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SUMMARY

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Original articles

THE EUROPEAN JOURNAL OF LYMPHOLOGY AND RELATED PROBLEMS (EJLRP)

The EJLRP - official organ of the European Group of Lymphology (ESL), Czech Society of Lymphology, Romanian Society of Lymphology, Greek Society of Lymphology, the Latin-Mediterranean Chapter of Lymphology (LMCL), the Società Italiana di Linfangiologia (SIL) covers all fields of Lymphology and aims to present a multidisciplinair approach to diseases of the lymphatic system, with information on the analysis, control and treatments of such diseases.

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The topics include:
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– oncology (primary lymphatic system diseases, lymphonodal metastatic process)
– immunology
– post-therapeutic complications
– upper and lower limb edemas

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May 26-27, 2016 - Stuttgart

43th ESL Congress

European Society of Lymphology

An overview of the treatment of primary and secondary lymphatic diseases: the effort of the ESL to put some order

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ESL

Panel of experts' considerations and practical recommendations on lymphedema and related disorders

43rd European Congress of Lymphology
26 – 27 May 2017

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Group Goals

- Early diagnosis
- Threshold for definition of excess volume
- Need of surveillance
- Patient education/self care
- Complications
- Risk factors
- Role of genetics
- Prevention (primary, secondary and tertiary)
- Treatment (conservative, surgical; early and late stages)

Recommendations

1) Early diagnosis

- Subjective symptoms and physical examination: swelling, pain, aching, numbness, stiffness, cording.
- Objective assessments: circumferential tape measurements are acceptable as a minimum standard (threshold of 2 cm, being measure every 4th cm); limb volumes can be calculated using the formula of a truncated cone, by water displacement or Archimede's principle; bioelectrical spectroscopy, tissue dielectric constants and infrared perometry can detect subclinical lymphedema (limit the risk of false negative or false positive results of circumferential tape measures); lymphoscintigraphy; indocyanine green (ICG) lymphography; ultrasonography for skin thisckness.
- MRI, CT, SPECT and SPECT CT lymphoscintigraphy have been used to define and detect the structural changes such as the honeycomb distribution of fluid and to visualize dilated lymphatic structures. However, their primarily role is in the assessment of late stages for surgical interventions and chylous disorders.

Recommendations

2) Threshold for definition of edema

- Lymphedema Relative Volume (LRV)
  - >=5% - < 10% minimal ly.
  - >=10% - < 20% mild ly.
  - >= 20%

Compared to the contralateral limb and better if compared to pre-op measurements

Recommendations

3) Need of surveillance

- Lymphedema negatively impacts overall quality of life and represents a financial burden for patients, caregivers, and society
- An early stage diagnosis offers the best opportunity for early intervention and early cure
- Many guidelines do not recommend one particular technique as the gold standard screening option
- The diagnosis of lymphedema is improved with a combination of assessments

Recommendations

4) Patient education/self care

- As concerns secondary lymphedemas, clinicians must raise awareness recognizing the lifetime risk of lymphedema, especially in the 2 years after surgery. They should inform patients of early signs and symptoms of aching, feelings of heaviness, tightness, fullness or stiffness that often precede visible swelling.
- Clinicians should educate patients on critical risk reducing strategies that are practical and evidence based (does and donts)
- Clinicians should encourage at risk and affected lymphedema patients to exercise. Resistance and aerobic exercise is safe. Working with a trained professional to learn to exercise safely is helpful for affected individuals.

Recommendations

5) Complications

- Lymphedema progresses from an early stage with soft tissue, reversible edema, no infections to a debilitating condition with tissue hardness, numbness, skin lesions, recurrent erysipelas due to gradual deposition of fat and fibrotic tissue
- Role of inflammation in the generation and maintenance of lymphedema
- In lymphedema, there is remarkable upregulation of the gene expression related to acute inflammation, immune response, complement activation, wound healing, fibrosis, and oxidative stress response
- Potential implications for pharmacological approaches to lymphedema. In the experimental setting, targeted inflammatory inhibition is responsible for substantial structural and functional improvement

Recommendations

6) Role of genetics

- Primary lymphedema is an autosomal dominant disorder with incomplete penetrance
- It can happen that the genetic mutation is of hereditary-familial type
- Primary lymphedema can be sporadic
- In syndromic cases, lymphedema is one aspect of the more complex clinical setting
- It is useful to study genetic mutations in order to better understand the incidence, penetrance and prevalence of the disease.

Recommendations

7) Risk factors for secondary lymphedemas

- Extensive surgery
- Radiation therapy
- Specific systemic therapies especially taxane-based regimens
- Body mass index / Morbid obesity
- Inactivity
- Injuries to derivative lymphatic pathways

Recommendations

8) Prevention (primary, secondary and tertiary)

- Primary: meaning to minimize injury of the lymphatic system by cancer treatment is now possible only with reverse mapping and LYMPHA technique.
- Secondary: to support the lymphatic system after cancer treatment to avoid development of lymphedema, manual lymph drainage, slight compression, pumping exercises and self-massage are often suggested but have not been sufficiently evaluated.
- Tertiary: to diagnose arm lymphedema at an early stage and start conservative treatment with compression therapy when the lymphedema still is mild and thereby prevent development of severe lymphedema. Early microsurgery in case of poor response to conservative treatment.

Recommendations

9) Treatment (conservative, surgical; early and late stages)

- Combined Physical Therapy (CPT) is the gold standard for the conservative management of lymphedema. However, for early stages both meta-analysis and Cochrane has proven compression to be the best first treatment followed by MLD only if compression does not work.
- CPT is a 4 part physiotherapy program consisting of: 1) Manual Lymphatic Drainage; 2) Gradient compression bandaging; 3) Therapeutic exercises; 4) Skin care.
- All patients with symptoms or measured changes should be referred for evaluation with a lymphedema physical therapist, formally educated, and provided graduated intervention according to the staging.

Recommendations

10) Treatment (conservative, surgical; early and late stages)

- Microsurgical approaches are physiologic procedures that aim to reconnect or reconstruct the lymphatics and have shown to be effective in multiple studies to reduce excess lymphatic fluid in early stage lymphedema
- Proximal multiple LVA technique creates multiple lymphatic-venous anastomoses at the proximal site of the affected extremity using the lymphatic collectors just below the site of lymphatic flow obstruction. The lymphatic-venous pressure gradient and competent venous valve promote lymph flow through the anastomoses.
- As concerns preoperative diagnostics, superficial and deep lymphoscintigraphy is the main diagnostic tool that supplies a precise functional assessment of both supra and subfascial lymphatic pathways allowing the surgeon to plan a proper and physiologic procedure to treat the lymphatic obstruction.

Recommendations

11) Treatment (conservative, surgical; early and late stages)

- Indocyanine green fluorescence can demonstrate only subdermal lymphatic vessels not providing a complete investigation of either superficial or deep lymphatic pathways, which is indispensable for a surgeon to have a proper assessment of lymphatic circulation.
- Another LVA technique uses small, distal, subdermal lymphatico-venular anastomoses however, the pressure from the venous circulation may impede lymph flow through the anastomoses in these cases.
- Excess volume reduction is variable with these techniques and it depends on the stage of the disease. Microsurgical reconstructive procedures are more effective for early lymphedema because functional lymphatics are still present, and there is minimal fibroadipose deposition.

Recommendations

12) Treatment (conservative, surgical; early and late stages)

- The understanding of the indications for vascularized lymph node transfer (VLNT) and its mechanism of action are still evolving
- Major concerns relating to VLNT include donor site morbidity and patient selection.
- VLNT can increase VEGF-C concentration locally which has been associated with lymphatic regeneration in normal tissue but also theoretically lends increased metastatic potential in tumors. The clinical impact of these theoretical advantages and disadvantages remains unknown

Recommendations

13) Treatment (conservative, surgical; early and late stages)

- Debulking techniques include minimally invasive approaches, such as liposuction, that is performed to remove accumulated fat and fibrotic tissue in late stages
- Liposuction effectively removes nearly 100% excess volume from affected limbs but does not address the underlying pathophysiology or etiology of lymphedema
- Therefore, patients must maintain continuous postoperative compression and follow up with a lymphedema therapist
- Recent proposed technique by a lymph vessel sparing procedure (so-called Fibro-Lipo-Lymph-Aspiration with Lymph Vessel Sparing Procedure- FLLA-LVSP - by green indocyanine fluorescent microlymphography).

Recommendations

14) Treatment (conservative, surgical; early and late stages)

- Patients should be assessed by a multidisciplinary team that has an understanding of lymphedema and after care where surgery is considered part of a multimodality treatment plan. Baseline and follow up assessments should be made including functional lymphatic assessments.

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EXPERIENCE WITH SILICONED BANDAGES

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ABSTRACT

Bandaging playss a fundamental in the treatment of lymphedema but its efficacy depends on various features such as high peak pressure during movement, high stiffness, low dislocation, and excellent comfort, while ensuring volumetric and tonometric reduction of the edema. We studied the Cizeta Press® short-stretch silicone bandages to check their action, and whether they satisfied the requirements of a lymphology bandage, possibly offering advantages over multilayer bandaging with short-stretch bandages. Cizeta Press® bandages have 35% extensibility, and are siliconed with dots on one side; they come in versions 5, 8, and 10 cm wide and have colored lines along them, marking 25%, 50% and 75% of the width.

Here we present the results with these bandages, which we have used in 60 patients with lymphedema of the legs or arms. Peak pressure was excellent, stiffness averaged around 10, and dislocation of the bandage was no more than 2-3 cm in 15% of the patients; the bandages were confortable to wear (mean VAS rating 2.5). Edema volume and tissue consistency were reduced in all patients after ten treatment sessions, and hysteresis was still excellent after continuous use and after washing and ironing (between 0.96 and 1.01).

INTRODUCTION

Complex decongestive physiotherapy (CPT) is the 'gold standard' for the treatment of lymphedema and one of the mainstays of this therapy is multilayer, short-stretch bandaging, together with manual lymph drainage, skin care and physiotherapy with movement for the bandaged limb (Consensus document ISL 2017). The rheological characteristics of lymphedema, with the high protein content of the fluid, imply the need for certain special features of the bandages employed: they must ensure high pressure peaks during movement (high working pressure) and lower pressure at rest (low resting pressure. This ensures that the bandage has strong decongestant action when the limb moves but can still be worn, with no problems, when the patient is resting. The difference between the working and resting pressures indicates the stiffness of the lymphology bandage, which should be at least 10.

Today's short-stretch multicomponent bandages are made up of several layers:

1. a cotton tube to protect the skin;
2. a sub-bandage of German cotton, or polyurethane foam bandages 2-5 mm thick;
3. several layers (2-3 or more) of short-stretch bandages, short-stretch + medium stretch, or several layers of medium extensibility bandages.

This study was designed to verifity the efficacy of a new type of short-stretch siliconed bandage, Cizeta Press®, for lymphedema of the limbs

MATERIAL AND METHOD

The study enrolled 60 patients with the following conditions:

– Lymphedema of a leg (37 patients, 16 with primary lymphedema and 21 secondary): 32 were stages 2 and 5 stage 3, according to the ISL classification;
– Secondary lymphedema of an arm (23 patients): 20 were stage 2 and 3 stage 3 according to the ISL classification.

Patients' ages ranged from 21 to 86 years; there were 17 males and 43 females. Patients with serious liver disease, severe renal insufficiency, motor disability with serious movement limitations, arteriopathy with walking index (W.I.) less than 0.5, or heart failure, were excluded.

