient with Lipoedema reported tenderness/pain at this exact location. Right Cockett 3.

Photo: Patient



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The Influence of Social Determinants of Health on Lymphedema Outcomes and Treatment Adherence

H. Kashyap, D. Jehu, D. Thiruvaiyaru, L. Bolgla, P. Watford, J. Cortes



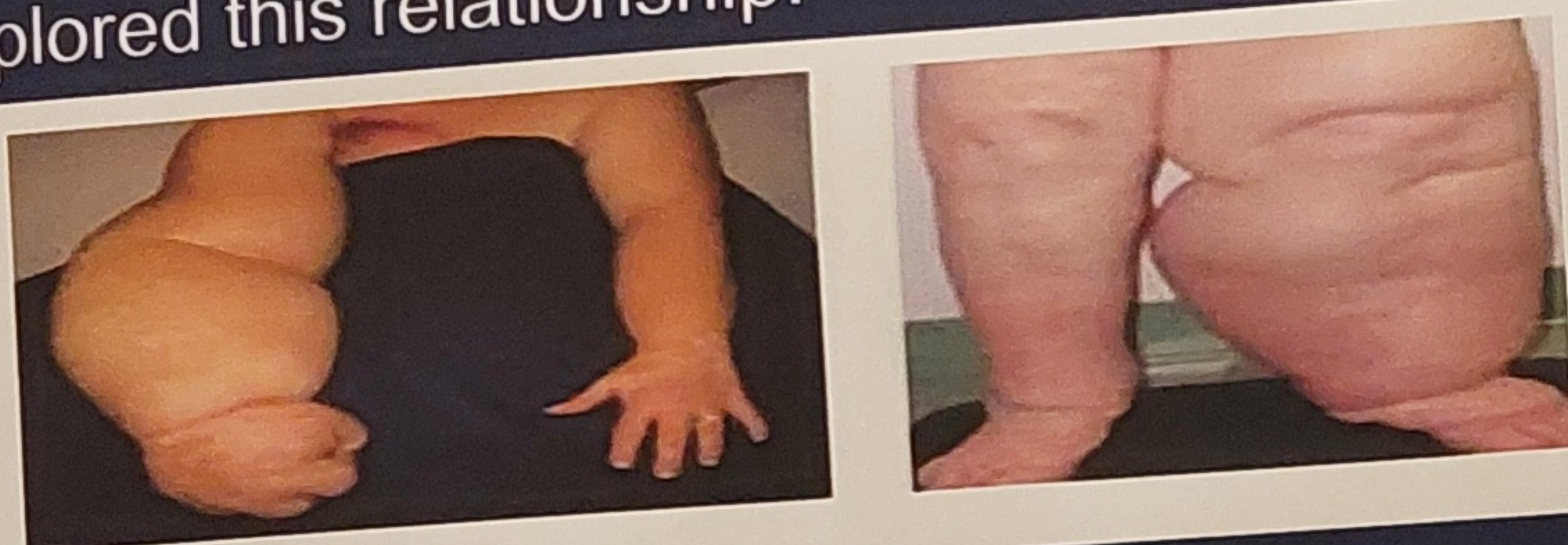
INTRODUCTION

Lymphedema commonly occurs following cancer-related treatment (Tx) due to damaged lymphatic system. Lymphedema affects approximately 1 in 1000 American [1]. Preliminary evidence indicates that social determinants of health (SDoH) may influence outcomes, but more evidence is needed. Adherence to lymphedema Tx may also depend on SDoH, but few studies have explored this relationship.



Figure 3: Social determinants of health [3]

Figure 1: Stage III Lymphedema of arm, leg [2]



OBJECTIVES

Systematic review to examine the influence of SDoH on lymphedema. Retrospective chart review to examine whether SDoH predict recovery. Retrospective chart review to investigate the relationship between SDoH and Tx adherence.

METHODS

Study 1: Systematic Review (PROSPERO ID: CRD42023402948) examining current evidence between SDoH & lymphedema.

