ISSN 0778-5569

OFFICIAL ORGAN
OF THE

EUROPEAN GROUP OF LYMPHOLOGY
LATIN-MEDITERRANEAN CHAPTER OF ISL
SOCIETÀ ITALIANA DI LINFANGIOLOGIA
CZECH SOCIETY OF LYMPHOLOGY
ROMANIAN SOCIETY OF LYMPHOLOGY
GREEK SOCIETY OF LYMPHOLOGY

THE EUROPEAN JOURNAL OF lymphology

and related problems

VOLUME 29 • No. 76 • 2017

INDEXED IN EXCERPTA MEDICA

SUMMARY

43rd European Congress of Lymphology

26-27 May, 2017

In cooperation with the Society of German Speaking Lymphologists

under the auspices of the International Society of Lymphology

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.

Topics
The topics include:
- anatomy and anatomopathology
- physiology and physiopathology
- pharmacology
- diagnostic methods (conventional radiology, nuclear medicine, ultrasonography, computed tomography, biopsy, nuclear magnetic resonance)
- therapy (surgery, medicine, radiotherapy, physical)
- oncology (primary lymphatic system diseases, lymphonodal metastatic process)
- immunology
- post-therapeutic complications
- upper and lower limb edemas

Manuscripts publications
Submitted manuscripts will be published in the form of Editorial, Review article, Original article, Teaching article, Special article, Work in progress, Case Report, Short Communications, Letter to the Editor (in English), Abstract (in English)

They will be subdivisided in Clinical and Basic Sciences.

Send manuscripts to:
the Executive Editor

Dr. S. MICHELINI
Department of Vascular Rehabilitation
S. Giovanni Battista Hospital
Via L.E. Morselli, 13 - 00148 Rome, Italy
Tel. +39 06 655961 - Fax +39 06 65596235
e-mail: sandro.michelini@fastwebnet.it

The Editor-in-Chief

Prof. Dr. F. BOCCARDO
Department of Surgery, Lymphatic Surgery and Microsurgery
S. Martino Hospital, University of Genoa
Largo R. Benzi, 8 - 16132 Genoa, Italy
Fax 0039010532778 - e-mail: Francesco.boccardo@unige.it

Associate-Editors also can receive and promote articles and start the review process.

Publications languages
Official language of the Journal is English.

Publication rate
The EJLRIP is published on a quarterly basis.

Subscription rates - All members of European Group of Lymphology or of National societies (with which the ESL has a cooperation agreement and whose fee includes a subscription to the EJLRP) receive the Journal free of charge.
Subscription rate for non-members is:
- for all issues, 30 € within European Countries, 50 € elsewhere,
- for single issue, 15 € within European Countries, 18 € elsewhere.

Annual subscription rate of ESL: 80 €

Please make cheque (in euro) to order of the ESL and to be sent to the Treasurer of the ESL: Mr J.P. BELGRADO, Treasurer of the ESL, Service de Kinésithérapie, Avenue Paul Héger, 28, OF 168, 1050, Brussels, Belgium.
E-mail: **belgrado@ulb.ac.be** or transfer the corresponding amount on the following Bank Account of the ESL n. 210-0557380-70 N° IBAN BE60 2100 5573 8070 BIC GEBABEBB (Générale de Banque), with mention of your name and of the year(s) subscription.

Change of address - Please notify the Secretary and the Treasurer of the ESL of any change of address and telephone number at least 30 days prior to the issue date by sending both the old and new address.

Data base & Traesurer of the ESL - J.P. BELGRADO: Université Libre de Bruxelles, CP 168, Av. F.D. Roosevelt, 50, 1050 Bruxelles, Belgium. Tel. +32 2 650.24.34 - Fax: +32 2 280.13.33 - Mobile +32 475 63.34.34

Business communications - Business communications concerning advertising, subscriptions, change of address, and permission requests shoul be sent to the Secretary, O. LEDUC, Service de Kinésithérapie, Avenue Paul Héger, 28 CP 168, 1050 Brussels, Belgium. Tel. (32) (2) 650.24.70 - Fax: (32) (2) 650.24.73.
Advertisements are subject to editorial approval and restricted to products or services pertinent to lymphology.
Advertising rates can be obtained from the Secretary and Treasurer.

Miscellaneous - The use of general descriptive names, trade names, trademarks, etc., in the publication, even if not specifically identified, does not imply that these names are not protected by the relevant lows and regulations.
While the advice and information in this Journal is believed to be true and accurate at the date of its going to press, neither the authors, the Editors, nor the publisher can accept any legal responsability for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.
The Editors do not accept any responsability for opinions that may be made by the authors.

Areas of distribution - Austria, Belgium, Czech Republic, Denmark, Egypt, France, Germany, Greece, Holland, Hungary, Israel, Italy, Japan, Norway, Poland, Portugal, Rumania, Russia, Spain, Sweden, UK, USA.

Graphics: Duògrafi, Rome - Printed by Arti Grafiche srl, Pomezia (Rome)

Instructions to authors

General

Submission of an original article implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out (including ethical committees and national licencing authorities); that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.

Manuscripts should be submitted in triplicate (original and two copies); they should be double-spaced, with wide margins on one side of the paper only, and should be carefully prepared in the style of this journal and checked before submission. Typing errors should be corrected legibly.

All manuscripts are subject to copy editing and, if necessary, will be returned to the authors for open questions to be answered or for missing information to be supplied before being sent to the printers. When extensive corrections are necessary, authors are responsible for having manuscripts retyped.

Pages should be consecutively numbered, starting with the title page. The desired position of figures and tables should be marked in the margin.

Changes in the proofs should be kept to a minimum: a charge will be made for changes introduced after the manuscript has been set in type.

Organization of the manuscript

The speed of publication depends greatly upon following these guidelines precisely.

1. The manuscript should be divided clearly into an Introduction, Materials and Methods, Results, Discussion and Conclusion and References. The text should be concise and consistent as to spelling, abbreviations, etc…

2. The **title page** should include the title of the work, first and last name(s) of author(s), name of institution, any footnotes referring to the title (marked with an asterisk), and the address of the author to whom the proofs are to be sent.

To facilitate communication between the authors, editors and publisher, the author should furnish a **telex** or **fax number** on the title page of the manuscript.

3. The **abstract** should be a summary of the hypothesis or aims of the work, the basic material and methods and the conclusion of the study.

4. Immediately following the abstract, up to 7 relevant **key words** should be sypplied for subject indexing.

5. **Footnotes**, other than those refering to the title heading, should be numbered consecutively.

6. The accuracy of the **References** is the responsibility of the authors.

The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications should be mentioned in the text only. The list should be in alphabetical order according to the first author's name. Works by two authors should be listed alphabetically according to the second author's name, then chronologically; those by three or more authors should be in chronological order. References should be styled as follows.

Biancos J.A., Eimaleh D.R., Leppo Jl.A. (1986) Effect of glucose and insulin infusion on the myocardial extraction of a radioiodinated methyl-substituted fatty acid. Eur. J. Nucl. Mad. 12: 120-124.
Gullberg G.T., Malko J.A., Eisner R.L. (1983) Bounday determination methods for attenuation correction in single photon emission computed tomography. In: Esser PD (ed). Emission computed tomography: current trends. Society of Nuclear Medicine, New-York, pp. 33-53.
Meltzer YL (1971) Hormonal and attractant pesticide technology. Noyes data, Park Ridge, New Jersey.

Citations in the text should be given in parentheses (Child 1941; Godwin and Cohen 1969; MacWilliams et al., 1970), except when the author is mentioned, as in "and the study of Hiliman and Tasca (1977)".

7. **Tables** should be submitted on separate sheets. Numerical data given in graphs and tables must not be duplicated.

8. All **figures**, whether photographs, graphs or diagrams, should be numbered consecutively throughout and submitted on separate sheets. Plate layouts or single figures may either match the width of the column (9 cm) or be 11.8 cm in width with the legend at the side. The maximum height for a figure or plate is 23 cm, including the legend printed at its foot. Photographs can be grouped into plates. They must be mounted on regular bond paper, not on cardboard.
All photographs and electron micrographs should be supplied as high-contrast glossy prints trimmed at right angles. Inscriptions on illustrations should allow for reduction if this is necessary; figures and letters should have a final height of 2 mm after reproduction.
Color illustrations will be accepted: however, the authors will be expected to make a contribution (approximately BF 7.500 per page) to the additional costs involved.

9. Typewritten **mathematical equations** should be clear, so that there is no opportunity for misinterpretation by the printer.

All letters contained in formulae as well as single letters in the text are automatically set in italics and therefore require no underlining. Hence, abbreviations that appear in formulae and are to be set in roman type (the type normally used for the text) should be specially marked by underlining in yellow, if possible.

It will be helpful to the printer if *Greek characters are underlined in red and script in green*. Lowercase letters should then be underlined once and capital letters twice; this applies also to Latin letters in formulae (in pencil). Boldface type (heavy type) should be marked by wavy underlining.

Subscripts and superscripts should be indicated by an inverted caret below the line, or a caret above the line, respectively: 12 12; a subscript to a subscript is styled: 12.

Obscure primes and dots must be clarified for the printer. The following must be differentiated clearly: number 1 and letter l; zero 0 and letters O, o, e, c, n, u, v, primes and apostrophes. Fractional exponents should be used in, stead of root signs and the solidus (/) for fractions whenever they are horizon. tal; an exp notation must be numbered sequentially in arabic numerals in parentheses on the right-hand side of the page.

10. Fifty (50) *offprints* of each paper with additional copies are available in lots of 100, (provided the order is teceived with the corrected proofs) may be supplied charged to the authors.

11. Enclose the picture of the first author of each article.

43rd European Congress of Lymphology

May 26-27, 2017

Stuttgart, Germany

In cooperation with the Society of German Speaking Lymphologists under the auspices of the International Society of Lymphology

Mail: contact@esl2017.com

THE EUROPEAN JOURNAL
OF
lymphology
and related problems
VOLUME 29 • No. 76 • 2017
INDEXED IN EXCERPTA MEDICA

E.S.L.
European Society of Lymphology

43rd European Congress of Lymphology

May 26th-27th, 2017 – Stuttgard, Germany

Congress Venue:

Wöllhaf Konferenz- und Bankettcenter
Stuttgart Airport
Im Zentralgebäude, Terminal 1, Ebene 4

Congress President:
Prof. Dr. med. Etelka Földi

Co-President:
Prof. Dr. med. R. Baumeister

Organisation:
C. Neubronner, A. Schinner

Local Organizing Committee

Albrecht, E.
Baumeister, R.
Döller, W.
Felmerer, G.
Földi, E.
Földi, M.
Oberlin, M.
Reißhauer, A.
Rößler, J.
Schacht, V.
Wagner, St.
Wilting, J.
Ure, Ch.

International Organizing Committee

Amore, Miguel Angel
Andrade, Mauro
Belgrado, Jean Paul
Boccardo, Francesco
Bourgeois, Pierre
Brorson, Hakan
Brun, Jean Patrice
Campisi, Corradino
Dimakakos, Evangelos
Eliska, Oldrich
Forner, Isabel
Leduc, Albert
Leduc, Olivier
Liu, Ningfei
Manokaran, Gurusamy
Michelini, Sandro
Ohkuma, Moriya
Okada, Eikichi
Olszewski, Waldemar
Papendieck, Christoph
Pissas, Alexandre
Thibaut, Gilbert
Witte, Marlys

ESL Executive Committee

Distinguished Honorary President:	Leduc Albert *(Belgium)*
President:	Boccardo Francesco *(Italy)*
Vice-Presidents:	Baumeister Rudiger (*Germany),* Földi Etelka *(Germany)*
Secretary:	Leduc Olivier *(Belgium)*
Treasurer:	Belgrado Jean Paul *(Belgium)*
Scientific Committee President:	Bourgeois Pierre *(Belgium)*
Scientific Committee Vice President:	Dimakakos Evangelos *(Greece)*
Members	Brorson Hakan *(Sweeden)*
	Brun Jean Patrice *(France)*
	Campisi Corradino *(Italy)*
	Cestari Marina *(Italy)*
	Eliška Oldrich *(Czech Rep.)*
	Forner-Cordero Isabel *(Spain)*
	Hamadé Amer *(France)*
	Johansson Karin *(Sweden)*
	Leduc Albert *(Belgium)*
	Michelini Sandro *(Italy)*
	Moneta Giovanni *(Italy)*
	Olszewski Waldemar *(Poland)*
	Papendieck Cristobal *(Argentina)*
	Pissas Alexandre *(France)*
	Riquet Marc *(France)*
	Thibaut Gilbert *(France)*
	Wald Martin *(Czech Rep.)*

ISL Executive Committee

Past President:	Hakan Brorson *(Sweeden)*
President:	Ningfei Liu *(China Rep.)*
President Elect:	Sandro Michelini *(Italy)*
Secretary-General:	Marlys H. Witte *(USA)*
Treasurer:	Alexandre Pissas *(France)*
Members	Miguel Amore *(Argentina)*
	Mauro Andrade *(Brazil)*
	Ruediger Baumeister *(Germany)*
	Francesco Boccardo *(Italy)*
	Corrado Cesare Campisi *(Italy)*
	Evangelos Dimakakos *(Greece)*
	Karin Johansson *(Sweden)*
	Stanley P.L. Leong *(USA)*
	Gurusamy Manokaran *(India)*
	Moriya Ohkuma *(Japan)*
	Eikichi Okada *(Japan)*
	Andrzej Szuba *(Poland)*
Advisory Committee:	Corradino Campisi *(Italy)*
	Cristobal Papendieck *(Argentina)*
Auditors:	Alberto Macciò *(Italy)*
	Makoto Mihara *(Japan)*

Lymphology between disciplines

Regardless of which part of the lymph drainage system is affected, homeostasis in the affected tussue is disturbed with secondary pathophysiological and pathomorphological alterations as a result, which then manifest as an independent illness. The most common disease is lymphedema affecting various parts of the body. This means, that diseases of the vascular system, when left untreated, lead to a chronic diseased condition of the connective tissue. The question is raised: Is Lymphology to be defined as a study of vascular disease, as with the veins and arteries, and lymphedema as a symptom, as fever is with inflammatory processes; or is it an independent disease of the connective tissue. According to the WHO definition, lymphedema is a chronic disease which progresses with severe complications without adequate therapy.

Due to the two-sided nature of clinical lymphology, lymphedema is associated with several medical disciplines, such as Angiology including vascular surgery, Dermatology, Phlebology and Internal Medicine. A further handicap for Lymphology is the absence of valid diagnostic measures. Therapy is conservative in most cases, and surgical for a small subset of patients. Widely used treatment methods have not yet undergone sufficient meta-analysis of multiple studies which have been adequately rigorous, well-controlled, and with sufficient follow-up. Satisfactory studies comparing different methods of treatment do not exist. It is also worth considering that a combination of therapies may be the best for some patients, but these combinations are studied even less frequently in comparison trials.

The unusual structure of the 43rd Congress of the European Society of Lymphology has been chosen with the aim of establishing where we are with regards to diagnostic measures and therapeutic forms, and in which direction future theoretical and clinical research work should be focussed. A further aim is to conduct multicentric studies according to strict clinical parameters and to attract sufficient numbers of patients for trials.

Professor Dr. med Etelka Földi
Congress president

THE EUROPEAN JOURNAL
OF
lymphology
and related problems
VOLUME 29 • No. 76 • 2017
INDEXED IN EXCERPTA MEDICA

SCIENTIFIC PROGRAM

Thursday, May 25th, 2017

17:00-18:00 **EXECUTIVE COMMITTEE MEETING**
18:00-20:00 **WELCOME EVENING**

Friday, May 26th, 2017

07:30-08:30 **REGISTRATION**

08:30-09:00 **OPENING CEREMONY**

WELCOME MESSAGE: E. Földi, F. Boccardo

The history of lymphology in Europe: A. Pissas

09:00-10:30 **SESSION I**
Chairmen: M. Witte, R. Baumeister, W. Olszewski

09:00-09:30 **New insights into the pathomechanisms of lymphedema and potential new therapies**
M. Detmar

09:30-09:50 **Morphological and molecular characterization of human lymphatic collectors and initial lymphatics**
J. Wilting

09:50-10:10 **Hereditary lymphedema in italien families; genetic of lymphedema, background and future**
Michelini S., Cardone M., Maltese P., Bruson A., Fiorentino A., Bertelli M.

10:10-10:30 **Abnormal mural cell recruitment in lymphatic capillaries: a common pathological feature in chronic lymphedematous skin**
Ningfei Liu Zi-You Yu Di Sun Yi Luo

10:30-11:00 **Coffee break**
Medi product presentation

Friday, May 26th, 2017

11:00-12:30 **SESSION II**
Chairmen: S. Michelini, J. Wilting, M. Detmar

11:00-11:15 **Immunhistological observation of lymphatic and blood vessels of the heart with special reference to signal conduction systems**
E. Okada

11:15-11:30 **Actual research on lymphatic pump of the hand**
M. Amore

11:30-11:45 **Lymphangiogenesis, inflammation and fat deposit in lymphedema**
M. Andrade

11:45-12:00 **Recent findings on inflammation in lymphedema**
W. Olszewski

12:00-12:15 **Interleukin-10 in secondary lymphedema**
M. Ohkuma, T. Kanda

12:15-12:30 **Lymphatics of the wounds and tattoo. Preliminary study**
O. Eliska

12:30-13:30 **Lunch break**
Jobst product presentation for night compression
Executive committee meeting

13:30-15:30 **SESSION III**
Chairmen: N. Liu, A. Leduc, M. Wald

13:30-13:45 **Altered lymph vessels and altered tissues in lymphedema may need different interventional approaches**
R. Baumeister

13:45-14:00 **Treatment of breast cancer related lymphedema: CDT and microsurgery**
N. Adriaenssens, A. Zeltze, Ch. Kerkhove, W. Hui, J. De Grève, M. Hamdi

14:00-14:20 **Tattoo pigments**
V. Schacht

14:20-14:30 **Do we need education and training in Lymphology? Who is the lymphologist?**
E. Dimakakos

14:30-14:45 **Impaired cell-mediated immunity in lymphoedema and its possible impact on cancer metastasis formation**
G. Szolnoky, J. Oláh, H. Öcsai, A. Dobozy, L. Kemény

14:45-15:00 **Early detection of secondary lymphedema after ancer treatments**
Belgrado J.P., Vandermeeren L., Vankerckhove S., Valsamis J.B., Hertens D., Beier B., Etbaz S., Carly B., Liebens F.