We tested Cizeta Press® siliconed bandages, with the following characteristics:

– 35% extensibility
– silicone dots on one side (2-5 dots/cm^2, covering 55-65% of the siliconed fabric
– width 5, 8, 10 cm
– colored lines indicating 25, 50 and 75% of the width, to guide the person overlapping the layers when applying them (Fig. 1).

Figure 1 - Cizeta Press® short-stretch siliconed bandages.

Data were collected according to the following method:

1. Pressure measurements taken with the patient supine, standing, or moving, when the bandages were applied and 24h later, using a PICOPRESS® (Microlab Elettronica, Padua, Italy).
2. The Static Stiffness Index (SSI) was calculated according to the CEN rules for legs.
3. The SSI was calculated for arms
4. Clinical assessment
5. Centimetric and volumetric assessment (using Linforoll® software) at the start and end of treatment, comparing the two limbs.

6. Assessment of tissue consistency by manual palpation, employing a three-step rating scale (1. Soft, 2. Medium, 3. Hard) and a five-step scale (1. Soft, 2. Soft-to-medium, 3. Medium, 4. Medium-to-hard, 5. Hard) at the start and end of treatment, comparing the two limbs.
7. Photographic documentation
8. Tolerance of the bandage, rated using a visual analog scale (VAS)
9. Dislocation of the bandage (in cm)
10. Calculation of the hysteresis (final length/initial length in cm) after continuous use (more than 200 hours) and after washing by hand with 'Marseille' hard soap in lukewarm water, drying and ironing at no hotter than 180°C (N.B. for comparison, the temperature recommended for ironing cotton is 204°C).

Bandages were applied in the following steps:

1. Thorough cleansing of the skin;
2. Positioning the cotton tube (6 or 10 cm wide, depending on the leg to be bandaged);
3. Polyurethane foam sub-bandage (10 cm wide, 2 mm thick)
4. Siliconed bandages (5, 8, or 10 cm wide depending on the leg configuration, with the dots towards the patient's skin
5. Application of a sleeve (per an arm) or a stocking (per a leg), to hold the bandage in place.

The pressure of the bandage on the edemoatose limb was recorded using a PICOPRESS® (Microlab Elettronica, Padua, Italy).
The PicoPress® instrument is a portable digital gauge to be utilized, for medical purposes, to measure the pressure exerted by a bandage. PicoPress does not administer energy to the patient while it is measuring pressure. The instrument utilizes a circular transducer made out of an ultrathin biocompatible material in which a known volume of air is inserted. The transducer is placed between the limb and the bandage. The pressure detected by the transducer is measured by a microprocessor digital gauge and visualized on an alphanumeric display which also displays the essential operating instructions. The instrument incorporates a micropump which is manually activated by introducing a known volume of air. The micro pump is fitted with a detection sensor when the plunger reaches its end of course.
(from the Technical Manual for Users issued by Microlab Elettronica Padova Italia) (Fig. 2).
The SSI was calculated following the rules set down by the European Standards > Organization (CEN) which establish the static stiffness index (SSI) as the rise in pressure per 1cm increase in the circumference of the leg (at point B1), calculated as follows: SSI = (pressure when standing – pressure when supine)/1. For arm lymphedema the SSI is calculated using a similar formula, placing the sensor 15 cm from the palmar fold, with the forearm supine, and recording the resting and dynamic pressures during flexo-extension and prono-supination of the arm.
The consistency of the edema was measured as at point 6 above.
We also recorded the patient's comfort while wearing the bandage, using a VAS with ratings from 0 to 10, where 0 indicated 'no discomfort' and 10 'maximum discomfort'. Patients were asked to place a mark on the rating scale to illustrate the level of discomfort the bandage had caused during the 24h it was worn (Fig. 3).
We calculated the limb volumes with the internal software of the Linforoll® device. This is an indirect calculation employing the formula of a cone after inserting the cirtometric data at preset measurement points for each patient (Fig. 4).

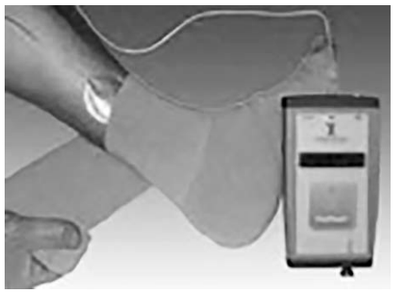
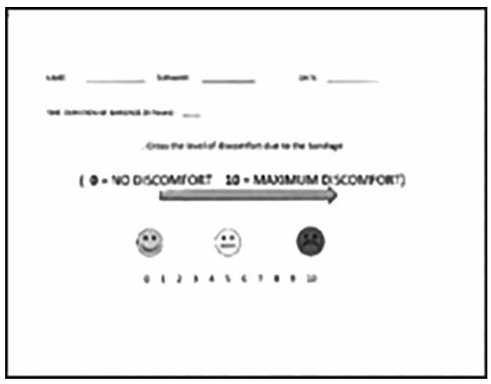


Fig. 2 - Picopress®

Fig. 3 - Visual-analog scale for rating the comfort of the bandage.



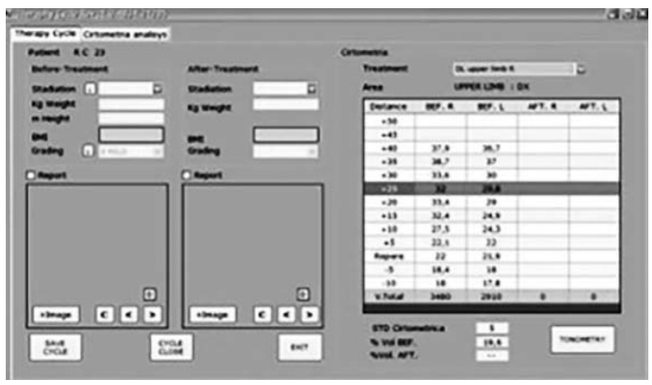


Fig. 4 - Indirect calculation of volumetry using the Linforoll® software.

We checked the hysteresis of the bandages by measuring their length before and after continuous use (more than 200 h), as follows: final length/initial length in cm, and after hand washing as indicated at point 10 above.

RESULTS

All the treated patients enjoyed reductions in the size/volume and consistency of the limb edema compared to the pre-treatment measurements. Peak pressure during movement reached 120 mmHg in the leg and 95 mmHg in the arm.

PATIENTS WITH LEG LYMPHEDEMA (37 cases)

Volumetry of the legs

The percentage differences in volume from start to end of treatment (10 sessions are shown in Graph 1). The difference between the legs before treatment ranged from 0.8 to 51.4%, and after treatment from 0.6 to 34.9%. The reduction in the difference between the leg with lymphedema and the healthy leg ranged from 4% to 91% (depending on the starting measurement) (Graph 2).

STIFFNESS OF THE BANDAGE IN THE 37 PATIENTS WITH LEG LYMPHEDEMA

We calculated the SSI when the leg was first bandaged then after wearing the bandage for 24h (Graph 3). The mean stiffness when first applied was 16.3, and 24h later it was 9.8.

PATIENTS WITH ARM LYMPHEDEMA (23 cases)

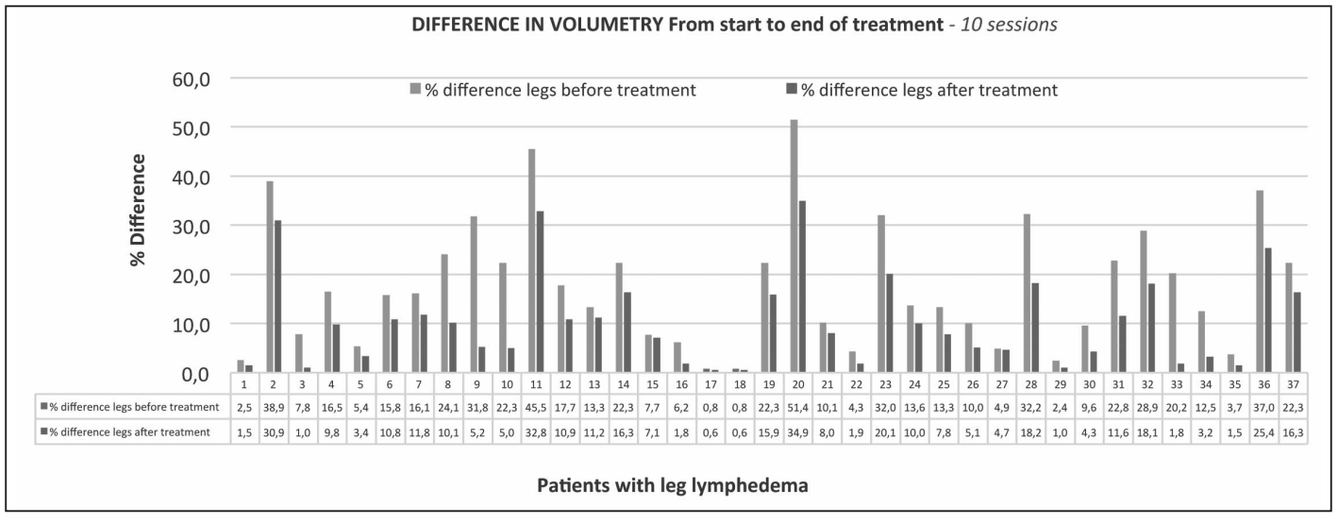
Volumetry of the arms

The differences in volume between the arms start to end of treatment (10 sessions) are shown in Graph 4. Before treatment they ranged from 3.1 to 120.9%, and after treatment from 0.3 to 85.2%.

The reduction in the difference between the arm with lymphedema and the healthy arm ranged from 12% to 90% (depending on the starting measurement) (Graph 5).

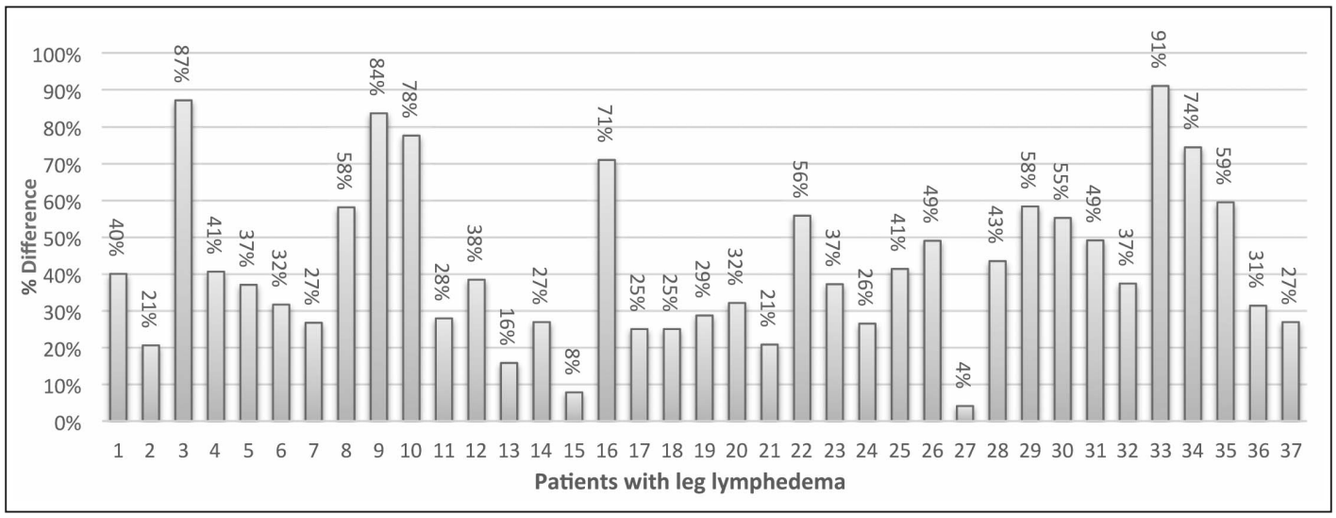
STIFFNESS OF THE BANDAGES IN PATIENTS WITH ARM LYMPHEDEMA

We calculated the SSI when the arm was first bandaged then after wearing the bandage for 24h (Graph 6). The mean stiffness when first applied was 13.3, then 24 h later 9.0.