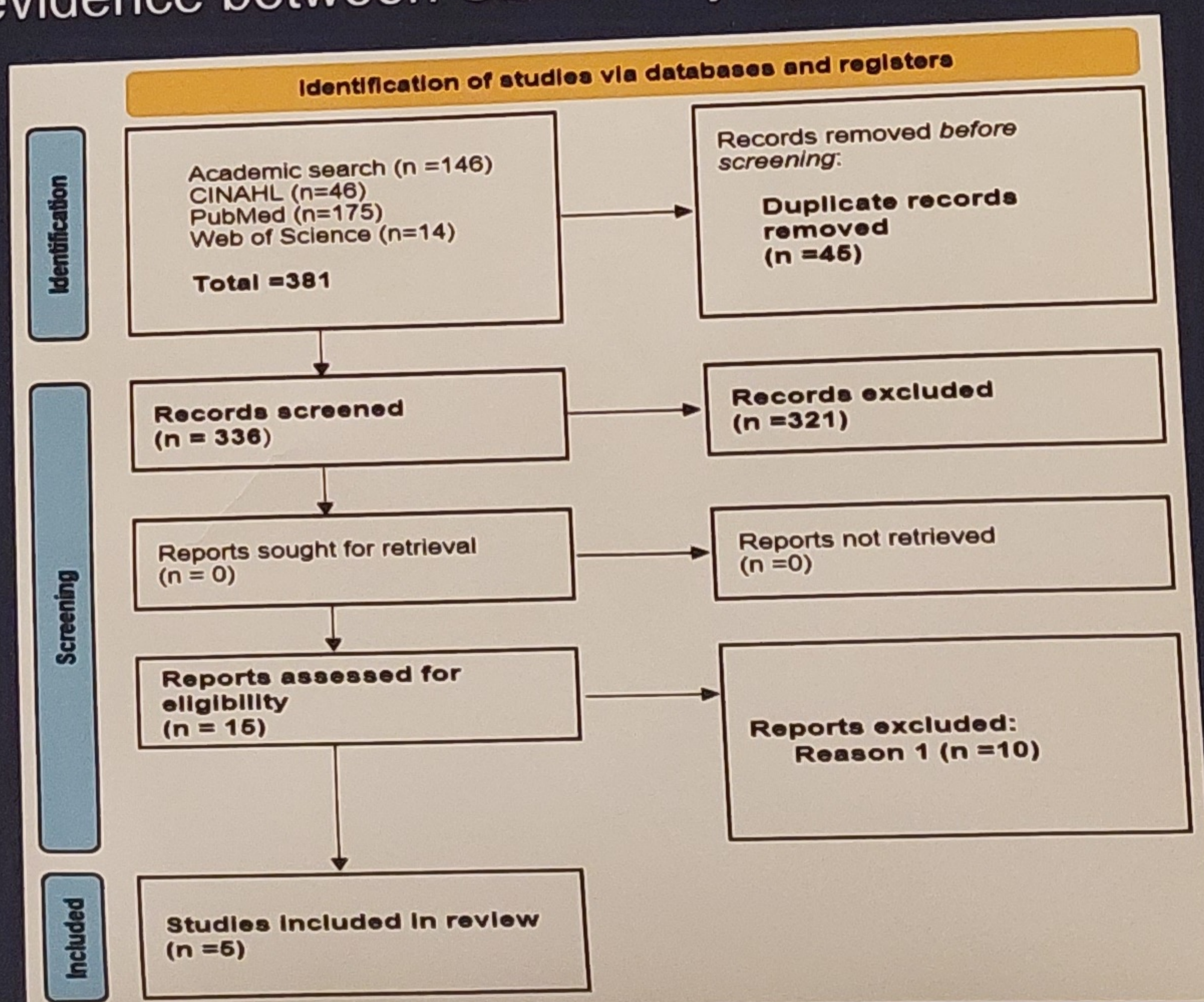


Figure 2: PRISMA flow diagram

Study 2: Retrospective chart review (n=500) to examine whether SDoH predict lymphedema recovery.

Study 3: Retrospective chart review (n=500) to Investigate the relationship between SDoH and Tx adherence.