15:00-15:15 **Chronic lymphatic skin ulcers and acute lymphangitis (diagnosis and treatment)**
A. Macciò

15:15-15:30 **The role of night garment in the optimization of lymphedema management during the first three months of maintenance after intensive treatment**
I. Quere

15:30-16:00 **Coffee break**
Product presentation "Competent treatment of lymphoedema with Juzo products"

16:00-18:40 **SESSION IV**
Chairmen: K.P. Martin, W. Döller, M. Cestari

16:00-16:15 **The importance of clinical examination in lymphostatic diseases**
M. Oberlin

16:15-16:35 **The relevance of the functional and different imaging modality methods for diagnosis and treatment of lymphedemas for surgeons and physiotherapists**
P. Bourgeois

16:35-16:50 **Analysis of the sensitivity of various methods of edema measurement**
O. Leduc

16:50-17:05 **Lymphoscintigraphic assessment as a therapeutic guidance for lymphedema treatment**
R. Barbieux, S. Doyenard, A. Pluska, K. Enciso, M. Roman, M. Hardy, O. Leduc, A. Leduc, P. Bourgeois, S. Provyn

17:00-17:25 **The importance of volume measurement in management of extremity edema**
M. Jünger, H-J. Thomä

17:25-17:40 **Elastosonography: a new ultrasonic technique for estimation and imaging of the elastic properties of lymphoedematous tissues**
A. Onorato

17:40-17:50 **Manual Lymph Drainage in an Allogeneic Stem Cell Transplant Recipient with Cutaneous Graft Versus Host Disease: A Case Report**
Kadirhan Ozdemir, Burak Erturk, Tugce Duman, Miray Haspolat, Ilke Keser P, Zeynep Arzu Yegin

17:50-18:00 **The effect of receiving chemotherapy and radiotherapy on severity of lymphedema**
Sinem Suner Keklik, Miray Haspolat, Nevin Atalay Guzel, Ilke Keser, Tugce Duman, Ozge Petek Erpolat

18:00-18:10 **Treatment of lymphedema in case of complications**
Anatoliy A Larionov, Aleksandr I Chernookov, Marina Berezko, Evgeniy S Silchuk

18:10-18:20 **Psychological aspects of complex rehabilitation of patients with lymphedema**
Kurtanova Y.E., Makarova V.S., Makarov I.G.

18:20-18:30 **Complex decongestive physiotherapy after liposuction surgery in primary lymphedema: A case report**
Miray Haspolat, Kadirhan Ozdemir, Burak Erturk, Tugce Duman, Ilke Keser, Dilek Erer

18:30-18:40 **Peripheral lymphedema in a patient with rheumatoid arthritis**
V. Breznik

20:00 **Gala dinner**

Saturday, May 27th, 2017

08;00-08:30 **REGISTRATION**

08:30-09:00 **Bauerfeind product presentation**

08:30-10:45 **SESSION V**
Chairmen: G. Felmerer, O. Eliska, Corradino Campisi

08:30-08:50 **An overview of the treatment of primary and secondary lymphatic diseases. The effort of the ESL to put some order**
F. Boccardo

08:50-09:05 **Inguinal lymphatic surgical bypass to a contralateral p=0 venous system in pediatrics**
C. Papendieck, M. Amore, R. Martinez Allende

09:05-09:20 **Single-site superficial and deep multiple lymphayic venous anastomoses Genoa procedure gives the best long-term clinical outcomes for an effective and early surgical treatment of peripheral lymphedema**
Corradino Campisi

09:20-09:35 **Microsurgery concept in chronic lymphedema Recent approaches in Göttingen**
G. Felmerer

09:35-09:50 **New surgical innovayions for advanced stages of peripheral lymphedema**
Corrado Cesare Campisi

09:50-10:05 **A reliable therapeutic approach to the secondary lymphedema: BLAST – Barcelona Lymphedema Algorithm for Secondary Lymphedema**
J. Masia

10:05-10:20 **The importance of additive plastic surgery procedures in the treatment of chronic lymphedema**
N. Torio

10:20-10:30 **Axillary lymphadenectomy and sentinel node dissection –** *Video with comment*
M. Wald

10:30-10:45 **Liposuction of the hand –** *Video with comment*
M. Wald

10:45-11:00 **Coffee break**

11:15-13:30 **SESSION VI**
Chairmen: M. Oberlin, J. Rößler, K. Johansson

11:15-11:30 **Innovative therapies for children with lymphatic malformation**
J. Rößler, E. Földi

11:30-11:45 **Protocol of lymphedema prevention after breast cancer: 3 years of follow-up**
M. Cestari

11:45-12:00 **Prospective surveillance, early diagnosis and treatment of patients at risk**
K. Johansson

12:00-12:10 **Lymphedema and sport – an overview of literature**
St. Wagner

12:10-12:20 **Lymphedema and its complications treatment (CDP with medical therapy)**
D. Corda

12:20-12:35 **Restauration of lymphatic function: free vascularized lymph node transfer with afferent lymphaticolymphatic and afferent lymphaticonodular anastomosis**
T. Aung

12:35-12:50 **Multimodality treatment for lymphoedema – my experience**
G. Manokaran

12:50-13:05 **Percutaneous sclerotherapy of lymphocele and lymphorrhea using povidone iodine: 12 cases**
A. Hamadé

13:05-13:20 **Lympha technique in preventing BCRL: our single-institution experience**
A. Busetto

13:20-13:30 **Close of the conference: discussion, questions and suggestions**

13:30-14:30 **GENERAL ASSEMBLY**

Saturday, May 27th, 2017

09:00-12:30 *Parallel Session*

Chairmen: E. Földi, J.P. Belgrado, G. Manokaran

09:00-09:10 **Effectiveness of conservative combined treatment in lipedema patients and clinical monitoring**
Michelini S., Cardone M., Cappellino F., Fiorentino A., Failla A., Moneta G., Zingaretti C., Cinti S.

09:10-09:20 **Italian Guidelines on Lymphedema: New public rules 2017**
Michelini S., Cestari M., Ricci M., Leone A., Galluccio A., Cardone M.

09:20-09:30 **A multicenter RCT comparing two compression methods for the treatment of decongestive phase of lymphedema**
Vicenta Pujol-Blaya, Ll. Catasús, Sira Salinas, Teresa Pascual, Ana Lobato, Laura Camprubí, Anna Mauri, Ana María Morales, Roser Belmonte

09:30-09:40 **Lipofilling of the axilla to reduce secondary lymphedema after axillary lymph node dissection**
Vandermeeren L, Belgrado JP, Vankerckhove S, Valsamis JB, Feipel V, Rooze M Moraine JJ, Hertens D, Carly B, Liebens F

09:40-09:50 **The occlusion pressure of the superficial lymphatic network in the lower limb of patients with functional lymph collectors**
Belgrado JP, Vandermeeren L, Vankerckhove S, Valsamis JB, Malloizel-Delaunay J, Moraine JJ, Liebens F

09:50-10:00 **Deep Infrared Imaging to identify venous impairment after breast cancer surgery**
Jean-Paul Belgrado, Liesbeth Vandermeeren, Sophie Vankerckhove, Jean-Baptiste Valsamis, Véronique Feipel, Marcel Rooze, Jean-Jacques Moraine, Dina Hertens, Birgit Carly, Fabienne Liebens

10:00-10:10 **MICROSURGICAL procedure for unresponsive groin lymphocele associated to leg lymphedema**
Sara Dessalvi, Francesco Boccardo, Corrado Cesare Campisi, Stefano Spinaci, Corradino Campisi

10:10-10:20 **The long-term follow-up of the patient with upper extremity primary lymphedema: A case report**
Tugce Duman, Miray Haspolat, Kadirhan Ozdemir, Burak Erturk, Sinem Suner Keklik, Ilke Keser PT

10:20-10:30 **The effect of complex decongestive therapy (CDT) in patients with postmastectomy edema**
Makarova Vera, Makarov Ivan, Makarova Natalie

10:30-10:40 **Leg edema in chronic lymphatic insufficiency is lympho-fibroadipo-edema**
Marzanna Zaleska, Waldemar L Olszewski, Marta Cakala

10:40-10:50 **Five years of intermittent pneumatic compression in postinflammatory, posttraumatic and post-cancer-therapy edema of lower limbs**
Marzanna Zaleska,Waldemar L Olszewski, Marta Cakala

10:50-11:00 **Comparison the body spinal stability and postural balance of women with and without lymphedema after breast cancer surgery: Pilot study**
Mahmut Sürmeli, Özlem Çinar Özdemir, Yeşim Bakar

11:00-11:10 **Upper extremity function, edema and disease specific health related quality of life in patients with lymphedema**
Elif Duygu, Yeşim Bakar

11:10-11:20 **Evaluation of the dielectric values and ratios in different penetration depths in patients after breast cancer surgery: Relayionship between duration and penetration depths**
Alper Tuğral, Yeşim Bakar

11:20-11:30 **Trunk lymphedema: Comparison of tissue dielectric constant (TDC) in patients with and without upper extremity lymphedema**
Alper Tuğral, Yeşim Bakar

11:30-11:40 **Indocyanine green lymphography is helpful in detection of early lymphedema after breast and uterine surgery before it is clinically diagnosed**
Waldemar L Olszewski, Marzanna T Zaleska

11:40-11:50 **Live indocyanine green lymphography shows differences in effectiveness of MLD, linfroll massage and intermittent pneumatic compression**
Marzanna T Zaleska, Waldemar L Olszewski, Rajesh Hydrabadi, Mohal Banker, Sashi Gogia, Arun Gogia

11:50-12:00 **Postmastectomy lymphedema is successfully treated by silicone tube implantation bypassing the axillary pit**
Waldemar L Olszewski, Marzanna Zaleska, Rajesh Hydrabadi

12:00-12:10 **Obstructive lymphedema of lower limbs can be successfully controlled by silicone tube implants replacing obliterated lymphatics – six years follow-up**
Waldemar L Olszewski, Marzanna Zaleska, Rajesh Hydrabadi, Pallavi Kulurkar

12:10-12:20 **Tonometry of deep tissues for setting effective compression pressures in edematous limbs**
Marzanna T Zaleska, Waldemar L Olszewski, Marek, Mariusz K. Kaczmarek, Bob Freidenrich

12:20-12:30 **Development of "sexual impact scale in breast cancer related lymphedema (SIS-BCRL)": A new instrument**
Yesim Bakar, Elif Duygu, Alper Tugral, Nuriye Özengin, Hamit Coskun

May 26-27th, 2017

Poster Session

1. **The use of Indocyanine green (ICG) imaging technique in the groin lymphocele microsurgical resection**
T. Aung, S. Geis, P. Lamby, A. Kehrer, K. Pfister, M. Ranieri, L. Prantl, J. Dolderer

2. **Effect of physical activity on the lymphatic system of patients with breast cancer related upper limb lymphedema**
Romain Barbieux, Julie Redaway, Pauline De Backer, Caroline Thomas, Olivier Leduc, Albert Leduc, Pierre Bourgeois, Steven Provyn

3. **Spect/ct assessment of unexpected lymphatic drainages in patients with primary lower limb lymphedema (IIIe)**
Florian Saragoni, Romain Barbieux, Olivier Leduc, Albert Leduc Steven Provyn, Pierre Bourgeois

4. **Lymphatic drainages to the paravertebral lymph nodes in breast cancer patients**
Mirela Mariana Roman, Romain Barbieux, Olivier Leduc and Pierre Bourgeois

5. **The long-term follow-up of the patient with upper extremity primary lymphedema: A case report**
Tugce Duman, Miray Haspolat, Kadirhan Ozdemir, Burak Erturk, Sinem Suner Keklik, Ilke Keser

6. **Complex decongestive physiotherapy during pregnancy with Klippel Trenaunay syndrome: A case report**
Elif Duygu, Yesim Bakar

7. **Turkish version, validity and reliability of the patient benefit index-lymphedema**
Elif Duygu, Yeşim Bakar, Ilke Keser

8. **Possibilities of combined application of gravitational therapy and surgical treatment for patients with lymphedema of lower limbs**
Myshentsev P., Katorkin S.

9. **Five-years of intermittent pneumatic compression in postinflammatory, posttraumatic and post-cancer-therapy edema of lower limbs**
Marzanna Zaleska,Waldemar L Olszewski, Marta Cakala

10. **An investigation of the relationship between venous findings and quality of life in chronic venous insufficiency**
Özlem Çinar Özdemir, Mahmut Sürmeli, Serkan Sevim, Yeşim Bakar

11. **The effect of gender on pain and quality of life in chronic venous insufficiency**
Serkan Sevim, Özlem Çinar Özdemir, Mahmut Sürmeli, Yeşim Bakar

12. **The influence of the arm sleeves on hemodynamic outcomes during an induced upper limb oedema**
Pastouret F., Anciello-Taffanel M., Leduc O., Zirak C. Hubar I.

13. **Interest of 3D reconstructed limb to build a customized multicomponent bandage for the treatment of a lower limb lymphoedema with partially amputated calf. Case report**
Pastouret F.

14. **Decongestive treatment in upper limb lymphedema related to burns sequelae. A case report**
Vicenta Pujol-Blaya, Mª Ll Torrent, Antonieta Falco

15. **Breast cancer related lymphedema on a male with sequelae of cerebral palsy**
V Pujol-Blaya, Daniel Pedrera, Esther Toro-Tamargo, Mº del Mar Melendez Plumed, Mónica Gomez

16. **Trunk lymphedema: Comparison of tissue dielectric constant (Tdc) in patients with and without upper extremity lymphedema**
Alper Tuğral, Yeşim Bakar

Acknowledgement

THE EUROPEAN JOURNAL
OF
lymphology
and related problems
VOLUME 29 • No. 76 • 2017
INDEXED IN EXCERPTA MEDICA

Friday, May 26th, 2017

SESSION I

Chairmen: M. Witte, R. Baumeister, W. Olszewski

NEW INSIGHTS INTO THE PATHOMECHANISMS OF LYMPHEDEMA AND POTENTIAL NEW THERAPIES

MICHAEL DETMAR, MD and EPAMEINONDAS GOUSOPOULOS, MD/PHD
Institute of Pharmaceutical Sciences, Swiss Federal Institute of Technology, ETH Zurich, Switzerland

The pathomechanisms leading to secondary lymphedema are poorly understood. To investigate the pathophysiology of lymphedema, we employed a mouse tail model, where a portion of proximal tail skin was removed and the collecting lymphatic vessels were dissected, resulting in the formation of lymphedema. RNA deep sequencing of control and lymphedematic tissue indicated upregulation of many T cell-related networks and identified upregulation of Foxp3, a transcription factor that governs T regulatory cells (Tregs), along with other Treg-related genes. Immunofluorescence stains and flow cytometry analyses confirmed a significant infiltration of Tregs in lymphedema, and an increased circulation of T regs was detected systemically 1 week after induction of lymphedema. Global depletion of CD4+ cells resulted in reduced lymphedema and also led to a reduction of the lymphatic vessel area and an improved lymphatic vessel function. To further investigate the functional role of Tregs, loss-of-function and gain-of-function studies were performed. Depletion of Tregs in transgenic mice with Tregs expressing the primate diphtheria toxin receptor and green fluorescent protein (*Foxp3*-DTR-GFP) led to exacerbated edema, concomitant with increased infiltration of immune cells and a mixed T_H1/T_H2 cytokine profile. Conversely, expansion of Tregs prior to the operation, using IL-2 – anti-IL-2 monoclonal antibody complexes, led to a significantly reduced lymphedema 1 week post operatively, with reduced tissue inflammation. Therapeutic application of adoptively transferred Tregs upon lymphedema establishment reversed all of the major hallmarks of lymphedema, including edema, inflammation, and fibrosis, and also promoted lymphatic drainage function. Collectively, our results reveal that Treg application constitutes a potential new curative treatment modality for lymphedema.

MORPHOLOGICAL AND MOLECULAR CHARACTERIZATION OF HUMAN LYMPHATIC COLLECTORS AND INITIAL LYMPHATICS

JÖRG WILTING
Institute of Anatomy and Cell Biology, University Medical School Göttingen, Göttingen, Germany

Millions of patients suffer from lymphedema worldwide. Supporting the contractility of lymphatic collectors is an attractive target for pharmacological therapy of lymphedema. However, lymphatics have mostly been studied in animals, while the cellular and molecular characteristics of human lymphatic collectors are largely unknown. We studied epifascial lymphatic collectors of the thigh, which were isolated for autologous transplantations. Our immunohistological studies identify additional markers for LECs (vimentin, CCBE1). We show and confirm differences between initial and collecting lymphatics concerning the markers ESAM1, D2-40 and LYVE-1. Our transmission electron microscopic studies reveal two types of smooth muscle cells (SMCs) in the media of the collectors with dark and light cytoplasm. We observed *vasa vasorum* in the media of the largest collectors, as well as interstitial Cajal-like cells, which are highly ramified cells with long processes, caveolae, and lacking a basal lamina. They are in close contact with SMCs, which possess multiple caveolae at the contact sites. Immunohistologically we identified such cells with antibodies against vimentin and PDGFRα, but not CD34 and cKIT. With Next Generation Sequencing we searched for highly expressed genes in the media of lymphatic collectors, and found therapeutic targets, suitable for acceleration of lymphatic contractility, such as neuropeptide Y receptors 1, and 5; tachykinin receptors 1, and 2; purinergic receptors P2RX1, and 6, P2RY12, 13, and 14; 5-hydroxytryptamine receptors HTR2B, and 3C; and adrenoceptors α2A,B,C. Our studies represent the first comprehensive characterization of human epifascial lymphatic collectors, as a prerequisite for diagnosis and therapy. Additionally, we will present data showing activating mutations in the PIK3CA gene of LECs derived from lymphatic malformations, and the *in vitro* effects of various kinase inhibitors.

HEREDITARY LYMPHOEDEMA IN ITALIAN FAMILIES. GENETIC OF LYMPHEDEMA, BACKGROUND AND FUTURE

MICHELINI S.*, CARDONE M.*, MALTESE P.**, BRUSON A.**, FIORENTINO A*. BERTELLI M.**
**San Giovanni Battista Hospital – Rome – Italy*
***Magi'sLab Rovereto (TN) – Rome - Italy*

Background: Given the great genetic heterogeneity shown by lymphedema, the Next Generation Sequencing (NGS) approach has quickly become the gold standard for lymphedema genetic testing both in research and diagnostic fields.
In the last few years, NGS technology gives the opportunity to increase the number of novel genetic variations in known lymphedema-associated genes. In familial cases, one of the first approach to evaluate pathogenicity of novel variants is to perform a family segregation study.

Aims of the study: In this study, we report the result of pedigree evaluations in lymphedema families.
Interestingly, when we extended the clinical and genetic study to relatives of mutated lymphedema probands (47/256 cases).

Results: The presence of the variant in relatives without a clearly recognizable phenotype is a strong predisposition factor towards overt disease. Since symptoms may manifest later in life, a lymphoscintigraphy evaluation is necessary in all family members and seems to be the best approach to recognize affected individuals absolutely not detectable through physical examination.

Conclusions: In family cases it's therefore recommend to extend both the genetic and the lymphoscintigraphic evaluation in all proband's relatives.
A timely diagnosis permits a better follow-up also allowing for pre-symptomatic interventions.

ABNORMAL MURAL CELL RECRUITMENT IN LYMPHATIC CAPILLARIES: A COMMON PATHOLOGICAL FEATURE IN CHRONIC LYMPHEDEMATOUS SKIN

NINGFEI LIU ZI-YOU YU DI SUN YI LUO
Lymphology Centre of Department of Plastic & Reconstructive Surgery, Shanghai
Ninth People's Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China

Objectives: This study aimed to explore the structural and functional characteristics of dermal lymphatic capillaries in patients with chronic LE, specifically focused on the mural cells that are associated with skin lymphatics.

Methods: Forty-four patients (30 primary LE and 14 secondary LE) and eight healthy controls were enrolled in this study. Genetic analysis of the FOXC2 was performed in 18 patients with primary LE. Full-thickness skin was excised and immunohistologically stained for podoplanin and α-SMA. The proportions of α-SMA+ Lv (α-SMA+ Lv%) were calculated. Lymphatic vascular function was assessed by indocyanine green lymphography.