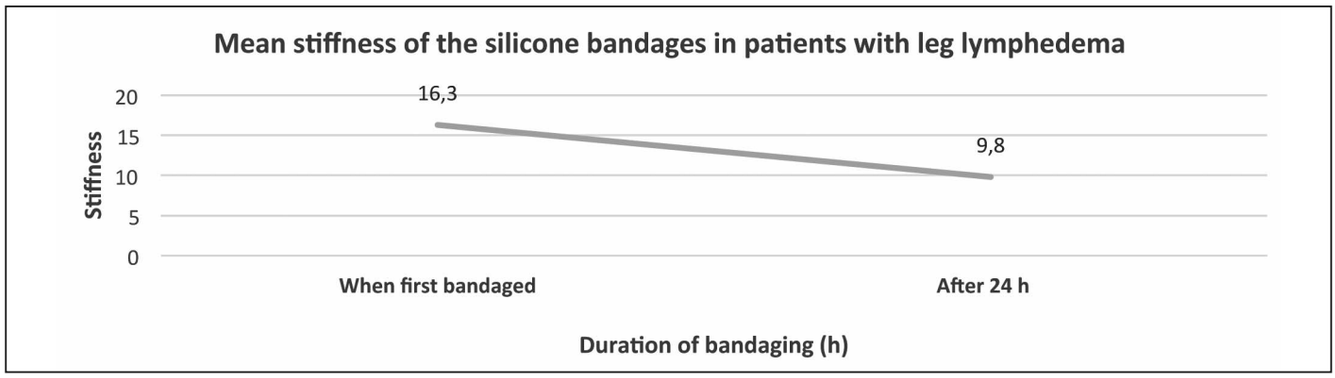


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
% difference legs before treatment	2,5	38,9	7,8	16,5	5,4	15,8	16,1	24,1	31,8	22,3	45,5	17,7	13,3	22,3	7,7	6,2	0,8	0,8	22,3	51,4	10,1	4,3	32,0	13,6	13,3	10,0	4,9	32,2	2,4	9,6	22,8	28,9	20,2	12,5	3,7	37,0	22,3
% difference legs after treatment	1,5	30,9	1,0	9,8	3,4	10,8	11,8	10,1	5,2	5,0	32,8	10,9	11,2	16,3	7,1	1,8	0,6	0,6	15,9	34,9	8,0	1,9	20,1	10,0	7,8	5,1	4,7	18,2	1,0	4,3	11,6	18,1	1,8	3,2	1,5	25,4	16,3

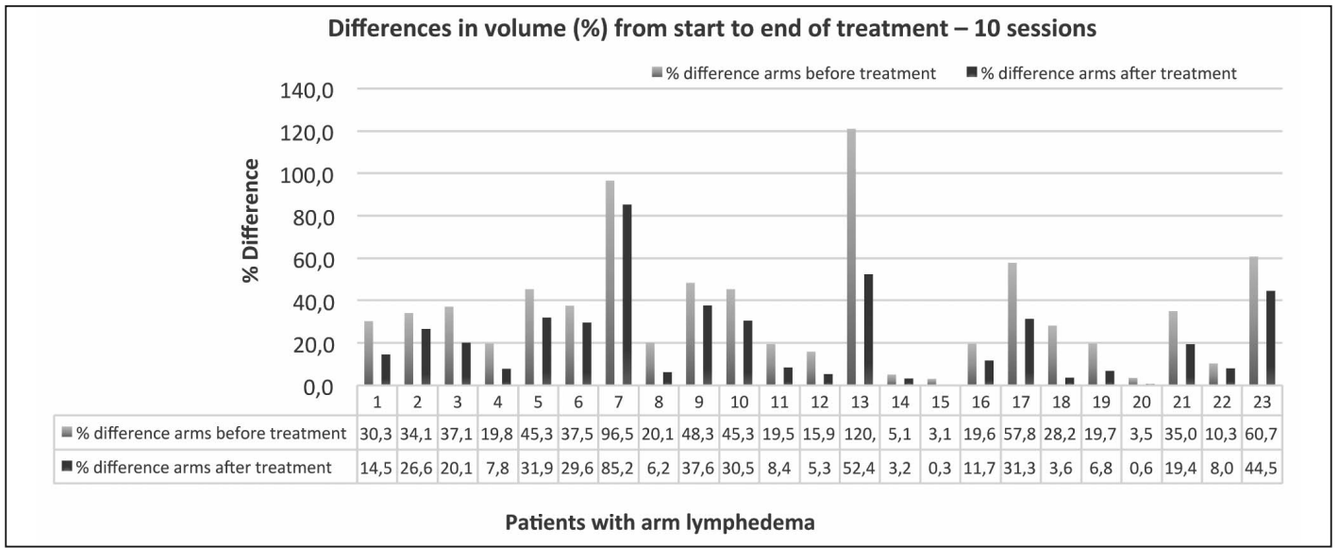
Graph 1 - Percentage difference between the lymphedema leg and the healthy one at start and end of treatment.



Graph 2 - Change in difference between the lymphedema leg and the healthy one at start and end of treatment.

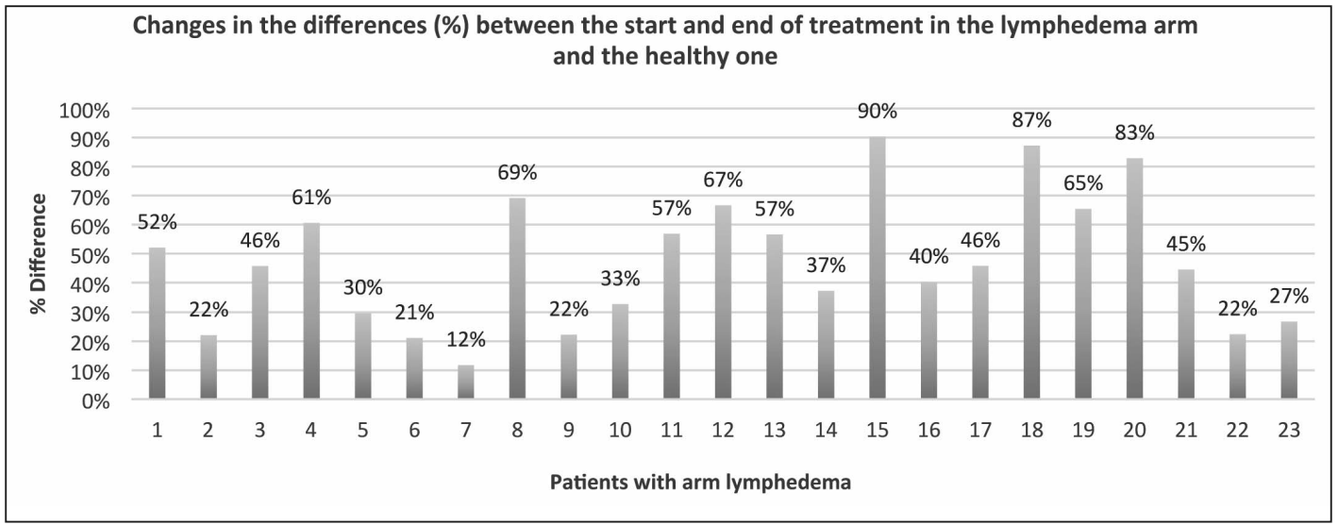


Graph 3 - Mean stiffness of the siliconed bandages in patients with leg edema.

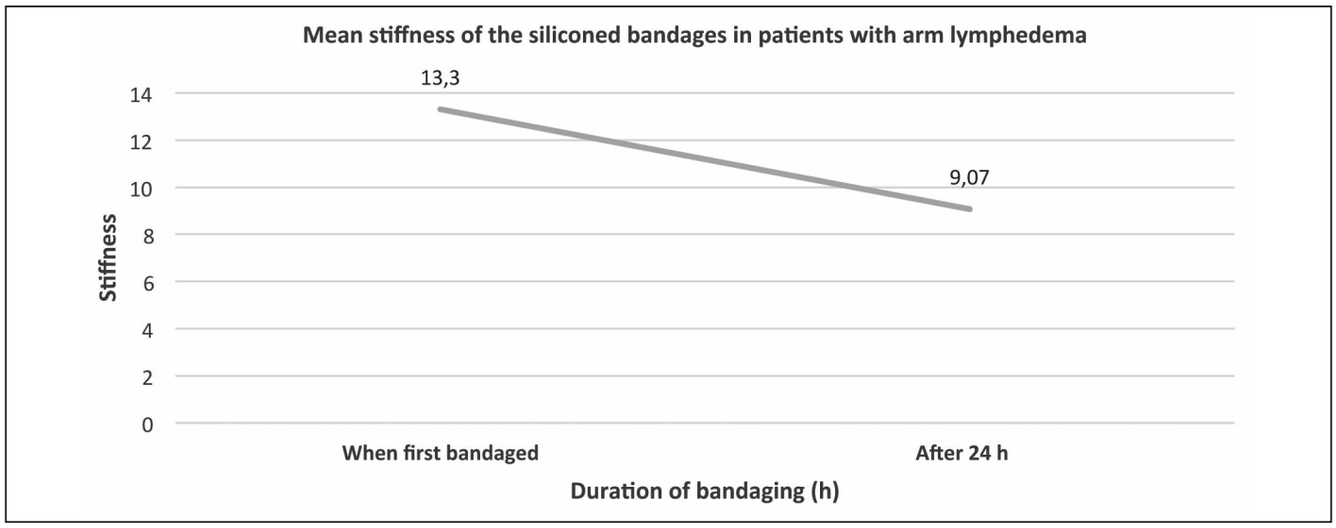


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
% difference arms before treatment	30,3	34,1	37,1	19,8	45,3	37,5	96,5	20,1	48,3	45,3	19,5	15,9	120,	5,1	3,1	19,6	57,8	28,2	19,7	3,5	35,0	10,3	60,7
% difference arms after treatment	14,5	26,6	20,1	7,8	31,9	29,6	85,2	6,2	37,6	30,5	8,4	5,3	52,4	3,2	0,3	11,7	31,3	3,6	6,8	0,6	19,4	8,0	44,5

Graph 4 - Differences in volume (%) at start and end of treatment in the lymphedema arm and the healthy one.



Graph 5 - Changes in the differences (%) between at start and end of treatment in the lymphedema arm and the healthy one.



Graph 6 - Mean stiffness of the siliconed bandages in patients with arm lymphedema.

In patients with lymphedema of the legs and those with involvement of the arms enjoyed a reduction in the tissue consistency on palpation of at least one step in the three-step assessment; in 35-40% there was a two-step improvement in the five-step rating scale.

All patients tolerated the bndage well (mean VAS rating 1.96 for the legs and 3.04 for the arms, with an overall mean of 2.5. They expressed substantial appreciation for the greater freedom of movement with the Cizeta Press® siliconed bandages compared to the 'classic' multilayer bandages.