SIGNIFICANCE

Up to 50% of the patients go on to experience recurrent infection, tissue fibrosis, increased hospitalization, and eventual disability resulting in loss of independence in daily living tasks [1,4]. Due to increased disease burden, it is important to examine influence of SDoH on lymphedema & inform policy, clinical practice guidelines [3].

CLINICAL IMPLICATIONS

This thesis will contribute to the fundamental knowledge about the influence of SDoH on lymphedema and its application to clinical practice.

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THE RELIABILITY AND VALIDITY OF LYMPHEDEMA SYMPTOM INTENSITY AND DISTRESS SURVEY LOWER LIMB (LSIDS-L) IN TURKISH PATIENTS WITH LOWER LIMB LYMPHEDEMA

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INTRODUCTION

Lymphedema is a debilitating disorder characterized by accumulation of excessive fluid and protein in the interstitium due to the impairments in lymphatic system and results in chronic swelling in different parts of the body. Lower limb lymphedema (LLL) is incurable and progressive conditions that can cause life-long physical, psychosocial and emotional problems and have impact on individual's well-being and quality of life. Many patients suffering from chronic lower limb lymphedema also experience a range of physical symptoms including heaviness, pain, discomfort, difficulty in ambulation, in finding fitted clothing and footwear as well as associated conditions including -skin ulceration, cellulitis and immobility. All these problems can be challenging and frustrating for many individuals and may lead to feelings of self-consciousness, embarrassment, depression and social isolation.

Accurate information on the impact and intensity of symptoms outcomes among patients with lower limb lymphedema is substantially needed to capture lymphedema-specific impairments and make clinical decisions for the management of this suffering condition.

In recent years there has been more interest in developing questionnaires designed and validated Turkish patients with LLL, similar to the procedures that have been undertaken for the validity of other QoL surveys. The study was conducted in Lymphedema Unit, Physical Medicine and Rehabilitation Department of a university hospital, between July 2022 and December 2022. The study was approved by the local Clinical Research Ethics Committee. All patients gave verbal and written informed consent for inclusion in the study. LLL patients with having mental incapacity, having psychiatric diagnoses requiring medications, those younger than 18 years and older than 65 years were not included. Patients were excluded if they are illiterate or involved in intensive lymphedema treatment during the test period, or if they have life-threatening or terminal illness. All the patients that have lymphedema due to cancer treatments had completed their chemotherapy and radiotherapy sessions and did not have active malignancy. The diagnosis of LLL was verified by symptoms, anamnesis, history, imaging and bilateral volumetric measurements depending on the circumferential measurements. For patients having unilateral leg lymphedema the circumferential measurements were performed by a standard 1 inch retractable tape at 4 cm intervals along the leg, from malleoli to groin and converted to an approximate leg volume using the truncated cone formula to enable estimation of volume. The presence of lymphedema was assessed by inter-limb volume difference ($>10\%$) based on the serial circumferential measurements in both affected and non-affected extremities. Also the circumferential measurements of second toe base and metatarsophalangeal areas were recorded for patients with feet edema. Lymphedema was defined as an increase in feet circumference at any level by 1.5 cm or more compared to the contralateral side. In bilateral disease, the diagnosis was made depending on inspection and lymphoscintigraphy results derived from the patient files.

This study aimed to adapt the Lymphedema Symptom Intensity and Distress Survey- Lower Limb (LSIDS-L) to Turkish and to test its reliability and validity in patients with lower-limb lymphedema.