Results: Analysis of FOXC2 revealed two mutations in two patients with LDs. Histologically, thirty-nine patients exhibited increased α-SMA+ mural cell coverage of lymphatic capillaries. The α-SMA+ Lv% values in the superficial and deep dermis in patients with primary and secondary LE were significantly higher than in the control group. Compared with imaging findings in healthy limbs, in which the collecting lymphatics were clearly visualized, lymphedematous extremities all exhibited dermal backflow.

Conclusions: Abnormal recruitment of mural cells in dermal lymphatic capillaries is a common pathological event in chronic LE, and may play a role in disease evolution.

SESSION II

Chairmen: S. Michelini, J. Wilting, M. Detmar

IMMUNOHISTOLOGICAL OBSERVATION OF LYMPHATIC AND BLOOD VESSELS OF THE HEART WITH SPECIAL REFERENCE TO SIGNAL CONDUCTION SYSTEMS

EIKICHI OKADA, M.D., Ph.D.
Takaoka City Municipal Hospital, Takaoka, Toyama, Japan

Background: With the advent of anti-podoplanin antibody immunohistochemistry, we can clearly observe lymphatic vessels in the formalin-fixed paraffin-embedded histological sections. I examined lymphatic and blood vessels of various parts of the heart.

Materials and Methods: We used ten autopsied adult hearts in this study. Specimens including cardiac conduction systems were obtained from formalin-fixed hearts and processed to paraffin sections. The sections were subjected to elastica van Gieson stain, and to immunohistochemistry using anti-podoplanin, anti-von Willebrand factor, and anti-CD31 antibodies.

Results: We clearly recognized lymphatic vessels by anti-podoplanin immunohistochemistry, blood vessels by anti-CD31 and anti-von Willebrand immunohistochemistry. In the epicardium, there is rich distribution of lymphatics, in addition to coronary vessels, and blood capillaries. In the myocardium of the left ventricle, there is rich distribution of blood capillaries. But no lymphatics present in the bundle of myocytes. It is connective tissue intervening between bundles of myocytes that we can recognize lymphatic vessels accompanying penetrating branches of coronary vessels. In the sinus node, blood capillary density is almost same as left ventricle, and, few lymphatics among sinus node myocytes. In the atrioventricular node, blood capillary density is almost the same as ventricular myocardium and sinus node. There are no lymphatics in the atrioventricular node. In the atrioventricular valve, there are no blood vessels. In the proximal and middle portion of the valve, there are lymphatics.

Conclusions: The blood capillary densities are rich in densities in the ventricular myocardium, and among the myocytes of the sinus node and the atrioventricular node. No lymphatic capillaries present in the bundle of ventricular myocardium and the atrioventricular node. In the atrioventricular valve, lymphatics are present, but blood vessels are absent.

ACTUAL RESEARCH ON LYMPHATIC PUMP OF THE HAND

M. AMORE

LYMPHANGIOGENESIS, INFLAMMATION AND FAT DEPOSITION IN LYMPHEDEMA

MAURO ANDRADE
University of São Paulo, Brazil

Excess adipose tissue in lymphedema has long been recognized and debulking was the preferred surgical approach in the 20th century, but until recently mechanisms of fat deposition in lymph stasis have been neglected and considered as a sub product of the inflammatory reaction. Interestingly, this particular aspect of the lymph stasis has received scarce attention in most classical books dealing with lymphedema. In fact, knowledge of the adipose tissue physiology has been obscure until recent years.

Nevertheless, obesity is a known predisposing factor for secondary lymphedema development and weight loss produces reduction in volume in limbs with lymphedema. Also, obesity is related to higher risk of lymph node metastasis in some forms of cancer.

Usually, the number of fat cells remains constant in adulthood and fat deposition is limited to intracellular deposition of triglycerides and cholesterol. New adipocytes are generated from multipotent cells under stimulation of hormones, cytokines and growth factors and depend on some transcription factors, such as C/EBP-α and PPAR-γ.

Recent experimental models provided new insights in fat deposition related to lymph stasis and adipogenic stimulators are constantly elevated in response to lymph blockage. On the other hand, as the lymphatic system modulates inflammatory response, impaired lymph flow has important influence on macrophages and monocytes. Also, lymph stasis up regulates expression of VEGF-C and VEGF-D in macrophages.

Increasing data suggest the intimate relationship among adipogenesis, lymphangiogenesis and inflammation and further investigation may provide new approaches in lymphedema prevention and treatment.

RECENT FINDINGS ON INFLAMMATION IN LYMPHEDEMA

W. OLSZEWSKI

INTERLEUKIN-10 IN SECONDARY LYMPHEDEMA

MORIYA OHKUMA and TAKAYOSHI KANDA*
Deapartment of Dermatology, Sakai Hospital, Kinki University, School of Medicine, Osaka, Japan
**Department of Gynecology, National Medical Center, Osaka Minami, Osaka, Japan*

Background: Inteleukin-10 is one of the cytokines which negatively control reactions as TGF. It controls response by T reg. negatively and negatively controls affect of enteritis. It negatively controls Th1 cytokines and inflammation. UV radiation, contact dermatitis and corneal stripping increase interleukin -10 of the keratinocyte. Interleukin-10 works on APC and induces tolorence of Th1 cells.

Method: Sera taken from 5 cases of secondary lymphedema are evaluated for interleukin-10 by ELISA.

Result: All patients show value lower than standard.

Discussion: In the tissue accerelating and restricting reactions are usually working at the same time for homeostasis. Interleukin -10 is not involved in secondary lymphedema. TGF-β is high in secondary lymphedema (Ohkuma, 2017)and may compensates this.

Conclusion: Interleukin-10 is not increased in secondary lymphedema.

LYMPHATICS OF THE WOUNDS AND TATTOO. PRELIMINARY STUDY

ELIŠKA O.
Department of Anatomy, 1st Faculty of Medicine, Charles University Prague, Czech Republic

It is known that healing of the wound with result of development of the scar thickness of one mm is obstacle for the growth of lymphatics. Previously we did experimentally o n the dogs the superficial skin wound by scalpel incision, it means opening of the epidermis and dermis. The lymphatics of the wounds were investigated in two types of heal procedure: primary and secondary. Heal procedure of the wounds and lymphatics was evaluated after surgery in patients too.
On the other hand for comparison the skin tattoo was investigated because resembling the superficial surgery type of the wound. The samples of tattoo were taken from cadavers and evaluated with morphology methods Result: in some specimens: the tattoo is obstacle for lymphatic flow.

SESSION III

Chairmen: N. Liu, A. Leduc, M. Wald

ALTERED LYMPH VESSELS AND ALTERED TISSUES IN LYMPHEDEMA MAY NEED DIFFERENT INTERVENTIONAL APPROACHES

RUEDIGER G.H. BAUMEISTER, PROF. DR.

Lymphedema is characterized by different changes regarding the lymphatic transport system and the tissue as well.
These changes may need different interventional strategies, once the conventional primary therapy has been started.
However, first the right timing for the transition from conservative to interventional treatment has to respect the progressive alterations with time, especially with regard to the lymphatic vessels.
To choose within the different interventional options, methods avoiding resections should be regarded first.
For lympho-venous shunts, lymphatic vessels with good pumping abilities are necessary for propelling lymphatic fluid into the peripheral venous system.
The free lymph nodes transfer is dependent on a spontaneous anastomosing process between small lymphatic vessels and capillaries.
The autologous transfer of lymphatic grafts has the advantage of using the own pumping abilities of the healthy vessels to get lymph out of lymphatic main collectors in lymphedema. Despite the advantage in the case of only partly altered lymphatic collectors in lymphedema, also in later stages of the disease this procedure has proved effective.
Limited alterations within the tissue may get resolved when only the lymphatic transport is improved. In heavy fibrotic transformations and a high amount of newly formed fat tissue, resection of the surplus of tissue may become necessary. Hereby low invasive methods should be taken into consideration first.

TREATMENT OF BREAST CANCER RELATED LYMPHEDEMA: CPT AND MICROSURGERY

NELE ADRIAENSSENS [1,2], ASSAF ZELTZER [1], CHARLOTTE KERKHOVE [2], WING KEA HUI [1], JACQUES DE GRÈVE [1], MOUSTAPHA HAMDI [1]
[1] Universitair Ziekenhuis Brussel, [2] Vrije Universiteit Brussel, Jette, Belgium

Objectives: Breast cancer related lymphedema (BCRL) is one of the most common and debilitating complications following breast cancer treatment. Since complex physical therapy (CPT) does not always offer the desired symptom reduction, microsurgical techniques may help restore lymphatic function, resulting in a possible long-term solution for BCRL. The aim of this study is to determine whether microsurgical treatment and CPT may lead to a decrease in arm volume.
Methods: *-Design:* prospective longitudinal cohort study. *-Population:* breast cancer related lymphedema stage I or II. *-Intervention group:* lympho-venous anastomosis (LVA) or lymph node transfer (LNT) and CPT, inclusion between 2012 and March 2017. *-Control group:* CPT, inclusion between 2002 and 2010. *-Main outcome measure:* relative interlimb difference (RID) in arm volume between the affected and the non-affected side (%). *-Measurement moments:* prior to intervention/control (T0) and one year following intervention/control (T1).
Results: In March 2017, 52 patients have been included in the intervention group. Preliminary analyses of 29 patients (56% of the intervention group) show a non-significant decrease in RID of 3,22% between T0 and T1 ($p > .05$). 93 patients have been included in the control group. A significant reduction in RID of 3,12% has been found between T0 and T1 ($p = .009$).
Conclusion: By the time of the congress, about 85% of the intervention group will have had a second measurement, one year following the intervention. In the hypothesis of the authors, the addition of more T1 measurements will confirm and strengthen the current results.
These preliminary findings suggest a positive influence of isolated CPT and the combination with microsurgical techniques in the treatment of BCRL.
Key Words: Breast cancer related lymphedema, microsurgical treatment, conservative treatment, arm volume.

TATTOO PIGMENTS

VIVIEN SCHACHT, M.D.

Tattoos and permanent make-ups are gaining more and more social acceptance. The number of people with tattoos, the number of articles and documentations about tattoos in the media as well as the number of tattoo studios are increasing.

However, the consequences of intradermal injections of tattoo ink are often neglected. The composition of tattoo inks is highly variable, and inks can contain many allergenic or carcinogenic components. Incidental findings of colored lymph nodes in biopsies demonstrate drainage of tattoo ink into lymphatic vessels and lymph nodes. Immunocompetent cells of the dermis and lymph nodes react with components of tattoo ink and granulomatous or delayed-type hypersensitivity reactions are possible consequences. The differences of tattoo pigments and different status of the immune system of the owners of the tattoos make it difficult to compare the inflammatory reactions on tattoos. Moreover, correct information about the components of tattoo pigments is hardly available for many customers.

There is a long tradition for tattoos, but nobody knows the effects of the currently used tattoo inks on the immune system. The pigments and their additives will stay in the dermis, lymph nodes and maybe inner organs for decades and more research about the interaction between tattoo ink components and the human immune system has to be performed to finally set up a positive list of tattoo ink components of definable adverse effects.

DO WE NEED EDUCATION AND TRAINING IN LYMPHOLOGY? WHO IS THE LYMPHOLOGIST?

E. DIMAKAKOS

Vascular Unit of 3rd Internal Medicine Department of the University of Athens-Sotiria General Hospital, Athens, Greece

There has been significant improvement in lymphology the last 100 years both at the level of the diagnosis of the lymphatic diseases and at the level of the treatment of the lymphatic diseases and especially of lymphedema. The presence and the guidance of brilliant personalities and the help of technology, mainly the recent years, change the low status of lymphology. There are societies that were created in an effort to unite all lymphological forces to provide a common language for all professionals Lymphologists.

Despite of that improvement of lymphology the status of the education level remains very low. There are only private actions and activities in Europe. Different 'schools' teach different ways for the treatment of lymphedema –lymphatic diseases. Some of them are approved and some others are unapproved without any criteria just only one criteria: the results. Lymphology had and has pioneer and leader personalities with a great and high level of education of lymphology but unfortunately only in personal level. So if the lymphology and the lymphologists want to go higher concerning the level of education we need official education with officials schools , officials centers, official books, official training centers in each country if it is possible with approval of the national lymphology societies and of course all of them must be recognized by the European society of lymphology. We need rules and criteria about who is the Lymphologist in order to drive our lymphology to higher scientific level.

IMPAIRED CELL-MEDIATED IMMUNITY IN LYMPHOEDEMA AND ITS POSSIBLE IMPACT ON CANCER METASTASIS FORMATION

SZOLNOKY G., OLÁH J., ÓCSAI H., DOBOZY A., KEMÉNY L.

Background: Chronic lymphoedematous limbs have an increased propensity for infections and malignant tumours including malignant melanoma and its metastasis formation. It has been attributed to suppressed delayed-type hypersensitivity (efficient control of microbes and cancer cells) measured in lymphoedemas related to Stewart-Treves syndrome, Kaposi's sarcoma or breast cancer treatment.

Objective: We aimed to examine whether decongestive lymphoedema therapy could improve cell-mediated immunity in breast cancer treatment-related lymphoedema (BCRL).

Methods: Eight women with unilateral BCRL were included in this study. At baseline, tuberculin skin test (TST) was performed on the volar surfaces of the forearms of the affected and non-affected sides using 0.5, 1 and 5 tuberculin units in the form of three consecutive injections with 3-cm spaces in-between, and arm volumes were measured using the Kuhnke's disc model. Decongestive lymphatic therapy was given to swollen arms in 10 consecutive working days. At the end of intensive decongestion, TST on affected side and bilateral volumetry were repeated.

Results: Baseline test using undiluted (5 units) and fivefold diluted (1 unit) tuberculin solutions has shown significant differences ($P < 0.05$) between the mean sizes (11.81 ± 2.32 and 7.75 ± 1.92; 7.12 ± 1.12 and 5.12 ± 0.91 respectively) in favour to healthy arms. Post therapeutically, the mean sizes were significantly increased ($P < 0.05$) in the dilutions of 1 : 1 and 1 : 5 (7.75 ± 1.92 and 10.56 ± 1.23 mm, 5.12 ± 0.91 and 5.93 ± 1.74 mm respectively).

Conclusion: Significant increase in TST sizes suggests that decongestive lymphatic therapy is able to partially restore impaired cellular immune function in BCRL.

EARLY DETECTION OF SECONDARY LYMPHEDEMA AFTER CANCER TREATMENTS

BELGRADO J.P., VANDERMEEREN L., VANKERCKHOVE S., VALSAMIS J.B., HERTENS D., BEIER B., ETBAZ S., CARLY B., LIEBENS F

Introduction: The overall incidence of secondary lymphedema in oncological surgery is estimated at 15,5%. Reducing the lymphatic capacity transport, lymph node dissections could shift the fluid balance exchange, leading in a time-delayed manner, to the onset of a lymphedema. All patients undergoing an adenectomy are at risk to develop a lymphedema. Currently a secondary lymphedema is diagnosed only after it has clinically developed.
In order to start earlier decongestive treatment or preventive treatment, sensitive detecting tools can be helpful. Near infrared fluorescence lymphatic imaging (NIRFLI) could be the answer to this need.
Our experience on healthy and lymphedema patients highlights that the superficial lymphatic system is completely different in healthy limbs compared to lymphedematous limbs.
This study aims to confirm the possibility to detect secondary lymphedema at a subclinical stage. Detection may be performed using NIRFLI that allows to realize a mapping and to track any change of the architecture of the superficial lymphatic network at different times before and after surgery, in order to follow the patient at risk to develop secondary lymphedema.

Method: Breast cancer patients are recruited before surgery and after the informed consent. They undergo NIRFLI exam before surgery, then 10 days, 3 months, 6 months, 1 year and 2 years after surgery. Images and videos are recorded and compared to the first ones in order to detect any change in the architecture of the superficial lymphatic system. Anamnesis, clinical examination of the operated area, precise volumetry and far infrared imaging are performed at each session. The study started in January 2015.

Results: On 50 consecutive patients, 4 patients presented changes in NIRFLI and developed lymphedema afterwards. Two patients presented minor changes in NIRFLI and up until now have not developed lymphedema. The 44 other patients had no change in NIRFLI and no lymphedema.

Conclusion: Primary results indicate that NIRFLI seems to be a promising sensitive tool to detect the imminent risk of development of secondary lymphedema. Continuous follow-up and an increased number of patients would strengthen these results. The time between architectural changes and the onset of the lymphedema has also to be studied.

CHRONIC LYMPHATIC SKIN ULCERS AND ACUTE LYMPHANGITIS (DIAGNOSIS AND TREATMENT)

ALBERTO MACCIÒ, MD
President of LymphoLab
Scientific Director of Compression Therapy study Group (CTG)

The lymphatic involvement is very frequent in patient with chronic ulcers of lower limbs
In this paper, we will show you our specific experience about the early diagnosis and the proper treatment of the lymphatic aspects of the chronic leg ulcers.
Specifically, we will focus on the septic complication of chronic lymphostasis also known as lymphangitis. Very frequent complication in daily practice of Clinical Lymphologist.
As we know, the primary and secondary prevention of microbial infection is a first and fundamental step in reducing the recurrences of the septic complication in chronic lymphostasis like decreasing the risk factors. In any case, the number of these relapses is increasing today in the same way as the prevalence of lymphatic diseases in the world.
We have estimated almost 1 % of the patients who are accepted in the emergency room showing signs and symptoms related to the potential infection with primary involvement of lymphatic circulation.
The Lymphangitis Score can be used to recognise very early the high risk of infection overall in chronic patients with lymphiostasis.
Once the lymphatic involvement is suspected the therapy should have two principal approaches. First is the prescription of systemic antibiotics, broad spectrum or guided by clinical signs. The second approach is using the appropriate short stretch bandages of the limb with zinc oxide or new Manuka honey dressings to reduce the edema, improve the peripheral lymph flow and , in case of Manuka to keeping under control the bacterial local overload. In our presentation, we will show you both procedures which include the protocol for choosing an antibiotic and the correct pressure when applying the bandages.
Estimating correctly the lymphostasis and the lymphangitis complicationare the most important things to help the patients with “non healing” chronic leg ulcers.

THE ROLE OF NIGHT GARMENT IN THE OPTIMIZATION OF LYMPHEDEMA MANAGEMENT DURING THE FIRST THREE MONTHS OF MAINTENANCE AFTER INTENSIVE TREATMENT

PR ISABELLE QUERE
CHU Saint-Eloi, Montpellier, France

Introduction: After intensive phase of lymphedema treatment, and in spite of self-care management, it is common to observe an increase of lymphedema volume also called rebound effect and/or "maintenance phase failure".
Optimized compression therapy and compliance during maintenance phase after intensive treatment are key factors for control of lymphedema. Self-bandaging helps but is no easy to put on or correctly applied during night time. Other alternatives are available such night garments but there is no previous specific study or data on their efficacy, safety or patient compliance.
The primary objective of this pilot prospective open-label randomized study was to assess the benefit of a new auto-adjustable arm sleeve (MOBIDERM® Autofit) on lymphedema volume, as a night treatment for maintenance phase during three months after intensive treatment.