The Picopress® recorded high peak pressures for the legs especially when patients were standing or walking, and for the arms during prono-supination and forearm extension. The peaks were from 40-50% lower after 24 h. Stiffness remained steady around 10; hysteresis averaged between 0.96 and 1.01 after one cycle of more than 200 hours of continuous use, and after washing and ironing (not hotter than 180°C). These findings indicate the excellent quality of the bandage material.

The bandages remained in place in 85% of the patients; in the other 15% they shifted within an acceptable range (2-3 cm), but this happened mainly for complete bandages of the legs.

In 18 patients (12 with leg lymphedema and 6 with arm lymphedema) we investigated the stiffness with four measurements in 24 h: at application, after 6-8 h, afger 14-16 h, and after 24h.

RESULTS

LYMPHEDEMA OF THE LEGS (12 patients) (Graph 7)

Mean stiffness

1. Stiffness at application, 15.8
2. Stiffness after 6-8h, 12.8
3. Stiffness after 14-16h, 12.6
4. Stiffness after 24h, 9.6

LYMPHEDEMA OF THE ARMS (6 patients) (Graph 8)

Mean stiffness

1. Stiffness at application, 11.4
2. Stiffness after 6-8h, 16.4
3. Stiffness after 14-16h, 15.1
4. Stiffness after 24h, 14.2

DISCUSSION

The main findings of this study are that the Cizeta Press® siliconed bandages ensure excellent pressures not only when patients are supine but particularly when they are moving. The pressures decrease from 40-50% in 24h. The SSI remained steady at around 10 (the limit for short-stretch bandages).

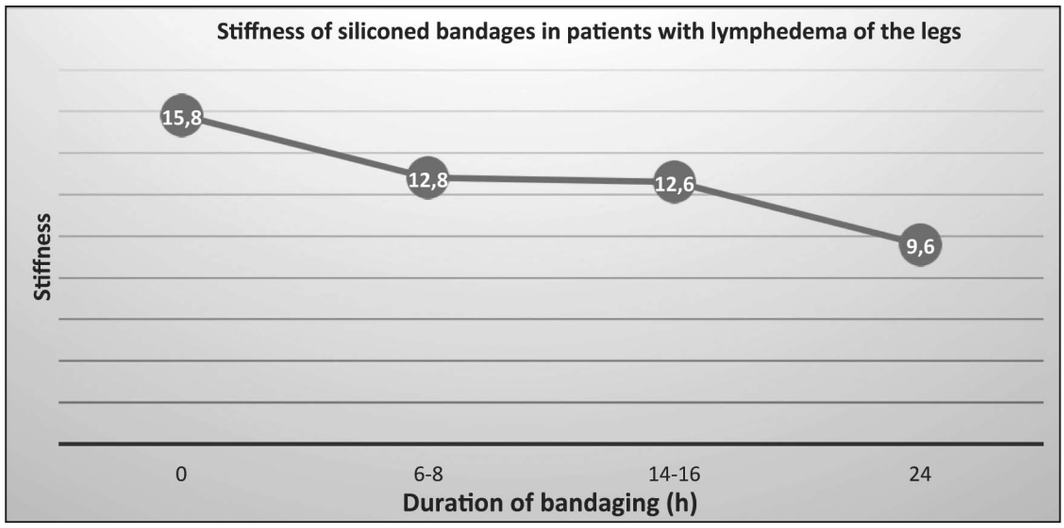
For the same number of bandages and layers the Cizeta Press® product's average stiffness value was double that of a 'classic' bandage: Cizeta Press® silicone bandages ≥10, medium-stretch bandages 5-6. To obtain stiffness of 10 or more with a classic bandage one must apply more layers.

The fact that fewer 'layers' of the Cizeta Press® bandages are needed gives giving the patient greater ease of movement and leaves the bandage itself more comfortable.

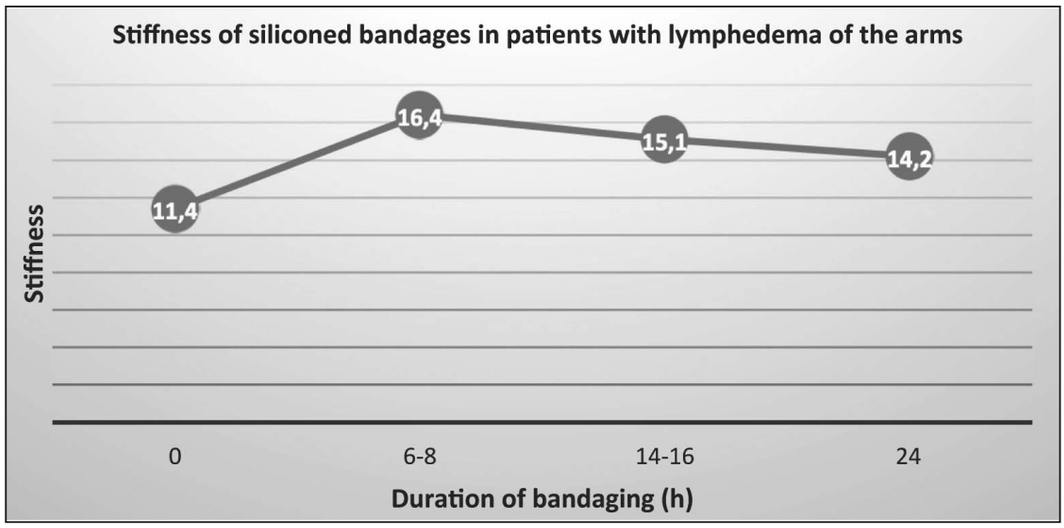
All patients had reductions in tissue volume and consistency on palpation, after ten treatment sessions. All patients tolerated the bandages very well, with a mean VAS rating of 2.4.

The bandages remained in place in 85% of cases, and only shifted 2-3 cm in the other 15% (mostly whole-leg bandages)- an acceptable range.

The Cizeta Press® had excellent hysteresis (0.96-1.01) after more than 200 hours of continuous use and after washing and ironing. This confirms the excellent quality of the materials employed and that they last well.



Graph 7 - Mean SSI of the silicone bandages in patients with lymphedema of the legs (4 measurements in 24h).



Graph 8 - Mean stiffness of siliconed bandages in patients with lymphedema of the arms (4 measurements in 24h).

CONCLUSIONS

This study illustrtes the therapeutic potential of Cizeta Press® siliconed bandages for the treatment of lymphedema. They were extremely effective for decongestion of the edematous limb. Future studies might usefully focus on new bandaging techniques, using these bandages to achieve maximum reduction of the edema in the shortest possible time.

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SEEKING A SAFE WAY FOR THE WITHDRAWAL OF COMPRESSION GARMENTS IN PATIENTS WITH BREAST CANCER RELATED LYMPHOEDEMA

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ABSTRACT

Objective: Compare the evolution of lymphoedema in patients who stopped using garments with those who continued using garments during the maintenance phase.

Methods: Patients with breast cancer related lymphoedema who had stabilised volume (changes <5%), without inflammatory complications for at least the last 12 months and without symptoms of worsening while not using garments were offered the possibility of ceasing garment to use in a progressive and monitored way. They were followed-up for 2 years and compared to patients who continued using garments. Outcomes were the change in excess volume and inflammatory complications. Analyses were performed using the *t test* and X^2 *test* ($p<0.05$).

Results: Seventy-six patients were included, 16 of them in the no garment use group. Lymphoedema severity was mild (<20% excess volume) for 41 patients and moderate (20-40% excess volume) for 35 patients. Three patients had to return to garment use because of volume increase. There were 2 (12.5%) patients in the no garment use group who had inflammatory episodes whereas there were 9 (15%) patients in the control group ($p=0.581$). The mean change in excess volume after 2 years was 0.7% for the no garment use group, and 0.42% for the control group. These differences were not significant ($p=0.646$). There were no significant differences in the analysis stratifying by lymphoedema severity.

Conclusions: At a follow-up of 2 years there were no significant differences in the change of excess volume between the patients who stopped using garments after a removal test with the patients who continued using garments. More research is warranted to determine which selected, stabilised lymphoedema patients could benefit from this reduction in the self-care burden.

Key words: Breast cancer; Compression; Lymphoedema.

INTRODUCTION

The treatment of lymphoedema generally starts with a decongestive phase followed by a maintenance phase. The main goal of the decongestive phase is to reduce the excess volume and hardness of lymphoedema. It is a phase of intensive treatment, usually 5 days a week, which must be applied by a professional expert in this pathology. It usually includes manual lymphatic drainage and compression techniques such as multi-layer bandaging. When the reduction of the excess lymphoedema volume stabilises, the maintenance phase starts. The main objective of the maintenance phase is to conserve the reduction achieved, avoid progression and prevent lymphoedema complications. The maintenance phase usually consists of the use of compression garments and self-care.

Compression garments are widely accepted as one of the components of lymphoedema management (Lymphoedema Framework, 2006; Training, 2009; Ridner, Dietrich and Kidd, 2011; ISL, 2013; Queensland Health, 2014). The most common compression garments for upper and lower limbs are sleeves, gloves, pants, stockings and gloves for toes. Compression garments produce a pressure gradient that goes from major to minor and from distal to proximal over the body segment where they are applied. They are made in flat or circular low-elasticity knit and their correct functioning usually requires tailoring. The daily use and the materials with which garments are made advise their renewal every 6 months. All these peculiarities mean that the garments are expensive products. Moreover, some people do not manage to put the garments on by themselves. Finally, for many patients the use of garments impairs self-image and interferes with socialisation.

Once a compression garment is prescribed, the tendency is to continue the prescription indefinitely according to the chronicity of the lymphoedema. The most important guidelines recommend

the use of garments but there is no information about when to stop using the garments and how to do it in a safe way (Lymphoedema Framework, 2006; Training, 2009; Ridner, Dietrich and Kidd, 2011; ISL, 2013; Queensland Health, 2014).
In our clinical practice we observed that some breast cancer related lymphoedema does not progress, but stabilises or even improves. On the other hand, some patients decided not to continue using compression garments on their own initiative. Many of these patients explained that they did not note any benefit from the use of the garments. Other patients argued that they did not tolerate the garments in the warmer months. We saw that many of the patients who abandoned the use of compression garments did not worsen and their lymphoedema remained stable. We therefore hypothesised that some stabilised lymphoedema could be managed without compression garments and we considered the possibility of offering our patients with breast cancer related upper limb lymphoedema the possibility of ceasing to wear compression garments.
The objective of this study was to compare evolution of the lymphoedema in patients who stopped using garments after a removal test with those who continued using garments in the maintenance phase.

METHODS

This was a retrospective observational study carried out in the rehabilitation service of a university, third-level general hospital. The rehabilitation service is part of the breast cancer unit where all patients undergoing axillary lymph node dissection follow a program of prevention and treatment of lymphoedema.
According to our clinical observations, the inclusion criteria were:

- Patients with upper limb lymphoedema secondary to breast cancer
- Mild or moderate lymphoedema (excess volume <40%)
- Following treatment with compression garments (gloves, sleeves)
- Lymphoedema measurements stabilised during the last 12 months (changes in excess volume <5%)
- Acceptance to participate in the withdrawal test

The exclusion criteria were:

- Symptoms of worsening while not using garments
- Infectious or inflammatory episodes during the last 12 months
- Difficulty attending frequent check-ups
- Cognitive or sensory difficulties to understand and follow the withdrawal test procedure.