MATERIALS AND METHODS

In this study we undertook a descriptive and methodological study for validation of the LSIDS-L among Turkish patients with LLL, similar to the procedures that have been undertaken for the validity of other QoL surveys. The study was conducted in Lymphedema Unit, Physical Medicine and Rehabilitation Department of a university hospital, between July 2022 and December 2022. The study was approved by the local Clinical Research Ethics Committee. All patients gave verbal and written informed consent for inclusion in the study. LLL patients with having mental incapacity, having psychiatric diagnoses requiring medications, those younger than 18 years and older than 65 years were not included. Patients were excluded if they are illiterate or involved in intensive lymphedema treatment during the test period, or if they have life-threatening or terminal illness. All the patients that have lymphedema due to cancer treatments had completed their chemotherapy and radiotherapy sessions and did not have active malignancy. The diagnosis of LLL was verified by symptoms, anamnesis, history, imaging and bilateral volumetric measurements depending on the circumferential measurements. For patients having unilateral leg lymphedema the circumferential measurements were performed by a standard 1 inch retractable tape at 4 cm intervals along the leg, from malleoli to groin and converted to an approximate leg volume using the truncated cone formula to enable estimation of volume. The presence of lymphedema was assessed by inter-limb volume difference ($>10\%$) based on the serial circumferential measurements in both affected and non-affected extremities. Also the circumferential measurements of second toe base and metatarsophalangeal areas were recorded for patients with feet edema. Lymphedema was defined as an increase in feet circumference at any level by 1.5 cm or more compared to the contralateral side. In bilateral disease, the diagnosis was made depending on inspection and lymphoscintigraphy results derived from the patient files.

The demographic properties (age, gender, education and marital status, occupation, BMI) and disease characteristics (causes, duration of lymphedema, involvement side, treatments, stage of lymphedema) were recorded.

Translation and cross-cultural adaptation

After obtaining written permission (2021) from the researcher who developed the LSIDS, the forward-backward translation method was initiated. Four steps were used in the linguistic validation of the questionnaire. Two lecturers graduated from departments of foreign languages of Bilkent University and two lymphedema specialists, competent who were fully bilingual in both Turkish and English, participated in the translation process. One of the lecturers translated the English version into Turkish to produce an understandable and conceptually equivalent translation. The back translation of the Turkish version into source language was done by the second lecturer who was unaware about the purpose of translation. The original form and the one translated form from Turkish to English were compared by the two lecturers, and the final form of the Turkish version was prepared. Finally the two lymphedema specialists, who were fully competent in both languages, controlled and revised the lecturers' final Turkish version to obtain the Turkish version used in this study. In order to avoid misunderstanding and to obtain difficulties in understanding, the instrument was given as a pretest to 30 patients with LLL. Face-to-face interviews with the patients showed that all the indices were clear and the instrument was understandable. We made no cross-cultural validation in the translation because feedback from the pretest study group did not identify any concerns. The Turkish version of LSIDS-L was answered by the patients themselves. One lymphedema specialist was in the interview room in order to help the patients in case they needed assistance, which was the case only in a few patients with difficulty in reading. The scale was completed by each patient twice with one-week interval.

Questionnaires

Lymphedema symptom intensity and distress survey-leg (LSIDS-L) was originally created by Ridner et al in 2018 with 31-items, on 2 main scales having seven subscales.

It has two scales, symptom intensity and distress, and each scale has seven subscales as follows: soft tissue sensation, neurological sensation, function, biobehavioral, resource, sexuality, and activity. Items 1, 2, 8, and 9 are loaded on soft tissue sensation; 3, 4, 5, 6, 7, 10 and 11 on neurological sensation; 12, 13 on function; 14, 15, 16, 18, 19, 20, 22, 23 and 24 on biobehavioral; 17 and 21 on resource; 25, 26 and 30 on sexuality and 27, 28 and 29 on activity. The response yes to the items is assigned one point and the response no is assigned zero. The number of the responses "Yes" is added and the total score for the survey is calculated. The lowest and highest scores to obtain from the survey are 0 and 30, respectively. If the participant does not respond to more than five items, the total score for the survey is not calculated. Responses of participants marking "Yes" are scored based on a five-point Likert scale in the scales intensity and distress (1: too little and 5: too much). The points for Intensity and Distress are added and the mean score for the survey is obtained. The mean score for each scale is determined by calculating the mean value for responses given to the items and the total score for each item ranges from 1 to 5. High scores for the survey show severe symptoms and distress. There is not a cut-off value for the survey. Cronbach α was 0.93 for intensity and 0.94 for distress. Cronbach α ranged from 0.74 to 0.96 for intensity and from 0.72 to 0.95 for distress. The Kuder-Richardson coefficients ranged from 0.66 to 0.92 for each subscale. It has been reported that the LSIDS-L is a valid and reliable scale to evaluate the severity of symptoms and distress caused symptoms in patients experiencing lower limb lymphedema.