Methods: Forty women with BRCL were consecutively enrolled and randomized (D0) for 1 month in 1:1 ratio either in Interventional group: with night-time MOBIDERM® Autofit garment, or in Control group: without MOBIDERM® Autofit (No night treatment). Patients wore additionally their day-time lymphology hosiery (THUASNE) in both groups.
Then, from Day 31 to Day 90, all patients in both groups used both day and night time devices.
Primary endpoint was lymphedema volume variation between Day 0 and Day 30. Secondary endpoints were compliance, Quality of Life (LYMQOL arm questionnaire), functional symptoms (heaviness, limb use limitation, and pain), sleep quality and safety.

Results: In ITT population, between Day 0 and Day 30, mean lymphedema volume increase was two times higher in Control group with 92.9 mL (i.e. 3.2%) than in Interventional group with 46.7mL (i.e. 1.80%), p=0.757. Between Day 30 and Day 90, when all patients were fitted with MOBIDERM® Autofit, a stabilization of the lymphedema volume was obtained in both groups (-1.3mL vs -0.3 mL in Interventional and Control groups respectively). The device improved functional symptoms (At baseline, 20% vs 25% of patients presented heaviness and/or pain in Gp Interventional vs Control respectively while at D30 they were 15% vs 60%) and function domain of the LYMQOL arm questionnaire. MOBIDERM® Autofit was worn overnight almost 85% of the nights. It was well accepted by the patients (82% of patients were satisfied) and no adverse reaction leading to permanent device discontinuation occurred and no major sleep disturbance was observed.

Conclusions: The results suggest that MOBIDERM® Autofit night garment displays maintenance properties that are beneficial for patients with BCRL after intensive treatment and enhances patient's self-management. Night treatment by specific garments might be an alternative to self-bandaging, and are well accepted by patient.

SESSION IV

Chairmen: K.P. Mar n, W. Döller, M. Cestari

THE IMPORTANCE OF CLINICAL EXAMINATION IN LYMPHOSTATIC DISEASES

M. OBERLIN

The pillars of basic diagnostics are medical history, inspection and palpation, and should always be conducted in this order. In addition to recording the general medical history (including family history), previous diseases with potentially lymph vessel damaging effects, edema-aggravating diseases (such as CVI, obesity, diabetes mellitus etc) and possible medication-induced edema should be recorded in a special edema history together with the progression over time, the location of first manifestation and the direction of progression. Complaints and symptoms such as swelling, functional limitations and difficulties with daily activities, pain, fluid loss and tendency to bruising should also be discussed and noted.
On inspection the location of the edema is noted. Under good light conditions the skin of the unclothed patient is then assessed with regards to colour, temperature, trophic disorders and specific lymphedema-associated skin alterations such as ectatic lymph vessels, lymph cysts, deepened natural skin folds as well as skin alterations caused by venous disorders and potentially malignant skin changes. During this inspection the patient should also be assessed for shortness of breath and mobility.
Palpation also takes place on the unclothed patient. The lymph node stations are palpated, then the consistency of the edema itself assessed, i.e. for the first signs of low-protein or protein-rich edema. The degree of pitting is assessed, i.e. the interstitial fluid content of the affected area by applying firm pressure with the finger tips for a sufficiently long period of time. Thickening of the skin folds is assessed by pinch-testing the skin over the proximal phalanx of the 2nd and/or 3rd fold on the fingers or toes, as well as over the base of the extremities, i.e. in the relevant truncal quadrant.
Combined with clinical experience, these basic diagnostics allow us to assess the etiology, staging and location of lymphedema and also relevant associated diseases. The basic diagnostics offer the experienced examiner sufficient security in making a diagnosis, if no relevant comorbidities are present and the lymphedema is in an advanced stage; from stage II.
Basic diagnostics alone are not sufficient when relevant comorbidities are present, in early stage lymphedema, when internal organs or lymphatic trunks are involved, or when invasive therapy is being considered.

THE RELEVANCE OF THE FUNCTIONAL AND DIFFERENT IMAGING MODALITY METHODS FOR THE DIAGNOSIS AND TREATMENT OF LYMPHEDEMAS FOR SURGEONS AND PHYSIOTHERAPISTS

PROF. P. BOURGEOIS, MD, PhD
Head of Clinic, Service of Nuclear Medicine and Multi-disciplinary Clinic of Lymphology
Institute Jules Bordet, Université Libre de Bruxelles, Brussels, Belgium

Different imaging methods can be proposed for the diagnosis and evaluation of lymphedemas. Three can be merely considered: the lymphoscintigraphic (LySC) investigations, the Magnetic Resonance Imaging (MRI) methods and the Near-Infra-Red (NIR) imaging of the lymphatic vessels with Indo-Cyanin Green (ICG). Each of these techniques has its own advantages and drawbacks. They can be considered and analyzed taking into account their respective functional and/or morphological informations-contributions with regard to the different expectations of the surgeons and of the physiotherapists. This analysis is the aim of our presentation and the basis of –we hope- interesting discussions.

ANALYSIS OF THE SENSITIVITY OF VARIOUS METHODS OF OEDEMA MEASUREMENT

[1] LEDUC O., [2-3] BARBIEUX R., [3] PROVYN S., [3] DE SMET A., [3] VAN THIELEN B., [1] MORVAN B., [1] HARDY E., [1] WATTEYNE M., [2] BOURGEOIS P., [4] LEDUC A.
[1] Unité de lympho-phlébologie Haute Ecole Bruxelles-Brabant ISEK
[2] CliniqueMulti-disciplinaire de Lymphologie, Institut J. Bordet, Université Libre de Bruxelles
[3] Anatomical Research and Clinical studies, Vrije Universiteit Brussel
[4] Prof. Emeritus, Université Libre de Bruxelles-Vrije Universiteit Brussel

In physiotherapy, the assessment of the limb volume is very important because it provides the opportunity of validating the treatment effect. The progress in the stages of physical treatment of oedema is depending on the oedema evolution. Various method where proposed to assess the oedema. The authors propose to analyse their sensitivity. Hypodermal experimental oedema where realized after progressive injection of physiologic fluid in cadavers upper limb. Technics compared in the study are the perometer, circumferences, hydrodensitometry and a CT scanner.

LYMPHOSCINTIGRAPHIC ASSESSMENT AS A THERAPEUTIC GUIDANCE FOR LYMPHEDEMA TREATMENT

ROMAIN BARBIEUX [1-2-5], SABRINA DOYENARD [4], AGATHE PLUSKA [4], KEOMA ENCISO [4], MIRELA MARIANA ROMAN [1], MICHEL HARDY [2], OLIVIER LEDUC [4], ALBERT LEDUC [3-4], PIERRE BOURGEOIS [1], STEVEN PROVYN [5]

[1] Department of Nuclear Medicine and Clinic-Unit of Lymphology, Institut Jules Bordet, Université Libre de Bruxelles.

[2] Service de Kinésithérapie et réadaptation, Jules Bordet Institute, Université Libre de Bruxelles.

[3] Service de Kinésithérapie et réadaptation, Université Libre de Bruxelles – Vrije Universiteit Brussel.

[4] Lympho-phlebology Unit, Department of occupational and environmental physiology, Haute École Bruxelles-Brabant ISEK, Brussels, Belgium.

[5] Anatomical Research and Clinical studies, Vrije Universiteit Brussel

Introduction: Manual lymphatic drainage (MLD) is an important technique used in the treatment of lymphedema. It is a slow, rhythmic and light massage technique applied in the direction of the physiological lymphatic drainage. This physical treatment aims to stimulate lymphatics and to decrease the edema. The purpose of this study is to quantify in a first time the effects of a standard MLD (SMLD) in patients with ULL using lymphoscintigraphic approaches and in a second time the effectiveness of a lymphoscintigraphically guided MLD (LGMLD).

Material and Methods: A series of 34 patients who had undergone a lymphoscintigraphy of the upper limb at Jules Bordet Institute were selected to participate to the study and randomized into two groups. At the end of their lymphoscintigraphic examination, the first group underwent two phases of SMLD during 15 minutes per phase with imagings after each phase. The second group underwent a first phase of SMLD (during 15 minutes) followed by a second phase of LGMLD with imagings after each phase. The quantifications were made on the imagings of each phase of the lymphoscintigraphic exam (resting, low physical activity and global activity of the upper limb, control phase, DLM 1 and DLM 2) and on each area of interest appearing (axillary and in transit lymph nodes, areas of lymph stasis in "dermal backflows").

Results: The results show that the colloidal activities in the axillary lymphatic nodes of the edematous limb are statistically increased (P value = 0.001) and the activities in the areas of DBF statistically decreased (P value < 0.0001) by the MLD when compared to a period of resting. Like the MLD, the physical activity is increasing the activities in the axillary lymphatic nodes of the edematous limb but is also statistically increasing the activities in the areas of DBF when comparing to a period of resting (P value < 0.0001). No statistical difference is found between the effect of the standard DLM and the imagery guided DLM concerning the activities in the areas of DBF but the imagery guided DLM is statistically increasing the filling of the axillary lymphatic nodes when comparing to the standard DLM (P value = 0.0242).

Conclusions: MLD increases the lymphatic flow and decreases the importance of the areas of DBF. Moreover, a lymphoscintigraphic assessment can give some useful information about the patients and can help the physical therapist to increase the effects of the DLM.

THE IMPORTANCE OF VOLUME MEASUREMENT IN MANAGEMENJT OF EXTREMITY EDEMA

MICHAEL JÜNGER [1], HANS-JÜRGEN THOMÄ [2]

[1] Universitymedicine Greifswald, Department of Dermatology, [2] Bauerfeind AG Zeulenroda Germany

Clinical apparent lymphedema comes along with an increase of volume, most frequently of the lower or the upper extremities. To assess the clinical course reliable information about the volume change is needed.

Water replacement volumetry ("principle of Archimedes") has revealed as a useful method, however it is not only time consuming but also dependent on the exact course of investigation. The usefulness of water replacement volumetry can be show best systematic clinical study, here the results of a cross over study about the effect of two compressing arm sleeves (CCL 2) in female patients with lymphedema will be demonstrated.

Touch-free measurement by means of computerized three-dimensional reconstruction of the body surface (BT600, Bauerfeind, Zeulenroda, Germany): Patient's body surface e.g. his leg is recorded by means of digitized video-recordings of the leg with the patient upright on a rotating plate. The surface of the leg is reconstructed by a computerized mathematical calculation based on the video recordings. Thus even the volume of leg segments of particular interest can be determined.

The clinical use of the new technique BT 600 will be shown by clinical cases.

ELASTOSONOGRAPHY: A NEW ULTRASONIC TECHNIQUE FOR ESTIMATION AND IMAGING OF THE ELASTIC PROPERTIES OF LYMPHOEDEMATOUS TISSUES

ALBERTO ONORATO, MD, PhD

Lymphological Research Unit of Associazione Lotta al Linfedema Onlus

A lymphedema feature is the transformation of the affected tissues, with fibrosclerotic evolution and formation of new fat tissue. Different methods and tools have been developed for the assessment of these changes, but with still unsatisfactory results, due to the difficulty of assessing the deeper tissues. It has been recently introduced elastosonography,an ultrasonographic tecnique that displays the elastic properties of soft tissues. Various technologically different types of elastosonography are available: common features are the objective of quantifying or qualitatively demonstrating the elastic modulus of the examined tissue, and the use of ultrasound to measure the tissue microdisplacement determined by different means. Use of elastosonography for lymphedema is still poorly documented in the medical literature , but there are now many data related to fibrotic and neoplastic changes of the liver, pancreas, kidney, breast. The author presents data published till now on the use of elastosonography for lymphedema and a personal study, performed with a quantitative analysis, using Acoustic Radiation Force Impulse Quantification.

Key words: Ultrasound elastography, Elastosonography, ARFI quantification.

MANUAL LYMPH DRAINAGE IN AN ALLOGENEIC STEM CELL TRANSPLANT RECIPIENT WITH CUTANEOUS GRAFT VERSUS HOST DISEASE: A CASE REPORT

KADIRHAN OZDEMIR PT.[1], BURAK ERTURK PT.[1], TUGCE DUMAN PT.[1], MIRAY HASPOLAT PT.[1], ILKE KESER PT.[1], ZEYNEP ARZU YEGIN MD.[2]
[1] *Gazi University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, TURKEY*
[2] *Gazi University, Faculty of Medicine, Department of Hematology, TURKEY*

Objective: Graft-versus-host-disease (GVHD), which is characterized by donor lymphocyte-mediated destruction of the host tissues, is a common complication of allogeneic hematopoietic-stem-cell-transplantation (allo-HSCT) with high morbidity and mortality rates. The aim of this study was to investigate the effectiveness of manual lymph drainage (MLD) on range of motion (ROM) and flexibility in a patient with cutaneous GVHD (c-GVHD).

Methods: A 29-year-old male patient who was diagnosed as acute lymphoblastic leukemia in April-2014 and underwent allo-HSCT in July-2014. Chronic extended skin GVHD was occured on day 180 after HSCT. As he was refractory to multiple treatment steps including PUVA (psoralen and ultraviolet A), extracorporeal photopheresis and systemic immunosuppressive agents; anti CD20 monoclonal antibody and imatinib combination were commenced. He was also consulted to oncological physiotherapy unit for the limitations of ROMs at several joints. Shoulder (flexion-abduction-internal/external rotation), elbow and wrist (flexion-extension), hip (flexion-extension-abduction-adduction), knee and ankle (flexion-extension) active-ROMs were measured via universal-goniometer pre and post-MLD by a physiotherapist. Moreover, flexibility of lower and upper body were assessed with chair-sit and reach test (CSRT) and back-scratch test (BST). MLD was performed 5 days-a-week for 2 weeks on trunk, upper and lower extremities. All sessions were maintained for 40 minutes. Furthermore, exercise (positioning, breathing and active-ROM exercises in Proprioceptive-Neuromuscular-Facilitation pattern) recommendations were suggested as a home-program.

Results: The differences in the measurements of total active-ROM were calculated. There were improvements in ROM of both upper (shoulder +13°, elbow +5°, wrist +9°) and lower (hip +5°, knee +3°, ankle +8°) limb. Shoulder external/internal rotation, wrist extension, hip flexion, abduction, adduction, and knee flexion did not change after MLD. CSRT results were increased (+3 cm) and BST results were improved in dominant (%24) and non-dominant (%28.1) extremities.

Conclusion: Contracture development and loss of flexibility can be observed in patients with c-GVHD. With MLD, ROM has not only been preserved but also improved in this patient. In addition, the flexibility has increased. The benefits of MLD in a case with c-GVHD promised positive contributions which should be investigated in further studies. Early and prompt physiotherapy is essential to improve flexibility and active ROM in allo-HSCT survivors.

Key words: c-GVHD, physiotherapy, flexibility.

THE EFFECT OF RECEIVING CHEMOTHERAPY AND RADIOTHERAPY ON SEVERITY OF LYMPHEDEMA

SINEM SUNER KEKLIK PT.[1], MIRAY HASPOLAT PT.[1], NEVIN ATALAY GUZEL PT.[1], ILKE KESER PT.[1], TUGCE DUMAN PT.[1], OZGE PETEK ERPOLAT[2]
[1] *Gazi University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, TURKEY*
[2] *Gazi University, Faculty of Medicine, Department of Radiation Oncology, TURKEY*

Purpose: To investigate the effect of receiving radiotherapy and chemotherapy on severity of lymphedema in patients with breast cancer.

Method: The patients who applied to Oncological Rehabilitation Unit were reviewed retrospectively. 117 patients were categorized into 3 groups according to the treatment they received and severity of lymphedema. To evaluate and classify lymphedema circumference measurements were performed: 1-3 cm as 'mild intensity'; 3-5 cm as 'moderate'; 5 cm and above as 'severe'.

Results: There were no lymphedema in % 21,36 (N:25) patients. The severity of lymphedema of the participants were % 28,20 mild (N: 33), % 18,80 moderate (N: 22) and % 31,62 severe (N: 37). % 23,07 (N: 27) patients only underwent chemotherapy, % 67,52 (N: 79) underwent radiotherapy and chemotherapy, % 9,40 (N: 11) patients were not applied chemotherapy and radiotherapy. In comparison between patients who had both chemotherapy and radiotherapy and patients who had none of these therapies, a significant difference was detected in terms of lymphedema severity (p=0.02). There was no difference in the severity of lymphedema between patients who underwent chemotherapy and radiotherapy and patients underwent only chemotherapy (p=0.77). When the patients who did not undergo chemotherapy and radiotherapy compared with patients who underwent only chemotherapy a significant difference was determined (p=0.02).

Conclusion: According to the results receiving chemotherapy and radiotherapy have potential to increase severity of lymphedema. In contrary to literature, the patients applied chemotherapy had more severe lymphedema than the patients underwent radiotherapy in this study. It was concluded that chemotherapy can affect the severity of lymphedema than radiotherapy. It was thought that follow-up of lymphedema may be as necessary in chemotherapy period as in radiotherapy period.

Keywords: Lymphedema, breast cancer, chemotherapy, radiotherapy.

TREATMENT OF LYMPHEDEMA IN CASE OF COMPLICATIONS

ANATOLIY A LARIONOV [1], ALEKSANDR I CHERNOOKOV [1,2], MARINA P BEREZKO [1,2], EVGENIY S SILCHUK [2]
[1] Center of phlebology, [2] I.M.Sechenov first Moscow state medical university, Moscow, Russia

Purpose: Complications of lymphedema indicate a neglected stage of the disease and are often the beginning of irreversible changes in the soft tissues of the limb.

Methods: We observed 301 patients with primary and secondary lymphedema of the upper and lower extremities, 273 (90.7%) women, 28 (9.3%) men. The mean age of the patients was 54.17 ± 7.12 years. Primary lymphedema is 25%, secondary 75%, upper limbs in 67%, lower limbs - 33%. Complications were observed in 44 (14.6%) patients: hyperkeratosis 8 (18%) patients, papillomatosis 5 (11%), lymphocysts 9 (20.5%), lymphorrhea 8 (18.5%), trophic ulcer 4 (9%), erysipelas 10 (23%). All patients underwent complete decongestive therapy (CDT).

Results: With hyperkeratosis and papillomatosis CDT was immediately started, all patients experienced mitigation of the epidermis, a decrease in papillomatous growths. When lymphocysts are formed a manual lymphatic drainage massage (MLD) leads to traumatization and lymphorrhea. All patients with lymphocysts had an average of 2.6±1.03 sessions of limb bandage, which led to the disappearance of the lymphocysts and allowed the onset of CDT. MLD with massive lymphorrhea often causes additional skin damage, increases the risk of secondary infection. Preliminary bandage of the limb was performed, an average of 3.7±1.12 sessions was required to completely stop or significantly reduce lymphorrhea, after which they could proceed to CDT. The infected trophic ulcers with pain syndrome are a contraindication to CDT. However, with a decrease of edema after limb bandaging, local ulcer treatment and anti-inflammatory therapy, epithelialization of the ulcerative defect was observed in the period of 10 to 22 days, after which the patients underwent CDT and compression garments. With erysipelas, the appointment of antibacterial, anti-inflammatory therapy and bandage of the limb allowed to stop the inflammation in a short time from 4 to 6 days. After lowering body temperature, reducing limb hyperemia, CPT and prophylaxis with antibacterial drugs of prolonged action was performed for 6 months.