In order to carry out the procedure in the safest possible way, the first step was a withdrawal test. It consisted of a progressive decrease in the use of the garments. Patients started the withdrawal test by using the garments on alternate days during the first 2 weeks. The next 2 weeks they used garments 1 day and did not use the garments for 2 days. The next 2 weeks patients use garments only 1 day a week. The patients then stopped wearing the garments altogether. If at any time there was an increase in lymphoedema volume, any symptom appeared, or an infectious or inflammatory episode or any other complication occurred, the patient returned to using the garments every day.
A medical check-up took place at 2 months or earlier if there were any complication. The specialist measured the perimeters and checked the stabilisation of the lymphoedema and correct tolerance to the withdrawal test. If everything was in order, the patient was encouraged to continue without using the garments. The patient then had to attend a medical check-up after any worsening or complication, or every six months.
The data analysed were from patients who stopped wearing garments from 2011 to 2013. This group was compared to patients with breast cancer related lymphoedema who did not stop wearing garments over the same period. The results are therefore after 2 years of follow-up.
The outcome variables analysed were excess volume and complications. The basal characteristics of the groups and volume changes were compared. Analyses used the X^2 and *t test*. The level of significance was <0.05.

RESULTS

Table 1 shows the characteristics and outcomes for all patients. Seventy-six patients with breast cancer related lymphoedema were included, 16 in the no garment use group and 60 in the continuing garment use group. The mean age was 61.9 (SD 11.6) years. The baseline period with lymphoedema was longer for the no garment use group than for the one continuing garment use (1,427 vs. 293 days, p<0.001). The baseline excess volume was almost significantly smaller for the no garment use group than for the continuing garment use group (14.2% vs. 20.1%, p=0.056).
At the end of follow-up, the no garment use group had 2 patients with 1 inflammatory episode each, none of these patients returned to garment use. In the continuing group, 4 patients had 2 inflammatory episodes and 5 patients had 1 inflammatory episode. Four patients of the no garment use group had a volume increase during follow-up at 5, 8, 11 and 15 months. Three of them returned to garment use, while 1 refused to use them again.
The median change in the lymphoedema excess volume after 2 years was 0.7% for the no garment use group and 0.42% for the group who continued garment use (p=0.646).
Table 2 shows the characteristics and outcomes stratified by lymphoedema severity. In 41 patients the lymphoedema severity was mild (<20% excess volume), and moderate in 35 (20-40% excess volume). The moderate lymphoedema group showed a higher body mass index for the continuing garment use group than for the no garment use group. The period of lymphoedema was longer for the continued garment use group than for the no-garment use group for both mild and moderate lymphoedema. There were no significant differences in outcome variables.

DISCUSSION

Twelve patients (75%) who stopped garment use continued with stable volume after 2 years of follow-up. The group of patients who stopped garment use showed no significant differences in volume increase and complications than the group of patients who continued garment use. This suggests that the inclusion criteria and the withdrawal test were a safe way for selecting candidates for garment withdrawal.
As we already knew, this was the first study of the evolution of patients who stopped garment use in the maintenance phase of

	All	Continued garment use	No garment use	p. overall
	N = 76	N = 60	N = 16	
Age (years)	61.9 (11.6)	61.1 (12.1)	65.0 (9.06)	0.166
BMI (Kg/m^2)	28.8 [25.4;33.9]	29.2 [26.4;33.7]	26.7 [23.3;33.2]	0.357
Affected side				1.000
Not Dominant	34 (44.7%)	27 (45.0%)	7 (43.8%)	
Dominant	37 (48.7%)	29 (48.3%)	8 (50.0%)	
Missing	5 (6.58%)	4 (6.67%)	1 (6.25%)	
Period of lymphoedema (days)	506 [102;1440]	293 [52.5;1135]	1427 [836;2978]	<0.001
Follow-up (days)	763 (95.0)	764 (97.5)	757 (87.7)	0.782
Baseline excess volume (%)	18.5 [12.0;28.7]	20.1 [13.3;29.1]	14.2 [6.45;20.7]	0.056
2 years excess volume (%)	16.6 [8.99;25.3]	17.4 [9.77;25.3]	12.4 [8.10;24.6]	0.320
Excess volume change (%)	0.57 [–8.13;4.75]	0.42 [–10.35;5.26]	0.70 [–2.70;2.89]	0.646
Number of complications				0.581
0	65 (85.5%)	51 (85.0%)	14 (87.5%)	
1	7 (9.21%)	5 (8.33%)	2 (12.5%)	
2	4 (5.26%)	4 (6.67%)	0 (0.00%)	

Table 1 - Characteristics and outcomes of all patients.

	Mild lymphoedema			Moderate lymphoedema		
	Continued garment use	No garment use	p. overall	Continued garment use	No garment use	p. overall
	N = 30	N = 11		N = 30	N = 5	
Age (years)	58.1 (11.6)	64.5 (9.57)	0.086	64.1 (12.1)	66.1 (8.76)	0.672
BMI (Kg/m^2)	31.3 (7.72)	31.6 (6.07)	0.905	29.8 (5.34)	21.4 (1.12)	<0.001
Affected side			0.657			0.369
Not Dominant	10 (33.3%)	5 (45.5%)		17 (56.7%)	2 (40.0%)	
Dominant	17 (56.7%)	6 (54.5%)		12 (40.0%)	2 (40.0%)	
Missing	3 (10.0%)	0 (0.00%)		1 (3.33%)	1 (20.0%)	
Period of lymphoedema (days)	293 [30.2;1094]	1155 [760;2827]	0.009	302 [64.0;1139]	2060 [1483;3858]	0.008
Follow-up (days)	754 (110)	738 (86.3)	0.615	774 (84.3)	801 (82.9)	0.541
Baseline excess volume (%)	12.2 (5.22)	9.70 (4.55)	0.144	28.5 (4.91)	27.0 (5.43)	0.580
2 years excess volume (%)	12.5 [7.58;19.6]	9.06 [7.07;13.0]	0.377	25.8 (16.4)	26.4 (11.8)	0.926
Excess volume change (%)	1.79 (8.46)	1.46 (4.99)	0.880	–2.72 (16.0)	–0.61 (7.70)	0.649
Number of complications			0.131			0.685
0	28 (93.3%)	9 (81.8%)		23 (76.7%)	5 (100%)	
1	0 (0.00%)	2 (18.2%)		5 (16.7%)	0 (0.00%)	
2	2 (6.67%)	0 (0.00%)		2 (6.67%)	0 (0.00%)	

Table 2 - Characteristics and outcomes of patients according to lymphoedema severity.

treatment. In one randomised controlled trial (Hornsby, 1995), the authors investigated the effect of a compression sleeve and concluded that the volume reduction was no different between patients who used the sleeve compared to patients who did not. These results could be in the line of those of the present study but they are not directly comparable because Hornsby (Hornsby, 1995) performed the study during the intensive phase, whereas this study was in the maintenance phase. In a prospective study with a cohort of 537 patients followed-up for 1 year after intensive decongestive physiotherapy (Vignes *et al*., 2007), the authors concluded that non-compliance with elastic sleeve use was an independent risk factor for an increase in lymphoedema volume. Our study's discrepancy with these results could be explained by the fact that in this study the patients who stopped garment use did so under criteria of stability, not randomisation.

Lymphoedema is a chronic condition that tends to progress and cause physical, functional, psychological, and social morbidity in breast cancer patients (Ahmed *et al*., 2008) (Nesvold *et al*., 2011). Lymphoedema can become an important problem for the patient after completion of cancer treatment itself; it worsens the quality of life, deteriorates self-image, makes self-care difficult and can become an economic burden (Paskett *et al*., 2012) (Campbell *et al*., 2012; Neuner *et al*., 2014; Taghian *et al*., 2014) (Boquiren *et al*., 2016). Despite consensus about the indication of garments in the maintenance phase, there is no evidence to support or refute their use (Devoogdt *et al*., 2010). Moreover, we agree with authors who pointed out that some patients with upper limb lymphoedema perceived compression sleeves as inefficient and not worth wearing (Tsuchiya, Horn and Ingham, 2012). Therefore, even assuming that patients may have to use the garments again, the period when they were not used can be considered time gained, with less burden on patient self-care.

The limitations of this study are related to its observational character. The biases include the fact that patients with unstable lymphoedemas or patients who had suffered complications during the last 12 months were not excluded from the group who continued using garments. The period of lymphoedema at baseline was longer for the no garment use group than for the continue garment use group. The baseline excess volume was significantly smaller for the no garment use group than for the continue garment use group, although this difference disappeared when analyzing groups according to the severity of lymphedema. The clinical importance of these results is to give patients an opportunity to lessen the burden of controlling their lymphoedema. We think that these results could be a basis for further research. There still remain questions to be answered such as how long compression garments should be prescribed, which patients can benefit from withdrawal, and how to withdraw the garments in a safe way so as not to risk worsening the lymphoedema.

CONCLUSION

At a follow-up of 2 years there were no significant differences in the change of excess volume between the patients who stopped garment use after a removal test with those who continued using garments. More research is warranted to determine which selected, stabilised lymphoedema patients could benefit from this reduction in the burden of self-care.

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LYMPHA TECHNIQUE FOR PRIMARY AND EARLY SECONDARY PREVENTION OF LYMPHEDEMA FOLLOWING CANCER TREATMENT

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ABSTRACT

LYMPHA proved to be an effective preventive procedure that contributes in giving our oncological patients a good quality of life. In this presentation, the author will report indications, technical aspects and benefits of LYMPHA technique.

Key Words: LYMPHA technique, lymphatic-venous anastomoses, lymphedema prevention, better quality of life

INTRODUCTION

LYMPHA was conceived and carried out about 10 years ago and the preliminary results were published few years after (Boccardo F. *et al*., 2009). This technique was initially applied to prevent breast cancer related lymphedema and a short term follow-up outcome was reported (Boccardo F. *et al*., 2011). Fig. 1.

METHODS

A longer term follow-up period demonstrated the efficacy of LYMPHA technique, which proved to be advantageous to prevent secondary arm lymphedema following axillary nodal dissection for breast cancer treatment (Boccardo F. *et al*, 2014). Figs. 2, 3.

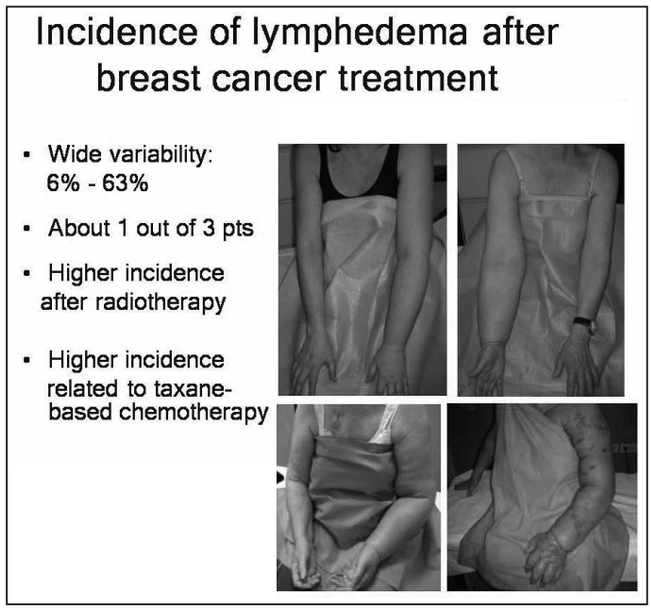

Fig. 1 - Incidence of breast cancer related lymphedema.