Patients with LLL were also administered the LYMQOL-Leg questionnaire which were previously validated in the same language (ref). The LYMQOL-Leg has been developed to assess the impact of lymphedema of the legs on the quality of life of the patients and consists of 27 items; 26 multiple-choice questions and 1 rating question. It covers four domains; symptoms, appearance, function and mood. The answers were evaluated on a four-point Likert scale (1=not at all; 2: a little; 3= quite a bit; 4: A lot). Each item received a score between 1 and 4, with higher scores indicating a worse quality of life. Domain totals were calculated by adding the individual scores and dividing the total by the number of questions answered. (If $>50\%$ of questions per domain were not answered this cannot be calculated *and =0). If the item was not scored and left blank or not applicable this was scored with a 0. The four domains and their corresponding questions are: Function 1 (a-h), 2,3, Appearance 4,5,6,7,8 Symptoms 9,10,11,12,13,14 and Emotion 15,16,17,18,19,20. A visual analog scale for 'overall quality of life' (Q21) is scored between 0-10, as the value marked by the respondent. If the item is not scored, left blank or not applicable, it is scored as zero. Previous reports indicated that the LYMQOL-Leg was easy to complete with clear face validity and good internal consistency.

Procedure

The participants completed the LSIDS-L and LYMQOL-Leg concurrently while the LSIDS-L was completed for patients twice within 7 days.

Statistical Analyses

The sample size is determined as at least 5 fold of item numbers, for the reliability and validity studies. According to this information 93 patients was required to study and 155 patients were included. Descriptive analyses were applied to calculate means and standard deviations and median of the demographic variables.

For test-retest reliability, all patients completed the questionnaires, as a second time within 7 days, at the same time of day, during a non-treatment period. Intra-class correlation coefficients (ICC) with one way random effects model, were used to determine test-retest reliability of the scores on 5 domains of LYMQOL-Leg and of the score on each question separately. Cronbach alpha coefficients were used to determine internal consistency of the entire questionnaire and of each domain. As recommended, internal consistency of a magnitude of 0.70 or greater was sought. Cronbach alpha was determined as high correlation if values in range of 0.80-0.95 were obtained, where a value >0.95 indicated excessive internal consistency.

Criterion validity and item analysis

We used the Pearson correlation coefficient for normally distributed scores and the Spearman correlation coefficient for the other scores. The correlation coefficients are interpreted as follows: <0.4 was weak, 0.4-0.74 was moderate, 0.75 to 0.9 was strong, and >0.9 was very strong.

All the analyses were conducted using SPSS 21.0. The level of significance was set at $p<0.05$.

RESULTS

One hundred-fifty five patients with LLL were included to the study. All the subjects completed test 1 and 2 for LSIDS-L for test-retest analyses. The time between test 1 and 2 was within 7 days. The demographic and clinical characteristics of the patients are shown in Table 1.

Table 1: Demographic and clinical properties of the patients

	Patients n=155
Age (years) Mean \pm SD (min-max)	52.85 \pm 13.91 (18-85)
Gender	
Female	136 (87.7%)
Male	19 (12.3%)
Marital status (n)	
Unmarried/single	25 (16.7%)
Married	116 (75.4%)
Divorced/widowed	14 (9%)
Education (n)	
Illiterate	10 (6%)
Primary school	62 (40.6%)
Secondary school	14 (9.4%)
Lycee	31 (21%)
University	52 (21%)
Occupation (n)	
Housewife	88 (57.2%)
Retired	20 (13%)
Officer	23 (15.2%)
Self-employment	11 (7.2%)
Student	7 (4.5%)
Unemployed	4 (2.6%)
Involved side (n)	
Right	20 (13%)
Left	37 (24%)
Bilateral	97 (63%)
BMI kg/m ²	25.64 \pm 9.64 (18.5-71.1)
Duration of lymphedema (months) Mean \pm SD (min-max)	88.46 \pm 81.98 (3-302)
Etiology	
Primary lymphedema	6 (3.8%)
Secondary lymphedema	139 (89.6%)
Causes	
Cancer treatment and/or radiotherapy	53 (34.1%)
Lipolymphedema	65 (42%)
Phlebolympheidema	29 (18.9%)
Trauma	2 (1.4%)
Infection	1 (0.6%)
Congenital/hereditary	6 (3.8%)
Surgery (n)	
TAH/BSO/omentectomy/inguinal lymph node dissection	44 (28%)
Melanoma/inguinal lymph node dissection	3 (1.9%)
Local colon resection + omentectomy	1 (0.6%)
Lymphoma	1 (0.6%)
Prostatectomy/ node dissection	2 (1.3%)
Metastatic cancer surgery	2 (1.3%)
Lymphedema stage (n)	
1	22 (13.7%)
2	116 (75.4%)
3	17 (10.9%)