Conclusion: Reduction of the extremity edema by bandage of the limb with short stretch bandages and early CPT allowed to stop complications in a short time and reduce the number of their recurrences.

PSYCHOLOGICAL ASPECTS OF COMPLEX REHABILITATION OF PATIENTS WITH LYMPHEDEMA

KURTANOVA Y.E., MAKAROVA V.S., MAKAROV I.G.

Comprehensive rehabilitation is designed to significantly improve the quality of life of patients with lymphedema. The medical component of rehabilitation achieves significant progress in improving the physical condition of the patients, however, it does not affect the work with the subjective component of the disease. Patients with lymphedema have specific psychological difficulties relating to coping with the disease. In the presence of a chronic disease is difficult life situation to which the patient had to adapt, change their way of life. In the adaptation, the patient usually meets with a number of life difficulties, with the restructuring of relationships, emotional feelings about their appearance, their future. These difficulties can help to solve a psychologist who is engaged in the rehabilitation of patients with lymphedema. A psychologist can help patients understand their difficulties, otherwise they look to reduce emotional distress and to rebuild difficult relationships with others, to come to some life changing decisions. The psychologist also encourage patients to daily work to maintain their physical condition (wearing compression underwear, occupation physical therapy, nutrition, skin care) helps to integrate care for the edema in a habitual way of life of the patient. The scientific-practical center "Lymph" is working on the psychological rehabilitation of patients with lymphedema. In addition to the practical activities of a psychologist in conjunction with clinicians the questionnaire was designed for patients about their medication adherence. The use of the questionnaire is at the stage of validation. It is expected that the questionnaire can help to identify common challenges of adherence to treatment of patients with lymphedema, and will also help to identify the individual characteristics of patients, their personal attitude to treatment, their specific difficulties physical recovery.

COMPLEX DECONGESTIVE PHYSIOTHERAPY AFTER LIPOSUCTION SURGERY IN PRIMARY LYMPHEDEMA: A CASE REPORT

MIRAY HASPOLAT PT [1], KADIRHAN OZDEMIR PT [1], BURAK ERTURK PT [1], TUGCE DUMAN PT [1], ILKE KESER PT [1], DILEK ERER MD [2]
[1] *Gazi University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, TURKEY*
[2] *Gazi University, Faculty of Medicine, Department of Cardiovascular Surgery, TURKEY*

Objectives: Complex decongestive physiotherapy (CDT) is recognized as a standard treatment for lymphedema. However advanced lymphedema presenting with adipose tissue hypertrophy may be unresponsive to CDT. Liposuction surgery may be beneficial to CDT by removing large volumes of hypertrophic fat deposits. The aim of this study was to examine the effect of CDT alone and CDT combined with liposuction surgery in a case with lower extremity stage III primary lymphedema (PL).

Methods: 33 years old female patient noticed the swelling in her left foot once during pregnancy in 2007. After birth, she applied to cardiovascular surgeon due to continuous swelling. She was diagnosed with chronic venous insufficiency and started using varicose stockings. After infectious disease in 2014, the swelling increased significantly, moreover fibro sclerotic changes appeared. She was diagnosed with PL in 2015. She was consulted to oncological rehabilitation unit for managing PL. She was treated with CDT for 9 weeks. Circumference measurement (CM) of extremities was performed with tape measure in 4 cm intervals from lateral malleolus. After CDT total difference between lower limbs decreased from 375.7 cm to 328 cm (12%). She was followed with compression garments, skin care, pumping and breathing exercises. For advanced lymphedema, she had liposuction surgery in 2016. She continued using compression garments. Two months after liposuction, the swelling began to increase and 6 months later she applied to our unit again. It was observed that the extremity volume decreased in comparison to the previous CDT application but the fibrotic tissue was persistent. Then she was treated with CDT again for 9 weeks. CM of extremities was re-performed.

Results: After CDT, the volume of affected extremity decreased and fibrotic changes improved significantly. The total difference between the two extremities decreased from 255.5 cm to 153.4 cm (39 %).

Conclusions: In advanced PL treatment, 9 week CDT application could enhance fibrosis but it could not be sufficient to decrease limb volume. CDT application for the same duration after liposuction was more abundant and provided significant decrease in limb volume and fibrotic tissue. Combined treatments may be more efficient for patients with advanced PL like this case.

Keywords: Primary lymphedema, complex decongestive physiotherapy, liposuction, physiotherapy.

PERIPHERAL LYMPHEDEMA IN A PATIENT WITH RHEUMATOID ARTHRITIS

VESNA BREZNIK, MD, SPECIALIST OF DERMATOVENEROLOGY
Department of dermatovenerology, University Medical Centre Maribor, Slovenija

Background: Secondary lymphedema has several possible causes: malignancy, infections, cardiac insufficiency, venous diseases, trauma, immobility, dependency of limbs and also chronic inflammatory conditions such as rheumatoid arthritis (RA). Lymphatic insufficiency can be dynamic or static.

Case report: 71 year old male patient presented with a one year history of progressive pitting edema of both lower and upper extremities. Due to anti-CCP and RF-positive RA known for more than 30 years he was formerly treated with nonsteroidal anti-inflammatory drugs, methylprednisolone and methotrexate. In the past year he was treated with tocilizumab. At the time of presentation RA was in remission. However, longterm aggressive form of RA led to deformities of small and big joints requesting dependence on a wheelchair. In addition to RA our patient also had history of miocardial infarction, orthopaedic surgeries of left ancle and right knee, hypertension, dyslipidemia, and benign prostatic hyperplasia. His current therapy consisted of tocilizumab, acetysalicylic acid, metoprolol, enalapril, meloxicam, rosuvastatin and tamsulosin.Based on wide diagnostic workup, heart, renal and venous insufficiency as well as obstruction in thoracic or abdominal cavities were excluded. Hypoalbuminemia, myxoedema, synovitis and secondary cutaneous amyloidosis were also excluded from consideration. Lymphoscintigraphy of lower extremities revealed very slow lymphatic flow in both lower extremities. We treated the patient with modified complex decongestive therapy: multilayer short-stretch bandages with reduced pressure in combination with physiotherapy and skin therapy. Maintenance of lymphedema was established by flat-knitted stockings. We observed improvement of our patient's lymphedema and also mobility.

Discussion: Peripheral lymphedema is a rare extraarticular feature of RA and it does not seem to correlate with RF-positivity nor clinical activity of the disease. In patients with RA dynamic and static lymph insufficiency can occure. We diagnosed our patient with functional type of static lymph insufficiency due to immobility and muscular inactivity. Lymphatic system requires external propulsion by means of tissue movement. Exercise and compression can increase lymph transport capacity more than 10-fold. Immobility results in minimal lymph drainage.

Conclusion: It is of utmost importance to consider wide differential diagnosis always when dealing with chronic peripheral edema in polymorbid patients.

SESSION V

Chairmen: G. Felmerer, O. Eliška, Corradino Campisi

AN OVERVIEW OF THE TREATMENT OF PRIMARY AND SECONDARY LYMPHATIC DISEASES. THE EFFORT OF THE ESL TO PUT SOME ORDER

BOCCARDO F, MD, PhD, FACS
Department of Surgery - Unit of Lymphatic Surgery
IRCCS S. Martino University Hospital – IST National Institute for Cancer Research
University of Genoa, Italy - Largo R. Benzi 10, 16132 Genoa, Italy
francesco.boccardo@unige.it

The ESL has recently decided to write a Consensus on Diagnosis and Treatment of Lymphatic Disorders. Apart from the Consensus of the International Society of Lymphology (ISL) and of the International Union of Phlebology (IUP), there are many other National Consensus of the various Societies of Lymphology all over the world. The idea of the ESL to write a European Consensus came from the necessity to gather the different National Consensus and strengthen their meaning and their role in the management of lymphatic diseases all over Europe.
I would like to focus the ESL effort to try to put some order in the European Lymphology, starting from some basic points which to discuss on and that are reported in the following sort of **"ESL Lymphological Decalogue"**:

All lymphatic malformations including primary lymphedema alone and syndromes associated with primary lymphedema, with or without gene disorders.

Bowel chylous dysplasias and gravitational reflux disorders.

Combination of therapeutic approaches (medical, physical and surgical treatments).

Differential diagnosis to rule out systemic causes of edema and to allow an early and adequate diagnosis.

Early correct multidisciplinary treatment strategy.

Focus on the patient compliance, important factor for a successful outcome.

Genetic screening.

Healing procedures for primary and early secondary prevention of lymphatic dysfunctions.

Infection timely treatment and effective prevention.

Levels of evidence and grading recommendations.

In conclusion, we will all cooperate to try to demystify definitely the concept that *"Lymphedema has no cure"* and *"There is nothing to do"*. I wish you all a very good and fruitful work!

INGUINAL LYMPHATIC SURGICAL BYPASS TO A CONTRALATERAL P=0 VENOUS SYSTEM IN PEDIATRICS

C.M. PAPENDIECK, M. AMORE, R. MARTINEZ ALLENDE
Angiopediatria Buenos Aires. Grupo Fronteras de la Linfologia. Argentina

Syndromes with iliofemoral accidental occlusive or venous truncular malformation are frequently associated with primary and/or secondary lymphedema --due to a simultaneous dysplasia of the lymphatic system or as a result of regional venous hypertension, occasionally highly relevant. An example of these may be overgrowth syndromes with vascular dysplasias and embryo-fetal or perinatal syndromes with occlusive venous thrombosis and its involuion By extension, also in some May Thurner syndromes, always occurring on the left side; eventual therapeutic lymph node-vein anastomoses generally wth a luck of a lymph-vein pressure gradient, both in terms of the lymph node drainage itself resulting from a disturbance of lymph concentration and of the lymph-vein anastomosis with hight venous pressure To prevent this situation, the classical Palma technique may be associated with the Nielubovics Olszewski proposals (modified), with no section of the efferent nodal lymphatic vessels. In this way, we involve an internal saphenous vein (vena safena magna) with pressure = 0 from the healthy side with a lymphatic system (and also venous, eventually) on the compromised side in hypertension. We use this alternative in severe cases of Klippel Trenauny Weber and Servelle, Proteus and CLOVEs Syndromes in pediatrics.

SINGLE-SITE SUPERFICIAL AND DEEP MULTIPLE LYMPHATIC VENOUS ANASTOMOSES GENOA PROCEDURE GIVES THE BEST LONG-TERM CLINICAL OUTCOMES FOR AN EFFECTIVE AND EARLY SURGICAL TREATMENT OF PERIPHERAL LYMPHEDEMA

Prof. CORRADINO CAMPISI, MD, PhD, FACS
Department of Surgery (DISC), Lymphatic Surgery and Microsurgery, IRCCS University Hospital San Martino-IST National Institute for Cancer Research, University of Genoa, Genoa, Italy

Aim: A wide clinical experience has lead to a remarkable knowledge about microsurgery applied to lymphatic disorders. Strategies of treatment are proposed to treat lymphatic diseases, utilizing a "single-site" procedure. The rationale behind the single-site approach is twofold: lower infection risk and larger caliber vessels for anastomoses. Particular focus is given by the authors to new technology and new surgical strategies within this field.

Methods: Clinical outcomes for over 4200 patients with peripheral lymphedema treated in Genoa, Italy with a follow-up of at least 5 years, to 20 years is reported. Microsurgical methods included derivative lymphatic-venous anastomoses and lymphatic reconstruction by interpositioned vein-grafted shunts, in a single surgical site. Specific pre-operative diagnostic investigations consisted of duplex scan, lymphoscintigraphy, and the Photo Dynamic Eye (PDE) method with indocyanine green fluorescence. Recently the new Fluodeam test, which allows measurements under normal light conditions, has been adapted. Outcome measures included volume reduction, stability of results with time, reduction of dermato-lymphangio-adenitis (DLA) attacks, necessity of wearing elastic supports, and use of conservative measure post-operatively.

Results: Compared to pre-operative conditions, patients obtained significant reductions in ELV of over 85%, with an average follow-up of 10 years or more. Over 87% of patients with earlier stages of disease (stages IB or IIA) progressively stopped using conservative therapies and 42% of patients with later stages (stages IIB and III) decreased the frequency of physical therapies. DLA attacks considerably reduced by over 91%.

Conclusions: MLVA or MLVLA techniques when performed at a single site produce excellent outcomes in the treatment of both primary and secondary lymphedemas, giving the possibility of a complete restoration of lymphatic flow in early stages of disease when tissue changes are minimal.

MICROSURGERY CONCEPT IN CHRONIC LYMPHEDEMA – RECENT APPROACHES IN GÖTTINGEN

G. FELMERER

From 2005 to 2017 microsurgery was performed by the author in two different hospitals. From 2005 to 2012 the main procedure was lymph-lymphatic transfer, described and teached by Prof. Baumeister.
Although efficient in treating chronic lymphedema the donor site was considerable, a long scar on the inner aspect of the leg and the possible lymphatic impairment on the leg.
From 2012 on lymph node transfer from the cervical region seemed feasible and the first results were promising. The donor site morbidity was very low. Only two patients had problems as a thoracic duct fistula, which could be addressed by revisional surgery and a palsy of the phrenic nerve which resolved completely after six month without a revision. Therefore the left side has been choosen and phrenic nerve was always identified and stimulated while operating in the supraclavicular region.
Whenever a patient had no resection of the superficial lymph nodes in the groin but internal excision of lymph nodes in the abdominal region LV shunts were performed. The concept of supermicrosurgical anastomosis was learned from Professor Koshima. In our experience LV shunts had no complications at all, no donor site morbidity and helped softening edema. However, no patient was free form conservative treatment after LV-Shunts whereas some patients did not need conservative treatment after lymph node transfer. Therefore, lymph node transfer is our first option, whenever feasible. Additional LV-shunts distal to lymph node transfer can safely performed in addition in areas where lymphedema did not ameliorate.
Campisis method of LV-shunts was used in few cases with lymphoceles and where we found multiple lymph vessels and only one bigger vein. Valvulo-plasty had to be performed when reflux of blood was a problem.
We are now able to adapt different reconstructive concepts to suit best the needs of the patients with chronic lymphedema.

NEW SURGICAL INNOVATIONS FOR ADVANCED STAGES OF PERIPHERAL LYMPHEDEMA

CORRADO CESARE CAMPISI, MD, PhD, MRM
Department of Plastic & Reconstructive Surgery, Salus Hospital, GVM Care&Research, Reggio Emilia (RE), Italy

Background: Peripheral lymphedema remains a poorly recognized disease that causes significant morbidity and chronic lymphedema is associated with fibrotic tissue changes and adipose formation ('non-pitting' edema) that is irreversible when untreated. Lymphatic Microsurgery provides a functional repair to overcome the obstacle in lymphatic flow. In these cases, lymphatic microsurgery helps to resolve the lymphstasis that contributes markedly to swelling. Notwithstanding the success of the microsurgery, there often remains significant adipose tissue in the affected limb in advanced lymphedema, which contributes to residual lymphstasis and increased risk of infection. The authors discuss a recently developed Fibro-Lipo-Lymph-Aspiration technique to improve this chronic swelling, using a Lymph Vessel Sparing Procedure (FLLA-LVSP).

Methods: In cases of advanced lymphedema, we use a recently developed Fibro-Lipo-Lymph-Aspiration technique with a Lymph Vessel Sparing Procedure (FLLA-LVSP) where microlymphography techniques highlights the lymphatic pathways and the excess adipose tissue is carefully aspirated. The lymphatics are anastomosed with telescopic technique to multiple tributary vein, for example, the axillary vein or the saphenous vein, depending on the affected limb.

Results: For 350 advanced cases involving the upper limb, there was an average pre-surgery excess volume of 22.36%, which reduced to 2.74% after the FLLA-LVSP (Z-score =-6.73, $p<0.001$). Similarly, for the lower limb, there was an average pre-surgery excess limb volume of 23.24% and a reduction to 2.84% post-operatively (Z-score=-3.42, $p<0.01$).

Conclusion: MLVA techniques when performed at a single-site produce excellent outcomes in the treatment of lymphedema, giving the possibility of complete restoration of lymphatic flow in the early stages of when tissue changes are minimal. In cases of advanced lymphedema, the FLLA-LVSP is efficient with immediate cosmetic results. More importantly, the removal of excess tissue is completed without further damage to lymphatic vessels.

A RELIABLE THERAPEUTIC APPROACH TO THE SECONDARY LYMPHEDEMA: BLAST – BARCELONA LYMPHEDEMA ALGORITHM FOR SECONDARY LYMPHEDEMA

J. MASIA

THE IMPORTANCE OF ADDITIVE PLASTIC SURGERY PROCEDURES IN THE TREATMENT OF CHRONIC LYMPHEDEMA

TORIO-PADRON N., FÖLDI E.M.
Földi Clinic for Lymphologie, Hinterzarten, Germany

Over the last 15 years, new microsurgical techniques have been propagated for treatment of chronic lymphedema. However, the conservative treatment, complex decongestive physiotherapy (CDP), still plays a main role in the treatment of chronic lymphedema. In severe cases, treatment by CDP alone may be inefficient. Ablative surgery could be a treatment option, but this is often considered to be a high risk procedure due to the concomitant diseases presented in those patients as well as the expected postoperative complications. These patients are frequently rejected in different clinics and feel frustrated and hopeless.
We present our experiences with an integrated therapy concept that we apply to treat severe cases of lymphedema affecting the lower and upper extremity as well as the genital area. The patients are treated preoperatively in a specialized lymphological clinic for several weeks until a significant improvement of the edema and a reduction of the volume has been achieved. Afterward, the patients undergo reduction surgery in a plastic surgery department and are subsequently transferred back to the lymphological clinic to continue the conservative treatment for further 2-3 weeks.
We demonstrate that severe cases of lymphedema can be successfully treated by combination of perioperative CDP and plastic surgery procedures. This integrated therapy concept also contributes to reduce the rate of postoperative complications.

AXILLARY LYMPHADENECTOMY AND SENTINEL NODE DISSECTION – *VIDEO WITH COMMENT*

M. WALD

LIPOSUCTION OF THE HAND – *VIDEO WITH COMMENT*

M. WALD

SESSION VI

Chairmen: M. Oberlin, J. Rößler, K. Johansson

INNOVATIVE THERAPIES FOR CHILDREN WITH LYMPHATIC MALFORMATIONS

JOCHEN RÖSSLER
Medical Center - University Freiburg, Center of Pediatrics and Adolescent Medicine, Germany

Lymphatic malformations (LM) are inborn abnormalities frequently diagnosed in the paediatric age group. Recently, somatic mutations in *PI3KCA*, a molecule of the mTOR signalling pathway have been identified in LM.

As mTOR inhibitors are available since several years for immunosuppressive therapy, the use of these drugs could now be an innovative approach for complicated LM that are not accessible to standard therapy such as sclerotherapy, surgery and conservative measures. Furthermore, complications of LM could be managed by this new strategy.

Lymph leakage is a severe complication of LM that can lead to protein loss and infections. We report on six patients that were treated with the mTOR inhibitor Sirolimus as an individual "ultima ratio" therapeutic approach. The patients had multiple pre-treatments such as surgery, laser- and sclerotherapy. First lymph leakage episodes started at the age of 2 months, 8 years, 12 years (2) and 14 years (2). Sirolimus was effective after one day (1), ten days (1), four weeks (4). Importantly, no toxicities were observed. Five patients are still on sirolimus for up to 3 years.