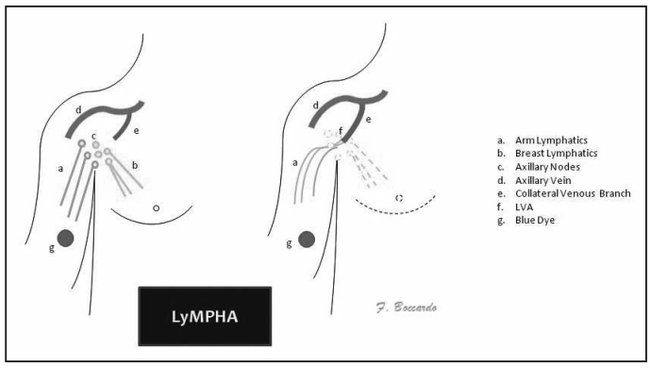

Fig. 2 - Schematic drawing of LYMPHA technique at the axilla.

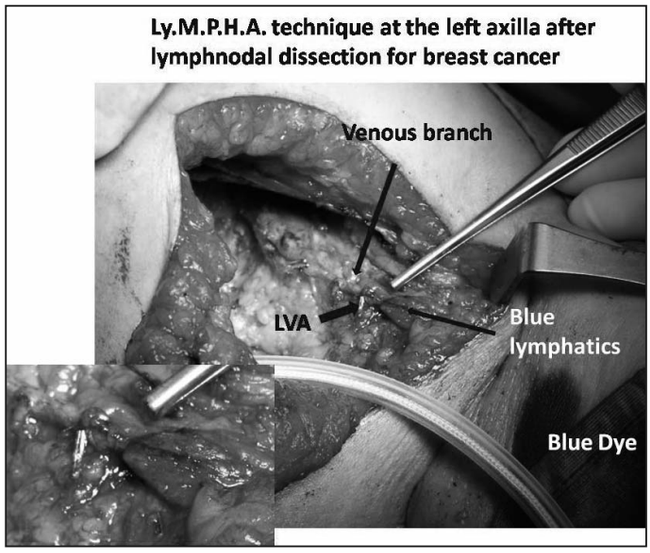

Fig. 3 - LYMPHA technique at the axilla. Brachial lymphatics are anastomosed to a collateral branch of the axillary vein.

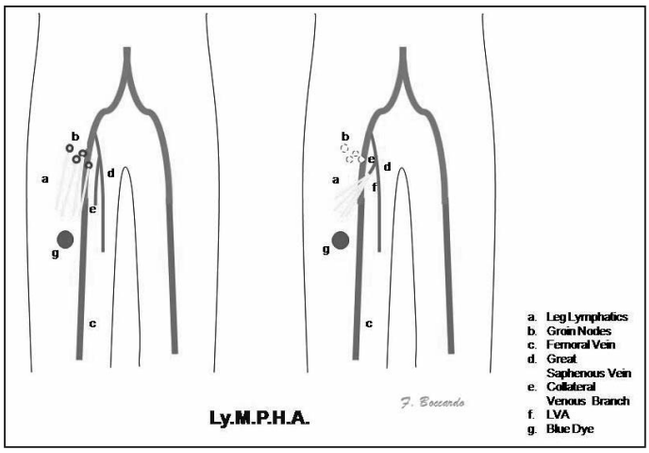

Fig. 4 - Schematic drawing of LYMPHA technique at the groin.

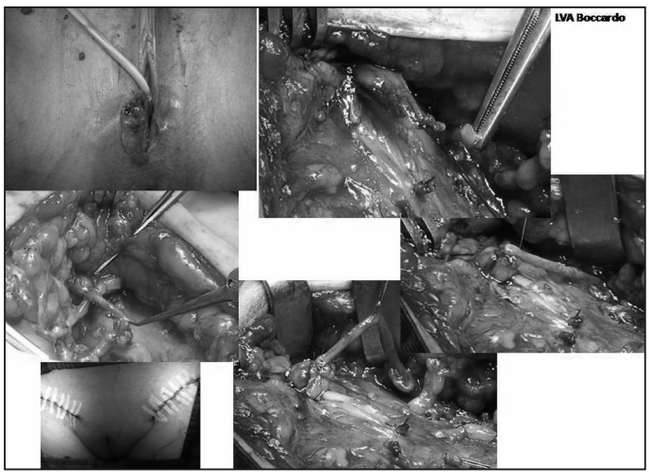

Fig. 5 - LYMPHA technique at the groin, during bilateral groin dissection for vulvar cancer.

Other groups started to use LYMPHA technique and reported their experience showing that LYMPHA is feasible, safe and effective for the primary prevention of breast cancer- related lymphedema (Feldman *et al*., 2015).

By now LYMPHA is reported among surgical interventions for lymphedema preventionand early treatment in several review articles talking about lymphedema prevention, reporting the quite promising results of the technique (Lopez Penha *et al*., 2015; Merchant *et al*., 2015; Ahn *et al*., 2016).

After this experience using LYMPHA to prevent arm lymphedema, we started to apply the same technique to prevent lower limb lymphedema following inguinal lymphadenectomy for the treatment of melanoma of the trunk (Boccardo *et al*., 2013) and vulvar cancer together with our colleagues gynecologists (Morotti, Valenzano, Boccardo *et al*., 2014). Figs. 4, 5.

After 4 years follow-up, encouraging results of LYMPHA technique to prevent lower limb lymphedema following groin dissection for vulvar cancer and melanoma were reported (Boccardo, 2016). Fig. 6.

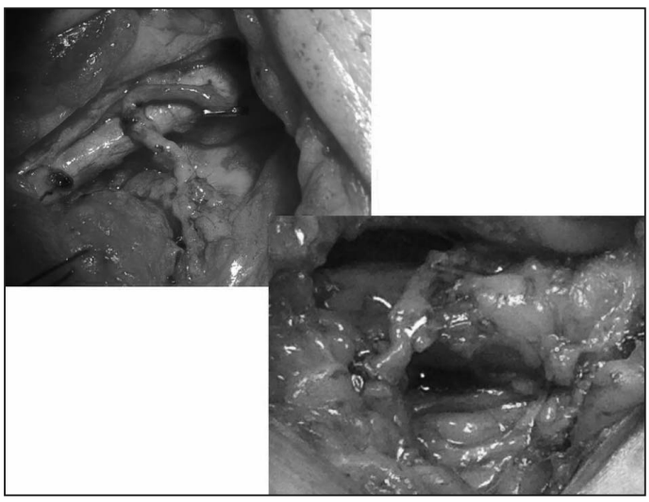

Fig. 6 - The concept of lymphatic-venous anastomoses is to "leave the tap open".

RESULTS AND CONCLUSIONS

LYMPHA proved to be an effective preventive procedure that contributes in giving our oncological patients a good quality of life.

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EDUCATIONAL PROGRAM FOR MANAGEMENT AND SELF-CARE OF LYMPHEDEMA. THERAPEUTICAL ADHERENCE TO TWO-YEARS

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ABSTRACT

Objective: Upper limb lymphedema is a complication of breast cancer surgical treatment. However, a lot of conservative treatments are available to the patients.

Material and Methods: Prospective and observational 2-year follow-up study, done in women treated for breast cancer surgery, who were included in an educational program; consisted on a theoretical talk about lymphedema and an exercise program. Measuring instruments were Quick DASH questionnaire and a self-administered questionnaire, designed to value the previous and acquired knowledge, the upper limb functionality and the breast cancer survivors satisfaction, as well as the adherence to their self-care and the exercises after having finished the program.

Results: Previous lymphedema knowledge of the 66 women included in the study was few, but it improved after the educational program. The self-care adherence of patients with lymphedema was higher than the other patients without lymphedema (with lymphedema: 3.4±0.56; without lymphedema: 2.99±0.84; p= 0.02), a good global adherence remained 2 more years (2.65±0.99). Upper limb functionality was preserved after surgery and it improved after 2 years. (Initial degree of disability: 31.93%; After 2 years: 27.11%). The level of satisfaction of the patients after the educational program was high (40.9% women: 10 points).

Conclusion: Educational program was useful to improve the patient's knowledge about lymphedema. The level of satisfaction of women was very good after the educational program. Self-care adherence remained two more years after the program.

Key Words: Breast cancer, secondary lymphedema, educational program, adherence, disability, upper limb, satisfaction.

INTRODUCTION

Upper limb lymphedema is a secondary complication of breast cancer surgery treatment [10]. Secondary lymphedema consists on the accumulation of protein-rich fluid in the interstitial space due to the impairment of the lymphatic system [5,6,8,10,24]. It is generally defined as the more than 2 cm increment of the arm circumference, compared to the healthy arm [5,24]. However, the swelling may be spread to the neck, shoulder and chest [1]. Lymphedema symptoms includes swelling, dyscomfort, pain, heaviness and decreased shoulder mobility and, therefore, body image perception and the quality of life perceived by patients may be affected [2,5,10,13,22]. The incidence of secondary lymphedema, a progressive disease without curative treatment [3,11], is between 4 and 56% [8,10,23,24].

Several options for conservative treatment are available, such as avoiding traumas, infections and sun exposure, skin hydration maintenance, upper limb elevation, use of compression garments, manual lymph drainage, decompressive bandage, mobility and strength exercises and low fat diet [2,4,17,19,22]. The effectiveness of these control measures of lymphedema has been evaluated in many studies and systematic reviews. However, the lymphedema self-care adherence on breast cancer patients has been studied in a small number of publications. This fact, plus the importance of informing the patients about their disease in a proper way, has motivated us to study the satisfaction and the adherence obtained on an upper limb lymphedema educational program.

MATERIAL AND METHOD

Objective

The main aim of this study was to assess, with a self-administered questionnaire, the patient's knowledge about lymphedema, the

self-care and exercises adherence, and the level of satisfaction after performing an educational program about upper limb lymphedema of patients diagnosed with breast cancer and surgically intervened for this reason, which they were referred to the Lymphedema's Unit of the Physical Medicine and Rehabilitation Department.

Study design

Descriptive and prospective study with a follow up period of two years.

Patients

All patients subjected to surgical treatment of breast cancer who were referred to the Lymphedema's Unit of the Physical Medicine and Rehabilitation Department at the Universitary Hospital Doctor Peset between January and December 2012, were included. Those patients who were unable to complete the questionnaire or those who could not practice the exercise program were excluded.

Educational program

Educational program consisted in two parts:

The first part was a theoretical talk about physiopathology, risk factors, prevention and self-care of lymphedema (dietary guidelines, physical activity, skin care…) and, finally, a symposium was established among patients. Additionally, the patients were provided with a booklet with a general information about upper limb lymphedema which was developed by Conselleria de Sanitat de la Generalitat Valenciana: "Linfedema. Prevención y tratamiento"[6].

In the second part's program, a specialized physiotherapist taught the patients an exercise routine for implementation daily home.

Measuring instruments

Two questionnaires were used as measured instruments:

A self-administered questionnaire which contains 17 items and was developed by the investigators of Lymphedema's Unit. Sixteen items of it collect information about the level of knowledge of patients before and after the educational program, the adherence, the motivation regard to self-care, the upper limb functionality and the evaluation of the program by the patients. The item score ranged from 1 to 4 (1 is the minimum score and 4 is the maximal score). To assess aspects such as motivation or adherence, some questions are grouped, and results are given as the arithmetic mean. The final question is about the overall satisfaction of the educational program and scores between 1 and 10, being 10 the highest score.