Majority of the patients were female with a mean BMI of 35 kg/m² and housewives. The most common education levels were lycee and primary school. More than half of them had bilateral lymphedema, followed by left lower extremity lymphedema. Half of them received CDT. The lymphedema was due to pelvic or abdominal cancer surgery followed by lipolymphedema and phlebolympheidema mostly. The mean duration of lymphedema was 88 months. Symptoms like skin ulceration, cellulitis was present in 8% of the patients.

Reliability

Internal consistency (based on a Cronbach alpha score of 0.99) and test-retest reliability (based on an intra-class correlation coefficient of 0.93-0.99 of the LSIDS-L were found to be high ($p<0.001$). The test-retest reliability of all the subscores and overall scores of LSIDS-L were strong (Table 2, Figure 1).

Table 2: Internal consistency and test-retest reliability of the Turkish LSIDS-Leg instrument subgroups (n=155)

LYMQOL-Leg scores	Test-retest		Consistency
	Pearson 95%CI	ICC	
Activity	0.0079*	0.9950	0.922-0.963
Soft tissue sensation	0.0967*	0.9944	0.866-0.936
Pain	0.176	0.9934	0.805-0.905
Resource	0.1105	0.9635	0.861-0.933
Biobehavioral	0.5068	0.9984	0.906-0.955
Neurological sensation	0.4639	0.9935	0.9877
Function	1.000	0.9938	0.9860
Sexuality	0.8154	0.9923	0.9667

* $p<0.001$

Criterion validity

According to the Item Analysis Report, all items in test provided information about overall test reliability and must not be deleted (Table 3).

Table 3. The results of item analysis

Item	n	Mean	Std Dev	Item-Total Correlation	Alpha if Deleted	Std Alpha if Deleted
Item 1	100	6.01	3.47	0.5787	0.9542	0.9107
Item 2	100	4.50	3.75	0.6267	0.9133	0.9096
Item 3	100	2.19	3.22	0.4587	0.9160	0.9123
Item 4	100	1.71	2.91	0.4526	0.9163	0.9123
Item 5	100	3.96	3.34	0.3990	0.9170	0.9132
Item 6	100	2.57	3.00	0.5536	0.9147	0.9107
Item 7	100	1.14	2.33	0.2536	0.9183	0.9152
Item 8	100	5.73	2.74	0.6627	0.9134	0.9094
Item 9	100	3.02	3.37	0.5832	0.9141	0.9106
Item 10	100	2.30	2.85	0.3623	0.9172	0.9135
Item 11	100	2.17	2.85	0.4165	0.9165	0.9128
Item 12	100	3.34	3.53	0.7477	0.9114	0.9080
Item 13	100	3.47	3.38	0.7055	0.9122	0.9087
Item 14	100	4.94	3.28	0.6139	0.9137	0.9101
Item 15	100	3.05	3.52	0.6215	0.9135	0.9100
Item 16	100	2.29	3.03	0.5203	0.9151	0.9114
Item 17	100	2.53	3.48	0.5808	0.9142	0.9106
Item 18	100	1.47	2.23	0.2835	0.9179	0.9145
Item 19	100	4.00	3.50	0.4993	0.9155	0.9120
Item 20	100	1.81	3.08	0.4678	0.9159	0.9122
Item 21	100	2.67	3.47	0.2440	0.9195	0.9155
Item 22	100	1.47	2.23	0.2835	0.9179	0.9145
Item 23	100	3.47	3.59	0.5613	0.9145	0.9110
Item 24	100	4.73	3.01	0.6381	0.9135	0.9096
Item 25	100	2.65	3.47	0.4387	0.9164	0.9126
Item 26	100	2.08	2.56	0.1812	0.9192	0.9163
Item 27	100	1.27	1.96	0.2719	0.9180	0.9149
Item 28	100	2.98	3.21	0.6046	0.9139	0.9101
Item 29	100	2.88	3.16	0.6461	0.9133	0.9095
Item 30	100	4.76	3.05	0.7443	0.9129	0.9083
Item 31	100	2.78	2.89	0.0773	0.9209	0.9180