PROTOCOL OF LYMPHOEDEMA PREVENTION AFTER BREAST CANCER 3 YEARS OF FOLLOW-UP

M. CESTARI, S. AMATI, F. APPETECCHI, L. CURTI, M. DE MARCHI, DE REBOTTI, C. TOMASSI
O.U. Territorial Rehabilitation Domus Gratiae Center - NHS Umbria2 - Terni, Italy

Introduction: Four years ago, in the authors' laboratory of lymphology, it was decided to focus the attention on patients without clinical evidence of oedema, at risk of developing lymphoedema in the homolateral arm after breast cancer treatment.
The authors planned a preventive protocol that highlighted the importance of primary prevention in order to avoid lymphoedema onset.

Materials and Methods: After join lymphologist and physiotherapist assessment consisting of clinical evaluation, a centimetrical/volumetrical measurement of compared arms, a lymphoscintigraphy request, a shoulder functionality evaluation, through Constant-Murley Shoulder Score, and BMI evaluation, patients were included in five different groups after the start-up of a rehabilitative project:

-*Informative Group,* which includes all patients (20 patients at a time), whose end-point is the information on lymphoedema and the preventive behavioural rules;

-*Individual Rehabilitation Treatment* which includes patients with limited shoulder functionality (Costant-Murley Shoulder Score: range of motion equal or less to 28 out of 40 points) who undergo specific treatment after physiatrician and physiotherapist assessment. After improvement the patient is included in the Physical Activity Group.

-*Individual Lymphological Section* which includes patients with positive lymphoscintigraphy exam (slower radiotracer flow with initial dermal back-flow) and which consists of the review of preventive behavioural rules and a prescription of standard flat sleeve for housework. After this Section the patient is included in the Physical Activity Group.

-*Individual post-surgery problems treatment* (breast oedema, scar with or without oedema, axillary web syndrome, mobilization of prosthesis). After the treatment the patient is included in the Physical Activity Group.

-*Physical Activity Group* (10 patients at a time), which includes a physiotherapist, and patients without limited shoulder functionality or with a range more than or equal to 30 out of 40 points as well as all patients from individual treatments. This Physical Activity Group consists of gymnastics, with mobilisation of all physical districts, breathing exercises, relaxation technique, with music-therapy, and stretching exercises; furthermore, the physiotherapist highlights the importance of physical activity, based upon the patients predisposition and problems, and patients confront their problems with physiotherapist and/or each other.

In cases of slower radiotracer flow, a follow-up of 6 months was required instead of 12 months in cases of normal lymphoscintigraphy.

Results: The preventive protocol has highlighted its usefulness in order to prevent lymphedema onset (9% of patients after 3 years of follow-up) and the physical-psychological well-being achieved through the early and holistic care.

Conclusions: In the authors' laboratory of lymphology a protocol of lymphoedema prevention after breast cancer was planned, useful, in their opinion to prevent lymphoedema onset through the compliance of the patients, who must cooperate actively, and a rehabilitative team with early and holistic approach.

PROSPECTIVE SURVEILLANCE, EARLY DIAGNOSIS AND TREATMENT OF PATIENTS AT RISK

KARIN JOHANSSON [1], KATARINA KARLSSON [2], POLYMNIA NIKOLAIDIS [3]
[1] *Department of Health Sciences, Lund University, Lund, Sweden*
[2] *Lymphedema Unit, Department of Cancer Rehabilitation, Skåne University Hospital, Lund*
[3] *Department of Cancer Rehabilitation, Karolinska University Hospital, Stockholm, Sweden*

Introduction: Highest risk for development of arm lymphedema (AL) occur among breast cancer patients treated with both axillary surgery and radiotherapy. Scanning of these patients 1 month after surgery and again 4 months after RT for early diagnosis and compression treatment has proven effective to maintain AL at a minimum in a 10-year follow-up and 80% of the patients never exceeded lymphedema relative volume(LRV) 10% (Johansson, 2010). A hypothesis was generated that slight AL could be treated only with self-care and no compression.

Methods: Slight AL was defined as (LRV)5-8% using water displacement method (WDM) and/or TDC ratio>1.45 for upper arm and >1.3 for forearm using MoisterMeterD. Fifty-nine patients have been included, randomized to either no compression treatment (NCT, n=29) or daily treatment with standard compression sleeve ccl 1 (CT, n=30). Follow-up are made after 1, 2, 3, 6, 9 and 12 months.

Results: 29% were diagnosed with both WDM and TDC, 27% with only WDM and 44% with only TDC. The mean LRV for diagnosis by WDM was 6.3±0,8% and mean TDC ratio for upper arm was 1.66±0.2 and forearm 1.53±0.2. Forty-eight patients have passed 6 months follow-up. In the CT group (n=23) LRV has not increased in any patient. In the NCT group (n=25) there has been an increase of ≥2%LRV in 14 who therefore have started CT, but 11(44%) have no increase of LRV.

Conclusion: Preliminary results indicate that when early diagnosed, AL can be effectively treated by compression garment but is only needed for about half of the patients when LRV is ≤8% at diagnosis.

LYMPHEDEMA AND SPORT - AN OVERVIEW OF THE LITERATURE

ST. WAGNER

Professor Winiwater recommended 1892 in his first publication for the treatment of lymphedema exercising as one of the four important points of treatment, as it is recommend until today. But the question remains: are sport and gymnastic that save and beneficial to the extremities of patients with lymphedema as we think? Does it really not harm the patients? Thinking about the physiology of the lymphedema we have to consider the following points: stimulation of the circulation by physical training raises the filtration volume including the lymphatic volume, which may burden the lymphatic system additionally.

> There are many studies of lymphedema, mainly concerning the upper extremities, as it is shown by a review of the literature between 2000 and 2017. The main question of all these studies is not if there is an additional advantage to the lymphedema extremity, but do we not harm to the involved extremity ?

> All studies dealing with physical training and lymphedema of the upper extremities show that they are not harmful, even when started soon after surgery or activities like heavy weights lifting. No study shows a worsening of the lymphedemavolume. Only exercise such as Nordic Walking with walking poles and compressing stockings are showing a decreasing lymphedema volume.

> There are only a few studies investigating the effect of sport or special strength training of the lower extremities with lymphedema. All these studies show no worsening of the lymphedema by physical trainings. In summery patients in good health but suffering from lymphedema have under physical training a significant better health- related quality of life. This is one of the main reasons to motivate those patients to take part in sport and or physical training.

> From the physiological point of view, physical activities in water should be ideal for those patients. But there are only two studies dealing with physical activities in water with controversial results.

> In summery, all these studies show that physical training, even with heavy weights don`t worsen the lymphatic edemas of the affected extremities. Exercise like Nordic Walking with walking poles seems to have a positive effect on a decreasing lymphedema volume in theupper extremities. Sport in all those cases should be recommended for a better mood and health- related quality of life.

LYMPHOEDEMA AND ITS COMPLICATIONS TREATMENT (CDP WITH MEDICAL THERAPY)

D. CORDA

The most frequent complication in patients with chronic lymphostasis is erysipelas also known as lymphangitis or cellulitis. In the absence of adequate decongestion, antibiotic therapy is not sufficient to significantly reduce the amount of bacteria. This eventually leads to chronicity of infection with progressive worsening of the clinical features of involved soft tissues. In recent years, we have observed multi antibiotic resistance of bacteria localized on the skin wounds of patients affected by chronic lymphostasis. It is increasingly difficult to eradicate the infection and the consequent progressive chronic inflammation leads to critical tissue degeneration. In this work, we report data obtained from the implementation of pharmacological programs in tandem with decongestive therapy designed to treat acute and above all chronic persistent infections. The results show that this approach seems decisive and specific for the treatment of lymphoedema patients complicated by chronic infections.

Key words: lymphoedema, lymphangitis, erysipelas, cellulitis.

RESTORATION OF LYMPHATIC FUNCTION: FREE VASCULARIZED LYMPH NODE TRANSFER WITH AFFERENT LYMPHATICOLYMPHATIC AND AFFERENT LYMPHATICO-NODULAR ANASTOMOSIS

T. AUNG [1], M. RANIERI [1], S. GEIS [1], P. LAMBY [1], S. KLEIN [1], R. MÜLLER-WILLE [2], W.A. WOHLGEMUTH [2], KATJA EVERT [3], L. PRANTL [1], J. DOLDERER [1]

[1] Center of Plastic, Hand and Reconstructive Surgery, University Medical Center Regensburg, Germany
[2] Department of Radiology, University Hospital Regensburg, 93042, Regensburg, Germany.
[3] Department of Pathology, University Regensburg, Regensburg, Germany

Lymphatic malformations (LMF) are characterized by abnormal formation of lymphatic vessels and tissue overgrowth. The lymphatic vessels present in LMF lesions may become blocked and enlarged as lymphatic fluid collects, forming a mass or multicyst. Lesions are typically diagnosed during childhood, and are often disfiguring and life threatening. Available treatments consist of sclerotherapy, surgical removal and therapies to diminish complications.
Lymphatic malformations in inguinal region and inguinal lymphnode dissection is a challenging operation to occur without lower extremity lymphedema (LEL). Here, we report the first case of the resection of a lymphatic malformation and Dissection of the inguinal Lymph node and simultaneously we complete the reconstruction with mini abdominal plastic with vascularized lymph node transfer (VLNT) from ipsilateral and free VLNT from contralateral suprainguinal lymphnode with afferent lymphaticolymphatic anastomosis(ALLA) and Afferent lymphatico nodular anastomosis (ALNA).
The VLN was harvested from the ipsilateral and contralateral suprainguinal region under Indocyanine green (ICG) lymphography and patent blau navigation and transferred to the right goin region. The efferent lymph vessel of the VLN was supermicrosurgically anastomosted to the contralateral medial thigh lymphatic vessel.
Postoperative, there were no subjective or objective lymphedema on the right side and further on the left side. The patient needed nomore compression garment and manual lymph drainage. Further postoperative ICG lymphography showed the restoration of the lymphatic function.

MULTIMODALITY TREATMENT FOR LYMPHOEDEMA – MY EXPERIENCE

Prof. Dr. GURUSAMY MANOKARAN

Chief of lymphology services, Prof of plastic and reconstructive surgery, Amrita institute of medical science and research centre, Kochin, Kerala , India

Lymphoedema is as old as human race itself but the treatment has not progressed much because of poor understanding of its patho physiology.
Though India has the highest number of Lymphoedema patients as LF is very common cause of Lymphoedema in my country and there is no proper Center to treat this problem all under one roof and we don't have any training centre to train this therapist for MLD and Bandaging, until we started in our Center to teach this by using volunteers as our trainers .now our hospital (Amrita institute of medical science and research centre, Kochin) is the only Center in our country to do all under one roof . The foot hygiene , CDT, Pressure garments ,and the various surgical options are available under one roof. Our experience and our result will be discussed in detail in my power point presentation .
Our result shows combining MLD Bandaging with surgery followed by pressure garments gives the best out come for Lymphoedema of any etiology .
Which will be shown in my presentation.

PERCUTANEOUS SCLEROTHERAPY OF LYMPHOCELE AND LYMPHORRHEA USING POVIDONE IODINE'S FOAM

AMER HAMADÉ, NAOUEL BENSALAH, HÉLÈNE LAMBACH, BASTIEN WOEHL, PIERRE MICHEL, GOLNAZ OBRINGER, MICHÈLE LEHN-HOGG, NATHALIE BUSCHENRIEDER

Vascular Medicine, GHR Mulhouse et Sud-Alsace, Hôpital Emile Muller, Mulhouse, France

Purpose: The Lymphoceles and Lymphorrhea can be treated by sclerotherapy: sclerosis using doxycline, sclerosis applying amidototrozoate, sclerosis using alcohol and povidone-iodone. Lymphorrhea and lymphocele are a possible complication after trauma, surgery and biopsy. Their treatment is considered to be as less traumatic as possible because it is intended for patients already operated. We propose the efficacy of the percutaneous sclerotherapy of lymphorrhea and lymphocele using povidone-iodine's foam.

Materials and Methods: We studied 12 patients, 4 men and 8 women aged from 32 to 82 years who presented lymphatic complications, 4 patients with lymphatic fistula and lymphorrhea (LA), 8 with lymphocele (LE): 2 men presented LE after radical prostatectomy, 3 women LA after breast cancer surgery, 5 LE after vascular surgery and biopsy on the inguinal region, one LA on the thigh after melanoma surgery and one LE on the leg after vascular surgery. We have treated all the patients by local medical care, compressive dressing and percutaneous sclerotherapy using povidone-iodine's foam. In deep lymphoceles an ulrasound's guidance was necessary.

Results: The evolution was favorable with complete but late closure of the LA and LE. Multiple sclerosis were necessary to treat the patients. No major complication was reported.

Conclusion: In certain cases, the treatment of choice of the LA and LE would possibly be the percutaneaous sclerotherapy using povidone-iodine's foam.

Keywords: Povidone iodine, slerotherapy.

LYMPHA TECHNIQUE IN PREVENTING BCRL: OUR SINGLE-INSTITUTION EXPERIENCE

BUSETTO A.[1], DORRUCCI V.[1], PAPACCIO G.[2]

[1] *Cardio-Thoracic and Vascular Surgery Department, Vascular Surgery Unit, "Dell'Angelo" General Hospital, Mestre-Venice, Italy*
[2] *General Surgery Department, Breast Unit, "Dell'Angelo" General Hospital, Mestre-Venice, Italy*

Purpose: the benefit of LYMPHA (Lymphatic Microsurgical Preventive Healing Approach) technique to prevent BCRL (Breast Cancer Related Lymphedema), as described in previous works by Boccardo et al, is nowadays well assessed.
Straight candidates to LYMPHA technique are patients with high BMI (>30); those ones with normal BMI become candidates when latent lymphatic impairment is assessed by lymphoscintigraphy.
Starting from what already taken, we present our preliminary experience with this unique surgical procedure.

Methods: Between September 2015 to July 2016, 5 patients with breast cancer requiring axillary lymphadenectomy underwent BCRL prevention by LYMPHA technique (5,5% of all submitted to cancer resection and LA). Cases were selected by age (<65 years) and stage (clinic,hatic collectors, afferent to blue nodes, and collateral branches of axillary vein were performed.
Volumetry and lymphoscintigraphy were assessed pre and postoperatively in all patients; the latter after approximately 6 months, comparing pre and post-op lymph Transport Index (TI – normal below 10). Mean follow-up was 6 (6-15) months.

Results: Five patients received LYMPHA protocol. Four of them (80%) had no sign of lymphedema and volumetry was coincident to preoperative condition; lymphoscintigraphy showed MLVA patency at 6 months after operation and normalization of lymphatic TI, compared to preoperative conditions; no lymphocele or infectious complications occurred.
One patient (20%) developed a lymphangitic attack during RT, about 2 months postoperatively, with permanent arm lymphedema; lymphoscintigraphy displayed MLVA occlusion and TI over 20.

Conclusions: Even in our initial experience, learning curve well-thought-out, the LYMPHA technique appears feasible, safe and effective for BCRL prevention.

Keywords: LYMPHA technique, arm lymphedema, prevention, breast cancer, MLVA.

PARALLEL SESSION

Chairmen: E. Földi, J.P. Belgrado, G. Manokaran

EFFECTIVENESS OF CONSERVATIVE COMBINED TREATMENT IN LIPEDEMA PATIENTS AND CLINICAL MONITORING

MICHELINI S.[1], CARDONE M.[1], CAPPELLINO F.[1], FIORENTINO A.[1], FAILLA ALESSANDRO [1], MONETA GIOVANNI [1], ZINGARETTI CRISTINA[2], SAVERIO CINTI [2]

[1] San Giovanni Battista Hospital – ACISMOM –Via L.E. Morselli, 8, 00148 Rome, Italy
[2] Dip. Medicina Sperimentale e Clinica - Anatomia - Facoltà di Medicina, Università Politecnica delle Marche, Ancona, Italy

Introduction: Lipedema is painful and causes an impairment of daily activities. Traditional conservative treatments combine compression therapy, lymphatic manual drainage, and diet modification, mainly addressed to reduction of pain.

Aims of study: Aim of the study was to evaluate effectiveness in adding to these treatments low frequency ultrasound therapy, through 40 KHz cavitation, extracorporeal shock wave therapy (2 atm., 300 blows/min, 4.000 blows/ session), manual lymphatic drainage and inelastic bandaging, in reducing leg measurements after treatment.

Methods: The study was conduced on 30 affected patients, in II clinical stage. The subjects underwent 10 sessions of treatment addressed to the fatty tissue of the legs, twice a week. Leg measurements, VAS pain scale and ultrasound measurements of supra-fascial thickness were performed before and after treatment protocol.

Results: The results showed a significant reduction of leg measurements and of supra-fascial thickness (14%) , showing better results in combining all the performed conservative treatments, compared to limited protocols observed in literature. Average values of VAS pain scale showed significant reduction after treatment (average 3.7 points). Lymphoscintigraphy performed in 16 cases demonstrated a decrease of dermal back flow (with normal picking up of tracer at root of limbs in all cases) at the end of treatment. BMI was substantially unchanged before and after the treatment in all patients. We also started electronic microscopy examination of histological samples in familial cases in order to evaluate common morphological and functional features in inherited lipedema.

ITALIAN GUIDELINES ON LYMPHEDEMA: NEW PUBLIC RULES 2017

MICHELINI S.[1], CESTARI M.[2], RICCI M.[3], LEONE A.[4], GALLUCCIO A.[1], CARDONE M.[1]

[1] San Giovanni Battista Hospital – Rome – Italy
[2] Vascular Public Consulting Room – Terni – Italy
[3] Rehabilitative Department Torrette Hospital – Ancona – Italy
[4] Carmide Hospital .- Catania - Italy

Lymphedema is a social and disabling illness that effects the patient globally, as for the primary and for the secondary kind.
In 2006 the Italian Ministry of the Health appointed a Commission of national experts to draft the 'National Guidelines' on the illness.
On 15th September 2016 the Italian Ministry of Health issued regulations that govern the care for patients with lymphedema and related disorders.
Lymphedema is a complex pathology now considered under ICF standards applying a bio-psycho-social approach in the evaluation of rehabilitation needs of the patient.
Diagnosis procedure includes a three level examination. The first consists of lymphoscintigraphy, high resolution ultrasound and colour Doppler ultrasounds. The second, the Computering tomography, the MRI and a Lymphography; the third, other particular exams tailored for each clinical case.
Early combined therapy is recommended. The type of treatment depends on clinical stage and patients compliance.
Surgical intervention includes microsurgical treatment by means derivative or reconstructive anastomosis or super-microsurgery.
Very important is to avoid monotherapy (only manual lymphatic drainage, only bandaging etc.). Regarding the garments two/yearly in adult and three in paediatric patients are assured by the Health System. It is recommended genetic testing in primary lymphedema.
Every Italian Region must organize at least a 'Reference Centre', in order to transmit data, for the Epidemiological Monitoring, perform diagnosis, care and training, for patients and health care professionals, under the aegis of scientific societies. With regards to treatment guaranteed public rehabilitation centres for periodic therapy cycles, according to clinical indication are provided.