The Quick DASH questionnaire was used to assess the upper limb disability. It contains 11 items about the upper limb limitations in daily activities with scores between 1 to 5 (1- no difficulty and 5- impossible to do it). The maximal score of questionnaire is 100% (inability to perform tasks with the upper limb) and the minimal 0% (without limitation).

These measures were taken 8 months on average after conducting "Lymphedema School". Two years after completing the educational program, the patients answered by telephone the Quick DASH questionnaire and the items about self-care and exercises adherence.

Study variables

To define the study sample was collected the age, study level, and type of work of the patients. The variables related to the breast cancer treatment were defined (type of surgery, lymph node excision, chemotherapy and radiotherapy) and variables related to lymphedema treatment too (presence or abscense of lymphedema, grade and stage of lymphedema and the treatment with physical complex therapy).

Data analysis

IBM SPSS Statistics version 20 for Macintosh programme was used. Descriptive stadistics and t-student test for indepents samples were used for the statistical analysis.

RESULTS

Sixty-six women were included in the study, with a mean age of 57.29 years old (36-89 years old). The patients without any education or only primary schools had 51.6%, 26.6% had secondary studies and 21.9% of patients had university studies (Table 1). Forty-six point nine per cent of women included in the study were housewife, 35.9% works outside the home and 17.2% were retired (Table 2).

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valids	Without education	9	13.6	14.1	14.1
	Primary education	24	36.4	37.5	51.6
	Secondary education	17	25.8	26.6	78.1
	University education	14	21.2	21.9	100
	Total	64	97	100	
Lossess		2	3	–	–
Total		66	100		

Table 1 - Level studies of patients. Descriptive statistics.

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valids	Housewife	30	45.5	46.9	46.9
	Work out-side home	23	34.8	35.9	82.8
	Retired	11	16.7	17.2	100
	Total	64	97	100	
Lossess		2	3	–	–
Total		66	100	–	–

Table 2 - Work activity of patients. Descriptive statistics.

At the baseline, 37.9% of patients had lymphedema (Grade I: 60.05% of all cases; Grade II: 28.04%; Grade III: 11.9%), 37.9% were diagnosed with subclinical lymphedema (pain o heaviness without increased volume in the arm) and 24.2% of women had no lymphedema (Table 3).

Disease	Percentage	Lymphedema grade	Percentage
Lymphedema	37.9	Grade I	60.05
		Grade II	28.04
		Grade III	11.9
Subclinic lymphedema	37.9		
No lymphedema	24.2		

Table 3 - Percentage of patients with lymphedema diagnosis and its grade. Descriptive statistics.

Surgical treatment of breast cancer who were subjected patients was lumpectomy in 45.5% of patients, modified radical mastectomy in 37.9%, harpoon conservative surgery in 13.6% and, only in one patient the surgery treatment was unknown. Axillary node resection was performed in 90.9% of cases. Furthermore, 77.3% received radiotherapy and chemotherapy was applied to 87.9% of patients (Table 4).

Breast cancer treatment	Percentage of patients
Lumpectomy	45.5
Modified radical mastectomy	37.9
Conservative surgery with harpoon	13.6
Unknown type of surgery	1.5
Lymph node excision	90.9
Radiotherapy	77.3
Chemotherapy	87.9

Table 4 - Percentage of different treatments for breast cancer approaching. Descriptive statistics.

The 66 patients included in the study filled out self-administered questionnaire elaborated by our Rehabilitation Department and Quick DASH questionnaire. Two years later, 57 women answered to self-administered questionnaire and 56 answered to Quick DASH (Table 5). The final losses within study were due to death of patients or relapse of breast carcinoma.

	Patients	Minimum	Maximum	Mean	Standard deviation
Previous knwoledge	66	1	4	2.89	0.97
Theoretical knwoledge post-program	66	2	4	3.37	0.48
Practical knwoledge post-program	66	2	4	3.54	0.47
Adecuation	66	2	4	3.43	0.55
Motivation	66	2	4	3.37	0.6
Upper limb functionality	66	1	4	2.94	0.75
Initial adherence	66	1	4	3.14	0.77
Adherence to 2 years	57	1	4	2.65	0.99
Initial Quick DASH	66	0	82	31.94	21.69
Quick DASH to 2 years	56	0	77	21.11	23.33

Table 5 - Initial and to 2-years scores on the adherence and satisfaction questionnaire and on the Quick DASH. Descriptive statistics.

According to data obtained through self-administered questionnaire, the knowledge about lymphedema previous to educational program were scarce (mean: 2.89 points), while information acquired with "Lymphedema School" was assessed as fairly (theoretical knowledge: mean 3.37 points; practical knowledge: mean 3.54 points).

Regarding the care applied to the upper limb and learned exercises, the patients referred perform them, at least every other day, in the first visit after educational program. The baseline adherence was 3.11±0.78 and it decreased to 2-years after educational program (2.65±0.99; p=0.00). At baseline, the patients with lymphedema had a greater self-care adherence (3.4±0.56) than patients without lymphedema (2.99±0.84; p=0.02). However, there was no statistically significant difference in adherence among patients with lymphedema and without lymphedema to 2-years (Patients with lymphedema: 2.69±0.95; Patients without lymphdema: 2.63±1.05; p=0.81) (Table 6).

		Patients	Mean	p-value
Initial adherence	Without lymphedema	41	2.99	0.02
	With lymphedema	25	3.4	
Adherence to 2 years	Without lymphedema	36	2.63	0.81
	With lymphedema	21	2.69	

Table 6 - Average adherence at baseline and after 2 years of having performed the educational program. T-student for independent samples.

The patients assessed the educational program and they concluded that it to meet the secondary requirements after cancer breast surgery, obtaining a very good suitability (mean: 3.43 points).
The motivation of the survivors regarding the conduct of exercises and self-care had a high score, with a mean of 3.37 points.
The women assessed the upper limb functionality was good (mean: 2.94 points).
The upper limb disability degree assessed by Quick DASH questionnaire showed that the disability of 66 patients at baseline was 31.93% (rank 0-82%). Fifty-six women assessed the mean of disability to 2-years was 27.11% (rank 0-77%) (Table 5).
The patients satisfaction level regarding the educational program was evaluated with equal score or higher than 5 for all cases. Eighty-one point nine per cent of women scored 8 or more points, and 40.9% of these, scored 10 points educational program (Figure 1).

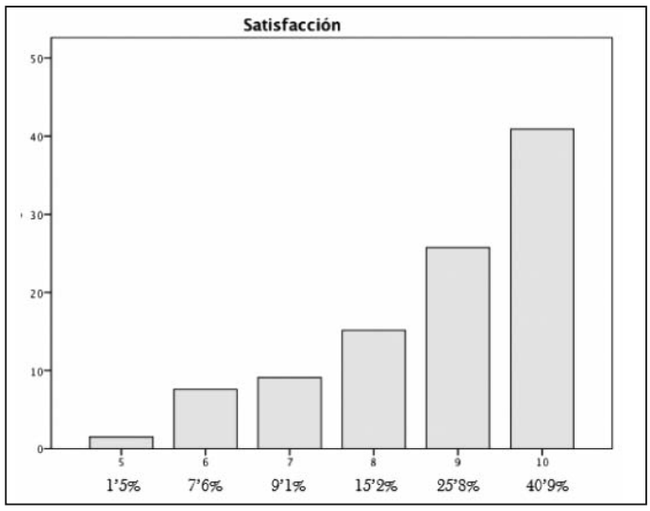

Figure 1 - Patient's level satisfaction after the educational program.

DISCUSSION

Lymphedema management after curative breast cancer treatment requires the application of measures to prevent its appearance and to control its progression. Therefore, it is extremely important that breast cancer survivors have enough knowledge about this disease and about daily care recommendations [9]. Accordingly, it is outstanding how patients are informed about the lymphedema pathology (definition, symptomatology, alarm signs, management), being informed by health care professionals in most cases (oncologist, surgeon, nurse, physiotherapist) [9,22,24]. Moreover, benefits of global and upper limb physical activity after breast cancer surgery have been studied. The exercise, even if it has an early or late onset, improves the pain, the mobility and the strength of the upper limb, as well as the quality of life perceived by the patients. It also decreases the volume of the arm in patients with established lymphedema, and it does not increase its incidence if there is not established lymphedema [1,13,14,20,21]. All this items have been referred in our educational program, so that the rehabilitation doctor provided to the patients the required information about lymphedema aspects and the management advices needed, and upper limb exercises were instructed by a physiotherapist.
In this study, previous knowledge about lymphedema after surgery in breast cancer survivors was limited, even if the oncologist or the surgeon evaluated them before being sent to Rehabilitation. However, after assisting to the "Lymphedema School", patients admitted that they obtained more information than they had before. That results are similar to the ones obtained in another studies (Aly Hagrass *et al*., 2012; Brown *et al*., 2014). After an implementation of a health program about lymphedema, there was a remarkable improvement in their knowledge comparing with previous. This fact shows that information provided by experts in this field (rehabilitation doctor, physiotherapist) facilitates the comprehension of the given information to the patients.
Revising the published literature, few adherence studies have been found, which can be defined as "the percentage of time that the patient spends on doing the self-care activities according to the frequency recommended by the professional" (Brown *et al*., 2014). In some studies, the adherence is defined as the rate of the attendance to the exercise sessions of the programme, and it is estimated that in most of the cases it is about the 80% of the sessions [1,2,12,20,21]. In a recent study [4], the therapeutic adherence was studied on 10 modalities of lymphedema treatment, collecting the data at the beginning, and on the next 3, 6 and 12 months, using the questionnaire made by themselves. It was observed that, after a following 12-months period, the modality who obtained more adherence was the skin care (adherence > 75%), while the manual drainage and the use of a bomb compression were the ones that had less frequency. In general terms, the 63% of the patients had an adherence over 50%. These findings are closed to the ones obtained in our study, in which it is determined that the patients did the proposed recommendations at least two days per week. In the other hand, the factors that can influence on the adherence on patient's lymphedema treatment recommendations were evaluated on a recent study (Sherman *et al*., 2015). They concluded that a good knowledge of the disease, a good capacity of stress management and a high self-efficacy to accomplish the auto self-cares, were factors that improved the adherence.
Upper limb functionality was evaluated in our study using the Quick DASH questionnaire. The functionality rose after the educational program, and it kept the improvement after 2 years of it's performance. Studies that evaluated the subjective upper limb disability by patients after the program assistance were not found. Nevertheless, there is information about global quality of life, and an improvement after the exercise program has been observed [2,10-12,18].
A new feature from the study is the assessment of the level of satisfaction of the patients after assisting to the "Lymphedema School". It has been important to know how patients evaluated the given information, so the professional's role could be determined too. As the results have been shown, patients were very satisfied after the program. That could be related with the knowledge improvement, the good adherence to the program and the adequate functionality of the patient upper limb after performing the Lymphedema School.
One of our study limitations is the lack of the validation of the used questionnaire. That can limit the comparison between our results and another results obtained previously. At this point, it

has to be mentioned the lack of unification on the used questionnaires [2,3,10,11,15,16,18] or their lack to value the level of patients knowledge and the adherence, as well as another variables related with the functionality and the quality of life. These limitations have been found in another published studies [2,4]. It is necessary, for the next future studies, a bigger sample, to think on checking the patients more frequently, and the obtainment of another variables in the study, like the range of motion of the shoulder and the quality of life.