Discussion

Lower limb is the most commonly affected area in patients developing lymphedema worldwide. LLL is an incapacitating disease and more morbid than upper extremity lymphedema. Although the incidence of LLL remains unknown both in our country and in the world, this condition is seen commonly in our routine daily practice. There is no cure for lymphedema and multi-modal treatment approaches focus on symptom-control and complex decongestive therapy. Since this chronic disease may have great impact on several areas of life like physical and mental well-being, the lack of information on different aspects of QoL influences the treatment outcomes of this detrimental condition. The use of LLL-specific QoL tools can give a general picture of the deficits in QoL experienced by the patients and may help to manipulate resources accordingly and guide therapeutic approaches comprising the patient education.

Although many instruments have previously been used to assess health-related QoL in patients with lymphedema, no consensus has been made on the gold-standard tool. A systematic review identified only 6 studies measuring the health-related QoL in the English literature. Most of the studies in this review utilized generic or cancer-specific QoL tools. Recently new QoL measures-specific to lymphedema are developed and are in use to gain more accurate insight on the burden of this suffering condition. LSIDS has a unique structure that comprises two separate questionnaires; for upper and lower lymphedema-LSIDS-Arm and LSIDS-Leg. The tool is short, understandable, practical and easily applicable.

In our study we tested the reliability and validity of the LSIDS-L in Turkish LLL patients and found that all subscales of LYMQOL-Leg had good internal consistency and test-retest reliability. As far as we have known, this is the first and the only validation study of this instrument in a different language and culture. The validation of this questionnaire has previously been made in Turkish for upper extremity lymphedema patients. In the original study, Ridner et al indicated an internal consistency using Cronbach's alpha scores ranging from 0.77 to 0.89 across all domains of the tool in patients with LLL (16). The internal consistency of our study was observed to be high with values between 0.93 to 0.99 more than those reported by previous studies.

As is well-known, lymphedema severity and outcome may show variability due to the awareness and education of the health professionals and public. In addition, socioeconomic and cultural factors as well as quality and access to medical services for lymphedema may vary from country to country and affect the course and outcomes of this debilitating condition. In our study the mean values of LSIDS-L subscale scores were higher than in original study indicating a worse QoL than in other cultures.

Although the female-to-male ratios of our study were consistent with other previous studies, a limitation of this study might be that majority of the subjects were female. But subgroup analysis evaluating the scores of LSIDS-L in regard to gender indicated no difference between the groups. Another limitation might be the exclusion of patients with cognitive and psychiatric dysfunctions (as assumed that they have not a full comprehension of all the questions) which may lead limitations in generalizability of our results for all LLL patients. But most of the previous studies conducted on LLL patients, used the similar exclusion criteria. We did not assess the responsiveness of this instrument as it was outside the context of our study, future studies that address the responsiveness of this questionnaire would be beneficial for the extensive use of this tool.

Conclusion

In conclusion assessment of impact of lymphedema and distress of LLL patients is important and our findings demonstrate that LSIDS-L is a valid and reliable instrument for the assessment of the symptom intensity, distress and QoL in Turkish patients with LLL. Turkish LLL patients found the Turkish version of LSIDS-L questionnaire easy to understand, respond and complete. In the absence of any other validated lymphedema-specific symptom burden questionnaire in Turkish language, the Turkish LSIDS-L appears to be a promising tool that can readily applied as an outcome measure both in clinical practice and research studies.

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