A MULTICENTER RCT COMPARING TWO COMPRESSION METHODS FOR THE TREATMENT OF DECONGESTIVE PHASE OF LYMPHEDEMA

VICENTA PUJOL-BLAYA [1], Mª LL. CATASÚS [2], SIRA SALINAS [2], Mª TERESA PASCUAL [3], ANA LOBATO [4], LAURA CAMPRUBÍ [1], ANNA MAURI [2], ANA MARÍA MORALES [3], ROSER BELMONTE [4]

[1] Hospital Universitari Vall d'Hebron. Barcelona
[2] Hospital Universitari de Bellvitge. L´Hospitalet de Llobregat. Barcelona
[3] Hospital Universitari Germans Trias i Pujol. Badalona. Barcelona
[4] Hospital Mar-Esperança, Parc de Salut Mar. Barcelona

Objective: To compare the effectiveness of a prefabricated adjustable compression wrap (PACW) vs. an inelastic multicomponent compression bandage (IMCB) in the decongestive treatment of upper limb lymphedema.

Methods: A single-blind randomized controlled trial with breast cancer-related lymphedema patients at four public hospitals. All patients were treated with manual lymphatic drainage followed by IMBC or PACW according to the allocation group. Outcomes were recorded after 10 sessions of treatment. The main outcome was the difference in the excess of volume of the affected extremity. Analysis by intention to treat was applied, to compare the results between the two groups with ANOVA at a significant level $p<0.05$.

Results: Among the 47 patients allocated, there were no significant differences between groups in any of baseline variables analyzed. Forty-two patients completed the study, 22 in PACW group. At the end of the 10 sessions, the heaviness and hardness decreased in the PACW group. In the IMCB group, there was a decrease in the tightness and hardness. In the PACW group the excess of volume decreased 15.8% (132ml) and the IMBC group showed a decrease of 27.6% (210ml) after treatments. There were no significant differences between groups in any variable.

Conclusion: Both treatments achieved a significant improvement in the excess of volume and symptoms at the end of the treatment. No significant differences were found between the groups.

LIPOFILLING OF THE AXILLA TO REDUCE SECONDARY LYMPHEDEMA AFTER AXILLARY LYMPH NODE DISSECTION

VANDERMEEREN L[1,2,3], BELGRADO JP [1,3], VANKERCKHOVE S [1,3], VALSAMIS JB [1,3], FEIPEL V [4], ROOZE M [4], MORAINE JJ [1], HERTENS D [2], CARLY B [2], LIEBENS F [2]

Université libre de Bruxelles
[1] Lymphology Research Unit, Faculté des Sciences de la Motricité
[2] Breast Clinic, C.H.U. Saint-Pierre
[3] Lymphology Clinic of Brussels, C.H.U. Saint-Pierre
[4] Laboratoire d'Anatomie fonctionnelle, Faculté des Sciences de la Motricité

Introduction: Upper limb lymphedema remains a frequent complication (3-60%) of axillary lymph node dissection (ALND) for breast cancer. Part of these lymphedema present also venous impairment. During surgery, adipose tissue surrounding the axillary vein is removed and the axillary sheath can also be damaged. This anatomical disruption could reduce the local hemodynamic condition, and increase microvascular filtration at the distal part of the affected limb. Patients with a venous impairment after ALND present clinical signs that allows us to identify them. In order to reduce their edema, we propose an original and simple surgical approach that could partially restore the axillary hemodynamic impairment.

Material and Methods: BCRL patients with positive clinical signs for axillary hemodynamic changes underwent lipofilling under the axillary vein. Patients remain without any treatment nor sleeves during 10 days after surgery. Precise volumetry was performed the day before, the day after and 10 days after surgery. After 10 days, patients restart previous physical treatment and we continued to evaluate limb volume by volumetry. Subjective symptoms as numbness, heavy arm, pain and tension of the skin were evaluated.

Results: 51 BCRL patients underwent lipofilling surgery. Edema volume reduced significantly in the majority of patients. Subjective symptoms like heavy arm, numbness, and functional impairment of the upper limb in daily activities started to decrease directly after the operation. After 40 months of follow up, no complications were recorded.

Conclusion: In selected BCRL patients, lipofilling under the axillary vein improves local hemodynamic, reduces distal hyperfiltration and consecutively reduces part of the edema. Results of this pilot study need to be empowered by multicentric studies.

THE OCCLUSION PRESSURE OF THE SUPERFICIAL LYMPHATIC NETWORK IN THE LOWER LIMB OF PATIENTS WITH FUNCTIONAL LYMPH COLLECTORS

BELGRADO JP [1,3,5], VANDERMEEREN L[1,3,4], VANKERCKHOVE S [1,3], VALSAMIS JB [1,3], MALLOIZEL-DELAUNAY J [5], MORAINE JJ [1], LIEBENS F [4]

Université libre de Bruxelles
[1] Lymphology Research Unit, Faculté des Sciences de la Motricité
[2] BEAMS, École Polytechnique de Bruxelles
[3] Lymphology clinic of Brussels, C.H.U. Saint-Pierre
[4] Isala Breast Clinic, C.H.U. Saint-Pierre
Université Paul Sabatier, Toulouse, France
[5] Dpt. of Vascular Medicine, University Hospital Rangueil

Introduction: Recently we showed, thanks to Near-Infrared Fluoroscopy, that the superficial lymphatic occlusion pressure in the upper limb of 32 healthy volunteers ranged between 80-140 mm Hg, mean 88.75 (SD 14.76). Given the surprising results, we decided to adapt the protocol on lower limb of patients with functional superficial lymph collectors in order to determine the superficial lymphatic occlusion pressure in the lower limb. Here we present our preliminary results.

Methods: Near-infrared fluoroscopy was performed on the lower limb in 16 patients with venous impairment or lipedema, but functional lymph collectors. Lymph flow was observed above a sphygmomanometer cuff, inflated by steps of 10mmHg. Optimized manual lymphatic drainage was executed during experiment to fill the observed lymphatic collectors, making sure they were stocked with lymph. Lymphatic pressure was established when lymph flow stopped. The experiment was interrupted at 160 mmHg, even if the lymph flow was still passing under such a high pressure.

Results: For one patient, the occlusion pressure was 130 mmHg. For the other 15 patients, lymph flow was not stopped at 160 mmHg. Lymphatic occlusion pressure is then higher than 160 mmHg for most of the subjects.

Conclusions: Near infrared fluoroscopy combined with optimized manual lymphatic drainage is an efficient tool to determine the lymphatic occlusion pressure of the superficial lymphatic collectors. Our study pointed out that the occlusion pressure of healthy superficial lymphatic collectors in the lower limb seems to be much higher than previously described, and even higher than in the upper limb.

DEEP INFRARED IMAGING TO IDENTIFY VENOUS IMPAIRMENT AFTER BREAST CANCER SURGERY

JEAN-PAUL BELGRADO [1,2], LIESBETH VANDERMEEREN [1,2,3], SOPHIE VANKERCKHOVE [1,2], JEAN-BAPTISTE VALSAMIS [1,2], VÉRONIQUE FEIPEL [4], MARCEL ROOZE [4], JEAN-JACQUES MORAINE [1], DINA HERTENS [1,2,3], BIRGIT CARLY [3], FABIENNE LIEBENS [3]

Université libre de Bruxelles
[1] Lymphology research unit, Faculté des Sciences de la Motricité
[2] Lymphology Clinic of Brussels, C.H.U. Saint-Pierre
[3] Isala Breast Clinic, C.H.U. Saint-Pierre
[4] Laboratoire d'Anatomie fonctionnelle, Faculté des Sciences de la Motricité

Introduction: Breast cancer related lymphedema (BCRL) is commonly attributed to axillary lymph node dissection (ALND) and reduction of lymph flow. Impairment of the axillary vein seems to contribute also to BCRL, leading to a deep pitting edema of hand and forearm. When a patient with axillary vein impairment stands up, hand skin looks rapidly hyperaemic, due to a vasodilation of the capillaries. This vascular situation may result from removal of the fatty tissue containing lymph nodes, and disruption of the good emptying of the axillary vein. The orthostatic intermittent venous stenosis induces collateralizations which are derivative evidence of the axillary vein impairment. We highlight them using an original and easy procedure, based on a deep infrared imaging (DIRI) device.

Materials and Methods: A total of 100 women were recruited, 50 BCRL patients and 50 healthy women as a control group. In all subjects, we performed visible light and DIRI pictures of the thorax, including neck, shoulders and upper arms. Images were mixed and screened by 3 blind operators. The operators screened for differences in thermograms, such as asymmetric and collateral trajects.

Results: The DIRI coupled with our reading grid seems to be specific and sensitive enough to identify BCRL patients with asymmetric collateralization of the axillary vein.

Conclusion: DIRI and its reading grid seems to be a useful tool in daily clinical practice to evaluate the hemodynamic changes of the axillary vein in BCRL patients. This evaluation gives us more insight in the (future) development and eventual treatment of BCRL.

MICROSURGICAL PROCEDURE FOR UNRESPONSIVE GROIN LYMPHOCELE ASSOCIATED TO LEG LYMPHEDEMA

SARA DESSALVI, MD, FRANCESCO BOCCARDO, MD, PhD, FACS, CORRADO CESARE CAMPISI, MD, PhD, STEFANO SPINACI, MD, CORRADINO CAMPISI, MD, PhD, FACS

Department of Surgery, Unit of Lymphatic Surgery
IRCCS S.Martino – IST Institute for Cancer Research
University of Genoa
Largo R. Benzi 8, 16132, Genoa, Italy

Lymphoceles may often complicate groin lymph node dissection related to cancer treatment. Conservative treatment is the first choice but not always successful. Different surgical methods have been used to treat lymphoceles, but they mainly consist in closing afferent lymphatics often causing the worsening of peripheral lymph stasis and related limb lymphedema. We assessed the efficacy of a diagnostic and therapeutic protocol to manage inguinal lymphoceles consisting of lymphoscintigraphy (LS) and microsurgical procedures. 21 groin lymphoceles (7 associated with leg lymphedema) were studied by LS preoperatively and treated by complete excision of lymphocele and microsurgical lymphatic-venous anastomoses between afferent lymphatics and a collateral branch of great saphenous vein. Lower limb lymphatics were identified intraoperatively using Patent Blue dye injection. 14 patients without lymphedema had complete healing of lymphocele and no appearance of lower limb postoperative lymphedema. The other 7 patients with associated secondary lymphedema had complete disappearance of lymphocele and a remarkable reduction of leg volume. 4 of them completely recovered without the need of any compression garment, after the first year postoperatively. Inguinal lymphocele nonresponsive to conservative treatment can advantageously be studied by LS and successfully treated by microsurgical reconstructive procedures.

THE LONG-TERM FOLLOW-UP OF THE PATIENT WITH UPPER EXTREMITY PRIMARY LYMPHEDEMA: A CASE REPORT

TUGCE DUMAN PT, MIRAY HASPOLAT PT, KADIRHAN OZDEMIR PT, BURAK ERTURK PT, SINEM SUNER KEKLIK PT, ILKE KESER PT

Gazi University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Turkey

Objectives: Primary lymphedema is progressive disease that typically affects the lower extremity. It is rarely diagnosed in upper limbs. The aim of this study was to investigate the long-term follow-up of the patient with upper extremity primary lymphedema.

Methods: We present an 18-year-old female patient with isolated left upper limb swelling which was described as PL. The patient was admitted to a cardiovascular surgeon complaining of swelling in the right hand dorsum. After Thoracic Outlet Syndrome and breast tumor were eliminated, she was evaluated for lymphedema. In lymphoscintigraphy was reported that she had an obstruction of the right lymph nodes of upper extremity. The patient was consulted to physiotherapist for exercise and advices for lymphedema. The patient was followed up for 2 years and assessed 6th, 12th and 18th months with home program which was included self-massage with manual lymph drainage, skin care, exercises (active and pumping), and advices for PL. Moreover, both posture and scoliosis exercises were added to the home program because of mild scoliosis. She complained about the increase in swelling as a result of carrying heavy books. The circumference measurement which was performed with tape measure in 4 cm intervals from ulnar styloid process to determine arm volume. The level of lymphedema was predicted from circumference measurement. The lymphedema severity was determined as mild (1-3 cm), moderate (3-5 cm), and severe (5+ cm). "The Disabilities of the Arm, Shoulder and Hand (DASH)", "International Physical Activity Questionnaire (IPAQ-Long Form)" and "Nottingham Health Profile (NHP)" were applied to determine the patient's arm and shoulder functions, physical activity level and quality of life.

Results: The body mass index scores were 20.52 at the beginning and 19.49 at the end. The total difference in circumference measurements was 14.8 cm at the beginning and 13.1 cm at the 6 month, 6.6 cm at the 12 month and 10.6 cm at the 18 month. The DASH-T score decreased from 26.67 to 15.75 points (0-100), and the IPAQ score was found to be physically active (>3000metric/min) at all the assessment. The NHP score increased from 43.91 to 117.31 points (0-600).

Conclusion: According to our results the patient benefit from the physiotherapy program. The quality of life of patient get worsted and the patient explained that it was because of the final week. The quality of life was effected by not only lymphedema but also other factors which cannot be thought as a determinant of the effectiveness of home program. It may be interpreted as the mild PL can be followed up with home program, successfully.

Keywords: Primary lymphedema, upper limb lymphedema, exercise, physiotherapy.

THE EFFECT OF COMPLEX DECONGESTIVE THERAPY (CDT) IN PATIENTS WITH POSTMASTECTOMY EDEMA

MAKAROVA VERA, MAKAROV IVAN, MAKAROVA NATALIE
Scientific and practical center "Lympha", Moscow, Russia

Breast cancer in 2012 was diagnosed in 1.7 million women according to the WHO. However, the 5-year survival rate at the first stage of breast cancer has increased and amounts to 80-90%. Thus, the urgent issue is rehabilitation of women after breast cancer treatment. One of the most frequently developing complications after combined treatment of breast cancer is postmastectomy lymphedema. In the absence of proper treatment, lymphedema can lead to serious complications and disability.
The aim of our work was to improve the comprehensive rehabilitation of patients with postmastectomy oedema.
646 patients with lymphedema have been treated since 2013 till 2015 in Scientific and practical center "Lympha". 42.2% of those was patients with secondary lymphedema, of which 43,5% (119 patients) - patients after mastectomy. The assessment of the effectiveness of edema care was conducted using the anthropometric measurements, photos in dynamics and calculation of the volume of the limb before and after treatment according to the formula, and comparing these volumes with the volume of healthy limbs.
The difference in volume between the two limbs (i.e. the amount of swelling) is conventionally taken as 100%. The total elimination of edema was 100%. Relief of edema by 30-50% was regarded by us as satisfactory, 50% to 75% - a good performance by 75-100% - an excellent result. All patients with postmastectomy edema received Complex decongestive therapy (CDT), which involved manual lymphatic drainage, the compression bandage, decongestive exercises and skin care.
The excellent result was marked in 95% of patients with unilateral postmastectomy. A good result was observed in 4.13% of patients, and only 1,65% had a satisfactory result.
So the use of Complex decongestive therapy (CDT) allows to achieve effective regression of postmastectomy edema. It provides the significant reduction of the edema, restore limb function, improve quality of life. This allows women who defeated breast cancer to live a full life.

Keywords: Lymphedema, breast cancer, postmastectomy edema, CDT.

LEG EDEMA IN CHRONIC LYMPHATIC INSUFFICIENCY IS LYMPHO-FIBRO-ADIPO-EDEMA

MARZANNA ZALESKA,WALDEMAR L OLSZEWSKI, MARTA CAKALA
Central Clinical Hospital and Medical Research Center, Warsaw, Poland

Objectives: In chronic lymphedema attention is directed at edema fluid but not tissue changes. Edema in lymphedema is accumulation of tissue fluid and lymph by obliteration of damaged lymphatic pathways and nodes. MRI and USshowed that fluid is only one element in increased limb volume. There is increase of fibroblasts and collagen mass, formation of multiple fibrous septa encompassing multiple fat globules in whole limb.

Aim: To study lymphatics, fluid volume, fibrous and fat tissue mass and their macro- and micro-topography. Methods. Fifty patients with lymphedema of lower limbs were studied. Ultrasound and MRI of limb were done. Biopsy specimens were collected during varicous veins surgery. Macroscopical evaluation of solid tissue structure, sites of fluid accumulation, subcutisimmunohistology, water content of specimens were done.

Results: Lymphoscintigraphy. Interrupted lymphatics, atrophied lymph nodes.
MRI. A 3-7 mm thick skin layer. Subcutis with a honeycomb structure and septa of different thickness depending on CEAP stage. Fat 20-30%, fibrous elements 30%, 15-40% of water. Ultrasound. Picture less clear but subcutis solid structure occupying up to 50% of surface. Biopsy specimens. Multiple fluid lakes 30-40% of area (not seen in controls). Dilated perivascular spaces. Dry mass after dessication up to 50% (controls 30%).

Conclusions: In lymphatic insufficiency limb volume is increased because of more fibroblasts, adipocytes and collagen mass, as well as accumulation of fluid. Early intensive high pressure compression therapy is recommended to prevent tissue changes.

FIVE-YEARS OF INTERMITTENT PNEUMATIC COMPRESSION IN POSTINFLAMMATORY, POSTTRAUMATIC AND POST-CANCER-THERAPY EDEMA OF LOWER LIMBS

MARZANNA ZALESKA,WALDEMAR L OLSZEWSKI, MARTA CAKALA
Central Clinical Hospital and Medical Research Center, Warsaw, Poland

Background: Chronic edema of lower limbs after dermatitis, trauma, venous ulcers and post-cancer-therapyis a serious disabling complication affecting millions. Cause of edema are chronic inflammation and subsequent venous and lymph stasis. Manual drainage can be applied to a limited number of patients.Problem of large cohorts of patients can only be solved by intermittent pneumatic compression (IPC).

Aim: To investigate a) how effective is a 5 years continuous daily high-pressure, long-inflation time IPC therapy in decreasing limb circumference/volume and tissue elasticity and b) tissue morphological changes an incidental complications.

Methods: Fifty randomly selected patients with unilateral lower limb with post inflammatory, posttraumatic and post-cancer-therapyedema stage II to IV were treated daily for a period of 5 years with a pneumatic device, 8 chamber sleeve, sequential inflation of chambers to 100-120mmHg for 50 sec(total 400sec) and no distal deflation, and 50 sec sleeve deflation time. Changes in limb circumference and tissue tonicity were measured during first year at monthly and later six months intervals.

Results: Durable decrease of limb circumference and increased elasticity were obtained starting after three-months of IPC application.Improvement was most expressed in the calf above the ankle and mid-calf. No complications as thigh ring or chronic genital edema were observed.

Conclusions: IPC takes over transport function of stagnant tissue fluid from insufficient veins and obliterated lymphatics by moving edema fluid to regions with normal drainage. Long term, high pressure IPC, long inflation timing therapy can be safely be recommended to patients with lower limb edema.

COMPARISON THE BODY SPINAL STABILITY AND POSTURAL BALANCE OF WOMEN WITH AND WITHOUT LYMPHEDEMA AFTER BREAST CANCER SURGERY: PILOT STUDY

MAHMUT SÜRMELI, ÖZLEM ÇINAR ÖZDEMIR, YEŞIM BAKAR

Abant Izzet Baysal University, Bolu, Turkey

Aim: The aim of this study was to compare the body spinal stability and postural balance of women with and without lymphedema after breast cancer surgery.