CONCLUSIONS

Educational program is useful to increase the knowledge of patients about lymphedema.
Breast cancer survivors continued with the self-care performing after 2 years from attending the program "Lymphedema School".
Patients with lymphedema had a higher initial adherence than the patients free of disease. In addition, the functionality of the upper limb after breast cancer surgery was good, and, a slight improvement in the same upper limb was appreciated after 2 years.
To conclude, the patient's level satisfaction after the educational program was high and, in any case, the level of satisfaction was valued negatively.

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LESION OF THORACIC DUCT: CLINICAL CASE REPORT

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ABSTRACT

Introduction: Chylous leakage is a relevant clinical problem after major abdominal or thoracic surgery. Literature report an incidence of chylous leakage of about 7%. An accurate diagnostic study is indispensable to plan the correct therapeutic approach. Surgical and interventional approaches are reserved for cases refractory to conservative treatment.

Clinical presentation: In July 2014, a 76-year-old male was diagnosed with locally advanced adenocarcinoma of the gastroesophageal junction. After chemotherapy, in November 2014 an Ivor Lewis esophagectomy was performed. After 1 month the patient developed a massive chylous ascites. Initially he underwent conservative treatments. An accurate diagnostic study with lymphangio-CT (LAG-CT) showed the chylous leakage at the lower third of the thoracic duct. Different attempts of embolization of the chylous leakage were carried out but the ascites and the metabolic imbalance persisted. On February 2015, a laparotomic approach was performed and the chylous leakage was confirmed with a fatty meal and treated with non-absorbable suture material and platelet gel.

Results: The patient was followed up clinically and instrumentally (with echo-scan and TC) for 6 months postoperatively. Lab tests demonstrated a progressive improvement of the metabolic and immunologic conditions. No recurrence of chylous ascites appeared.

Conclusions: According to Authors' experience, LAG-CT represents the gold-standard in the diagnostic work-up in patients affected from thoracic duct lesions. Angio-radiologic approach is a valid solution but not always successful, especially for extensive damages of the thoracic duct.
The surgical approach remains the last therapeutic solution for chyloperitoneum refractory to non-operative treatment and more recently it is efficaciously associated with the use of platelet gel or fibrin glue.

Keywords: thoracic duct lesion, chyloperitoneum, chylous ascites, chylous leakage, therapy.

INTRODUCTION

Also thanks to the anatomic studies by Miguel Amore on cadavers [1], many clinical findings could recognize a precise explanation. In fact iatrogenic injuries are more common in patients with malformation of the thoracic duct, that presents a normal aspect only in 60% of patients.
From the epidemiologic point of view, thoracic duct injuries can be divided into traumatic and non traumatic forms. Different causes can determine disruption of the thoracic duct, such as traumas, tumors or infections but iatrogenic lesions, and above all surgery, representing the 80% of the traumatic ones, are more common [2-5]. Literature reports an incidence of thoracic duct injuries following esophagectomy for carcinoma variable from 0,6 and 9% [6-10].

CLINICAL PRESENTATION

A 68-years-old male presented with dysphagia to solids and weight loss. Past medical history was not significant. Endoscopy revealed an esophageal carcinoma of the lower third. Treatment with a cycle of Cisplatinum and 5-FU was followed by an Ivor-Lewis Esofagectomy. A feeding jejunostomy was fashioned during the abdominal stage. After about 20 days, the patient was discharged from the hospital without any relevant morbidity.
One week later he was readmitted in hospital due to the occurence of chylous ascites with vomit and dyspnoea. Investigations demonstrated the presence of a remarkable ascites and a pigtail drain was inserted into the abdomen draining about 4 litres of chyle. The patients also presented a dehiscence of the surgical wound at the dorsum that required the use of vacuum therapy. A conservative treatment started and It consisted in total parenteral nutrition, administration of Octreotide, diuretic. Several peritoneal lavages with sclerosing solutions (Tremollieres solution and Rifocin) were performed.
Conservative treatment continued for over 3 weeks but there was no reduction of the chylous output so we performed a bipodal CT-Lymphangiography. Thanks to that, it was possible to localize

topographically the site of the leakage because lymphangiography demonstrated the lesion of the thoracic duct at its distal third (Fig. 1). The following step was a percutaneous embolization of the lesion with Cyanoacrylate glue, but this therapeutic temptative was not successful, and a second step was done with the same technique 1 week later. The contrast medium showed the site of chylous leakage at the chylous cyst but also this second step did not bring any result and therefore the third embolization step was done using also metal coils.

After 15 days the patient was addressed to surgery because he was not responsive to these interventional approaches. After the administration of a fatty meal, the surgical approach revealed the presence of remarkable scarring tissue at esophageal iatus and the site of chylous leakage from an extensive area with cribrous aspect of the tissues.

The operation consisted in cleaning the surgical area and closing the leakage sites with surgical stitches. Several lavages with sclerosing agents were performed. At the end, fibrin glue was placed in the surgical field (Fig. 2 a and b) and 2 drainage tubes were left. After 2 weeks from surgery, a further injection of fibrin glue was done through the drain tube, to better seal the area and finally to stop the chylous leakage.

RESULTS

The chylous output significantly decreased after starting conservative therapy, but above all after surgery and after the second application of the fibrin glue (Fig. 3). The follow up period was 1 year. The patient was studied with ultrasonography and blood tests: there were neither clinical nor instrumental signs of chylous ascites. He reached a good metabolic balance and the healing of the ulcerative lesion of the dorsum.

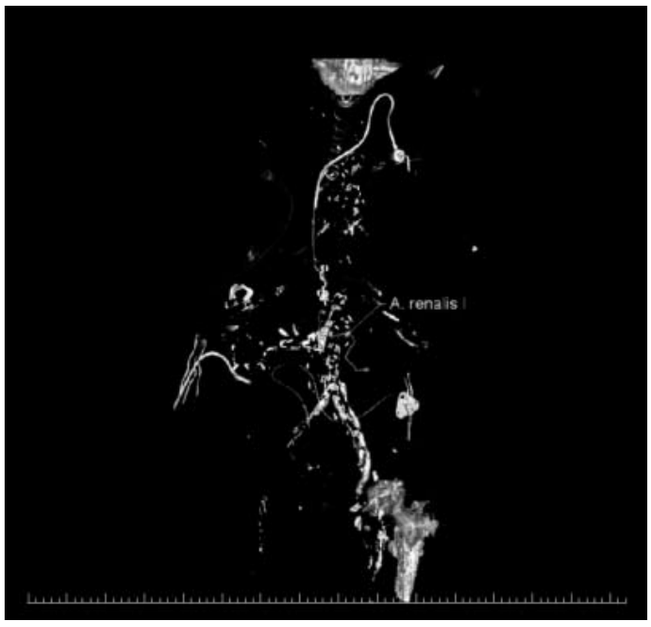

Fig. 1 - Lymphangio-CT shows the exact site of chylous leakage.

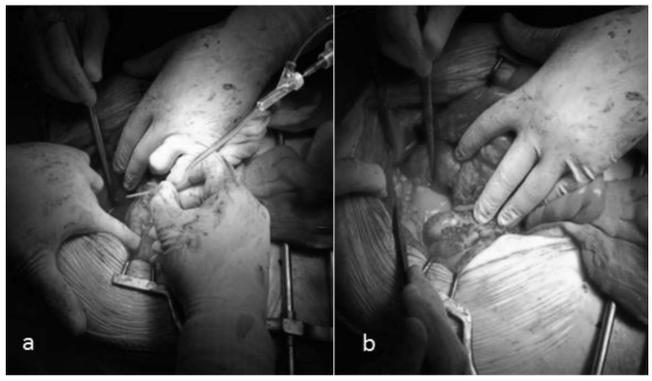

Fig. 2 - At the end of the surgical approach, the fibrin glue is used (a) to seal the surgical area (b).

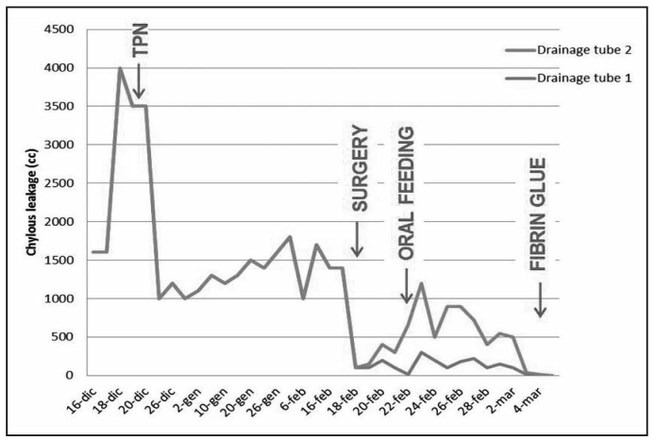

Fig. 3 - Graphic representation of chylous leakage.

DISCUSSION AND CONCLUSIONS

Our protocol for the investigation of chylous disorders usually includes paracentesis or thoracentesis, depending on whether the problem relates to the chest or the abdomen (chylothorax or chylous ascites), to confirm the diagnosis and to analyse biochemically the lymphatic leakage.

Lymphoscintigraphy and SPECT-CT are performed for a functional study. Lymphangio-MR is useful but does not always indicate precisely the accurate and topographic situation of the splancnic area.

Lymphangio-CT is the gold standard because it allows a more accurate assessment of disease extension, as well as the site of the obstacle and source of chylous leakage. 3D-CT scan allows to point out relations between lymphatic-lymph nodal structures and skeletal apparatus, bringing about precise information about the site of chylous dysplasia and/or fistulas.

Although conventional lymphangiography (LAG) can be performed in 2 different ways [11], according to our protocol we use liposoluble ultrafluid contrast (Lipiodol Ultrafluid) injected after isolation and cannulation of the lymphatics of the dorsum of the foot with microsurgical technique. Although lymphangiography performed with bipodal microsurgical technique allows to assess

lower limb lymphatics and nodes, it is a longer and more difficult technique, requiring also skin incisions. On the other hand, intranodal lymphangiography is faster, technically easier but can cause nodal disruptions. In both cases, lymphangiography can also have a therapeutic role when associated with embolization [12-13], but also by itself, because Lipidol can have sclerosing effects on lymphatics, obtaining the closure of lymphatic fistulas in patients with chylous leakage [14].

For better recognition of chyliferous vessels, the administration of a fatty meal (60 g of butter in 200 ml of milk) might be useful 4-5 hours before surgery.

These kind of disorders are initially treated with non operative procedures, as it is also reported in literature [15]: the combination of TPN, MCT oil and Octreotide allow to obtain the resolution of most of the cases.

These conservative methods let the patient reach a good metabolic balance and immunologic competence.

For non responsive cases, laparoscopy and thoracoscopy can be used to treat the disease. Surgical treatment consists in cleaning of the area, removing fibrotic tissue and closing the leaking area. Platelet gel and fibrin glue (which is preferred in patients with history of tumors, for oncological reasons) allow to obtain a proper healing of the tissues, to prevent lymphatic complications and to reduce the period of persistence of the surgical drain [16-17].

If the pathology relapses, notwithstanding the surgical treatment, it is possible to use peritoneo-venous shunt or to perform pleurodesis.

In conclusion, Thoracic duct injury may result from different iatrogenic injuries or from other kind of obstructions. As regards surgical causes, thoracic duct injury is an uncommon complication of esophagectomy. The reported incidence after this kind of surgery varies between 0.6% and 9%.

Chylous leakage requires an early intervention, for this reason diagnostic plays an important role.

Lymphangio-CT is the main diagnostic investigation that can supply precise topographic information about the site of the chylous leakage allowing to perform surgical and interventional approaches that should be reserved only for cases that are refractory to conservative treatment.

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