Method: 19 women, with an average age of 55,89±10,01, who underwent surgery for breast cancer participated in the study. The subjects were divided into two groups. One group consisted of 9 women who developed lymphedema and another group consisted of 10 women without lymphedema. The Biodex Balance System was used to measure the parameters of postural balance in 3 parameters: overall, anterior-posterior and mediolateral. To evaluate body postural alignment, New York Posture Rating Chart was used. In addition; spinal stability were evaluated by using Spinal Mouse measuring device allowing computer assisted analysis and display of the spinal cord's shape and mobility in the sagittal and frontal planes. The device provides data to the computer with Bluetooth and the measured curvatures are shown on the computer display.

Results: When the groups with and without lymphedema were compared after breast cancer surgery, Spinal Mouse Spine Check Score mean and posture values, and New York Posture Rating Chart values were found to be significantly different in favor of the group with women who were not developed lymphedema ($p<0,05$). When the postural balance values of the groups were compared, no significant difference was found in any of the overall, anterior-posterior and medio-lateral parameters ($p>0,05$).

Conclusion: As a result of our study, we found that the postural stability and alignment of lymphedema in women after breast cancer surgery were impaired; however, there was no significant change in postural balance parameters. This study was conducted with a small sample. There is a need for larger sample studies to achieve more objective results and more general interpretations about postural stability and balance changes in women with lymphedema after breast cancer surgery.

UPPER EXTREMITY FUNCTION, EDEMA AND DISEASE SPECIFIC HEALTH RELATED QUALITY OF LIFE IN PATIENTS WITH LYMPHEDEMA

ELIF DUYGU, PT, MSc., YESIM BAKAR, PT, PhD, Prof.
Abant Izzet Baysal University School of Physical Therapy and Rehabilitation, Bolu, Turkey

Introduction: Lymphedema is a debilitating condition due to chronic progressive nature. Negative impact of lymphedema on activities of daily living and quality of life is well known.

Objective: Aim of this study was to investigate the relationships between upper extremity function, edema and disease specific health related quality of life (HRQoL) in patients with breast cancer related lymphedema (BCRL).

Materials and Methods: 38 patients with BCRL were recruited to this study. Edema was assessed with the frustum method, disease specific HRQoL with Turkish version of Lymphedema Quality of Life (LymQoL) (ICC=0.92-0.99, Cronbach alpha's= 0.74-0.91) and upper extremity function were assessed with, Quick Disabilities of Arm, Shoulder and Hand Questionnaires (Quick DASH) respectively. Lower scores in Quick DASH and LymQoL indicates better upper extremity function and HRQoL.

Results: Mean age of the patients was 53 ± 11,3 years. Moderate positive correlation was found between Quick DASH and edema (r=0.5, p=001). High correlation was found between Quick DASH and LymQoL (r=0.7, p<0,01), Low to moderate correlation was found between edema and LymQoL (r=0.3, p=0,02).

Conclusion: As the edema increased, disease specific HRQoL and upper extremity functions decreased in patients with BCRL. Patients with better arm function had better quality of life. As lymphedema treated in early stages, so that the reduction of quality of life and upper extremity functions can be prevented.

Keywords: Breast Cancer Related Lymphedema, Quality of Life, Quick Disabilities of Arm-Shoulder and Hand Questionnaire.

EVALUATION OF THE DIELECTRIC VALUES AND RATIOS IN DIFFERENT PENETRATION DEPTHS IN PATIENTS AFTER BREAST CANCER SURGERY: RELATIONSHIP BETWEEN DURATION AND PENETRATION DEPTHS

ALPER TUĞRAL PT, MSc, YEŞIM BAKAR PT, PhD, Prof.
Abant Izzet Baysal University, School of Physical Therapy and Rehabilitation, Bolu, Turkey

Introduction: Studies reported that the more the earlier diagnose of breast cancer related lymphedema (BCRL) is made, the more the positive acquisitions are achieved. Tissue Dielectric Constant (TDC) measurement is a novel measurement method which is used for this purpose along with measuring the treatment effects. This study was aimed to analyze the relationship between time spent after surgery and TDC values in different penetration depths.

Materials and Methods: 20 women who underwent breast cancer surgery without lymphedema were included. Mean age, time spent after surgery were 56.05±11.01 years, and 2.74±3.32 years, respectively. Moisture Meter-D (MMD, Delfin Technologies, Kuopio, Finland) was used for measuring the dielectric values of the patients in both sides: 6 cm distal (forearm) and 8 cm proximal (biceps) point from the antecubital fossa, 10 cm inferior point of the axilla. MMD was used to measure in four depths (0.5, 1.5, 2.5 and 5.0 mm)

Results: The dielectric ratios, which are calculated by dividing the affected side's dielectric value to unaffected side's, were as follows within each probe in order of 0.5, 1.5, 2.5 and 5.0 mm depths in biceps, forearm and thorax reference points: 0.97±0.08, 0.99±0.14, 1.00±0.09, 0.97±0.07 for biceps, 1.02±0.16, 1.00±0.12, 1.04±0.17, 1.05±0.14 for forearm, 1.10±0.24, 1.22±0.30, 1.16±0.25, 1.17±0.21 for thorax, respectively. Correlations between time spent after surgery and ratios for each probe were not significant (p>0.05), while significant correlation among ratios between reference points within four different depths was found (p<0.05).

Conclusions: Although researchers indicated that the optimal probe depth was 2.5 mm to detect changes in tissue fluid, because it can measure the fluid proportion approximately in the dermo-epidermal junction, there was no information about the other probes which they can assess the proportional tissue fluid in different penetration depths. It is a well-known fact that as lymphedema gets chronic, tissue changes become more aggravated in its deep layers, and those cannot be evaluated with just a physical examination or 2.5 mm penetration depth TDC probe. To examine the changes mainly occurred with breast cancer surgery-related issues, studies needed in this area to investigate interactions between penetration depth and regular follow-ups.

Keywords: Tissue Dielectric Constant, Breast Cancer, Lymphedema.

TRUNK LYMPHEDEMA: COMPARISON OF TISSUE DIELECTRIC CONSTANT (TDC) IN PATIENTS WITH AND WITHOUT UPPER EXTREMITY LYMPHEDEMA

ALPER TUĞRAL PT, MSc, YEŞIM BAKAR PT, PhD, Prof.
Abant Izzet Baysal University School of Physical Therapy and Rehabilitation, Bolu, Turkey

Introduction: Incidence of the breast cancer-related lymphedema (BCRL) was reported to 20-36%, and recent reports assume these rates might be higher. BCRL is not affecting the extremities only, but also trunk parts in patients who suffer BCRL. While reports have been limited to show the incidence of trunk lymphedema, it was stated that after 3-4 years breast cancer surgery, patients could suffer from lymphedema in the axilla (22%) and their upper back (10%). Lymphedema of the trunk causes dysfunctionality, discomfort along with other symptoms which all contribute the one's decreased quality of life. Thus, this study was aimed to compare Tissue Dielectric Constant (TDC) of the trunk in patients with and without BCRL within 5 years after breast cancer surgery.

Objectives:

Method-Design: A total of 50 patients who underwent the breast cancer surgery were included. 29 of 50 (58%) patients had no lymphedema (Group 1) while 21 of them (42%) (Group 2) had not. Moisture Meter-D compact (MMDc, Delfin Technologies, Kuopio, Finland) was used for measuring the dielectric values of the patients in both sides 10 cm inferior point of the axilla in 2.5 mm depth where MMDc allows to measure. TDC ratios were calculated by dividing affected side's TDC value to the unaffected side's after triplicate measurements were done for each point. Averaged TDC value was recorded via device's software automatically.

Results: There was no significant difference in regard to time spent after surgery (1.96±1.21 vs 2.57±1.37 years), age and BMI between groups ($p>0.05$). TDC values of the affected side's and ratios between groups were not significant (35.05±7.53 and 1.10±0.26 for Group 1, 33.41±4.99 and 1.06±0.16 for Group 2).

Conclusions: Trunk lymphedema has been overlooked through in many lymphedema studies which they focused mostly on extremity lymphedema. This study showed that there is no difference in regard to affected side TDC values of trunk among breast cancer patients with or without lymphedema. It might be caused because of the RT, CT histories were not different between groups ($p>0.05$) (data not shown). Although it was reported that trunk lymphedema appears at the rate of 23-48% in breast, there are not enough studies. Further studies needed to clarify about trunk affection in regard to BCRL.

Keywords: Tissue Dielectric Constant, Breast Cancer, Lymphedema, Breast cancer-related lymphedema.

INDOCYANINE GREEN LYMPHOGRAPHY IS HELPFUL IN DETECTION OF EARLY LYMPHEDEMA AFTER BREAST AND UTERINE SURGERY BEFORE IT IS CLINICALLY DIAGNOSED

WALDEMAR L OLSZEWSKI, MARZANNA T ZALESKA
Central Clinical Hospital and Medical Research Center, Warsaw, Poland

Background: Around 40 % of postmastectomy and 25% posthisterectomy lymphedema are registered and numbers are increasing with longevity of patients. The development of lymphedema could be controlled if the early diagnosis were made.

Aim: To early diagnose lymph stasis in postmastectomy and posthisterectomy patients using indocyanine green lymphography (ICGL) before it is detected by the patient.

Materials and Methods: Twenty patients first year after axillary lymphadenectomy and twenty after histerectomy without visible edema of the limbs underwent ICG lymphography and pattern of lymphatics and sites of tissue fluid stagnation were evaluated. Time of ICG transport to proximal part of limbs was estimated.

Results: Postmastectomy. ICG accumulated in all patients at axillary pit, did not move across it but spread laterally displaying a dense meshwork picture. Time ICG reached arm pit was 2-3-times longer than on healthy side. Posthysterectomy. ICG reached groin region to produce a picture of a mesh sometimes very limited but evident. In few cases it was seen in the hypogastrium. In other few it was seen on both sides, however, one side dominated with larger area of stagnation.

Conclusions: ICG lymphography is a useful diagnostic tool for early detection of lymph stasis leading to formation of lymphedema.

LIVE INDOCYANINE GREEN LYMPHOGRAPHY SHOWS DIFFERENCES IN EFFECTIVENESS OF MLD, LINFOROLL MASSAGE AND INTERMITTENT PNEUMATIC COMPRESSION

MARZANNA T ZALESKA, WALDEMAR L OLSZEWSKI, RAJESH HYDRABADI, MOHAL BANKER, SASHI GOGIA, ARUN GOGIA
Medical Research Center and Central Clinical Hospital, Warsaw
Indian Lymphology Centers Ahmedabad, New Delhi

Background: In lymphedema classic lymphoscintigraphy can depict only sites of accumulation of edema TF but not its movement during compression procedures. Indocyanine green lymphograhy (ICGL) is more effective and can show TF movement at the tissue depth of 15mm. Pictures of the flowing TF allow application of effective massage pressure and timing.

Aim: To observe edema TF flow in lymphedematous lower and upper limbs during manual and Linforoll devise massage and intermittent pneumatic compression.

Material and Methods: Twelve patients with LLed of lower and twelve of upper limb stage II and III were investigated. ICG was injected between toes or fingers. Massaging started immediately after injection to avoid dye binding with tissue proteins. In groups of 4 classic MLD, Linforoll and IPC compression were applied. Linforoll massage pressure is shown on computer screen, that of IPC is selected on devise prior to massage. In all groups pressures ranged from 80 to 120 mmHg. Visual evaluation of TF flow was done. In some cases local fluorescence intensity was measured.

Results: MLD required forced pressure upon tissues to move radially TF and there was fast backflow upon removal of the massaging hand. Linforoll effectively moved TF unidirectionally without immediate backflow and rolling had to be repeated. IPC moved TF unidirectionally without backflow but 50 sec compression was not enough TF to flow a distance of 9 cm (length of inflated chamber).

Conclusions: IPCL should be used in studies of effectiveness of various types of massaging.

POSTMASTECTOMY LYMPHEDEMA IS SUCCESSFULLY TREATED BY SILICONE TUBE IMPLANTATION BYPASSING THE AXILLARY PIT

WALDEMAR L OLSZEWSKI, MARZANNA ZALESKA, RAJESH HYDRABADI
Central Clinical Hospital and Medical Research Center, Warsaw, Poland
Vein Clinic, Ahmedabad

Objectives: Women treated for breast cancer are facing a life-time risk of developing lymphedema in up to 40% of this population. In advanced cases of lymphedema main lymphatics are obstructed and tissue fluid accumulates in the interstitial spaces forming fluid “lakes”and “channels”. The only solution for fluid drainage would be creating artificial channel for flow away to the non-obstructed regions.

Aim: To form artificial pathways for edema fluid flow by subcutaneous implantation of silicone tubes bypassing armpit.

Material and Methods: Implantation was carried out in 35 patients with lymphedema after mastectomy, axillary lymphadenectomy and radiotherapy, stage II and III. Conservative treatment for at least 12 months remained without success. Tubes were placed from hand dorsum, through forearm and arm to scapular region. Implantation was followed by routine arm sleeve compression. Prophylactic long term penicillin was administered. The follow up is at present 24 months. External compression remained same as before implantion.

Results: a) implanted tubes brought about fast evacuation of excess tissue fluid, b) most decrease in circumference, volume and stiffness occurred in first two weeks, c) lymphoscintigraphy tracer accumulated in tubes and around them, e) free fluid was seen on ultrasonography at both ends of tubes and in between , e) no postoperative infection complications or tubing expulsion.

Conclusions: We propose a multimodality method comprising implantation, limb compression to generate fluid pressure gradient for flow and prevention of inflammation by administration of long-term penicillin. Operation is low-invasive and lasts 30minutes. It can be done in large cohorts of patients.

OBSTRUCTIVE LYMPHEDEMA OF LOWER LIMBS CAN BE SUCCESSFULLY CONTROLLED BY SILICONE TUBE IMPLANTS REPLACING OBLITERATED LYMPHATICS-SIX-YEARS FOLLOW-UP

WALDEMAR L OLSZEWSKI, MARZANNA ZALESKA, RAJESH HYDRABADI, PALLAVI KULURKAR
Central Clinical Hospital and Medical Research Center, Warsaw, Poland
Vein Clinic, Ahmedabad

Background: Obliteration of lymphatics recognized as lymphedema is followed by stasis of edema fluid with dilatation of intercellular space The question arouse whether decongestion of edematous tissue can be accomplished by implantation of artificial channels replacing function of lymphatics and support tissue fluid flow by application of external compression.

Aim: To follow effect of silicone tube implants replacing obliterated collecting lymphatics.

Materials and Methods: Study included 60 patients with lymphedema of lower limbs stage III and IV. All patients developed edema after hysterectomy and radiotherapy with inflammatory episodes, 5 had infectious skin incidents in the past. Lymphoscintigraphy showed lack of flow of tracer from foot to the groin. Three medical grade hydrophobic silicone tubes o.d.3.2, i.d. 1.8 mm, perforated every 2 cm, were implanted subcutaneously from mid-calf to hypogastrium. Subcutis and node fragments were taken for on-plate bacteriology. Elastic stockings grade II and two weeks of intermittent pneumatic compression were applied postoperatively.

Results: After 3-6 years mean decrease in circumference in mid-calf was from 1.5 -5 cm (3-17%) and increase in elasticity by 7-23%. On lymphoscintigraphy tracer was seen in tubes or around them. On ultrasonography accumulation of fluid around tubes could be shown. In 4 cases inflammatory episodes at calf and hypogastric end of implant were observed. Retrospective analysis of bacteriology from time of implantation revealed presence of Proteus, Acinetobacter and Neisseria.

Conclusions: Silicone tube implants in lymphedematous is a low-invasive effective method for decompression of obstructive lymphedema. Bacteriology of deep tissues at time of implantation is helpful for controlling infective inflammation episodes with specific antibiotics.

TONOMETRY OF DEEP TISSUES FOR SETTING EFFECTIVE COMPRESSION PRESSURES IN EDEMATOUS LIMBS

MARZANNA T ZALESKA, WALDEMAR L OLSZEWSKI, MAREK, MARIUSZ K. KACZMAREK, BOB FREIDENRICH
Central Clinical Hospital and Medical Research Center, Warsaw, Poland
Biocompression, Moonachie, NJ, USA

Background: Methods for evaluation of intermittent pneumatic compression (IPC) are based on limb circumference and volume. There is another important factor for evaluation of compression effects, namely elasticity measured by tonometry.

Aim: 1. to measure applied tonometer force and tonometer- generated edema fluid pressures, 2. to plot tonometer force against fluid pressure data to obtain correlation curve for setting ICP pressure, 3. Based on 2 and 3 findings to work out a formula for setting pressures in pneumatic device for an individual patient and at various limb levels.

Methods: Deep tissue tonometry force and tissue fluid pressures under tonometer indentor were measured in lower limbs in a group of 20 patients with lymphedema stage I-III.

Results: 1. deep tissue tonometry provided data on pressure generated in tissue fluid under tonometer indentor penetrating at depth of 10mm. 2. plotting tonometer force against tissue fluid pressures showed threshold pressure necessary for moving edema fluid, 3. formula based on tonometry values, for setting ICP pressures at levels initiating fluid flow was worked out.

$$Pp = T \times (25+13=38) + C3$$

Pp- pump pressure in mmHg,T- number of kg/sq.cm indenting tissues by 10mm, 25 mmHg + 13 mmHg -mean tissue fluid pressure under tonometer indentor/1000g/sq.cm + onesd,C30mmHg – mean pressure loss in tissues during IPC (difference between inflated cuff and tissue fluid pressure). Example: Pp = 2.0 x 38 + 30 = 106 mmHg in the inflated cuff (predicted tissue fluid pressure 76 mmHg).

Conclusions: Deep tissue tonometry of limbs is useful for setting IPC devices at compression pressures mobilizing edema fluid.

DEVELOPMENT OF "SEXUAL IMPACT SCALE IN BREAST CANCER RELATED LYMPHEDEMA (SIS-BCRL)": A NEW INSTRUMENT

YESIM BAKAR, ELIF DUYGU, ALPER TUGRAL, NURIYE ÖZENGIN, HAMIT COSKUN

POSTER SESSION

THE USE OF INDOCYANINE GREEN (ICG) IMAGING TECHNIQUE IN THE GROIN LYMPHOCELE MICROSURGICAL RESECTION

T. AUNG [1], S. GEIS [1], P. LAMBY [1], A. KEHRER [1], K. PFISTER [2], M. RANIERI [1], L. PRANTL [1], J. DOLDERER [1]
[1] *Center of Plastic, Hand and Reconstructive Surgery, University Medical Center Regensburg, Germany*
[2] *Department of Vascular Surgery, University Medical Center Regensburg, Germany*

The postoperative occurrence of lymph fistulas and lymphoceles in the groin is a complication that should be taken seriously. These fistulas or lymphocele cause an increase in morbidity and can support local and ascending infections. Furthermore a conservative treatment is not always successful. We recently described the Microsurgical resection of peripheral lymphoceles.
In the following study we investigated the efficacy of a pre-operativ and intraoperativ diagnostic and therapeutic protocol to manage inguinal lymphoceles using lndocyaningreen (ICG) and microsurgical procedures. All the patients completely recovered without the need of any compression garment, after the surgery.

EFFECT OF PHYSICAL ACTIVITY ON THE LYMPHATIC SYSTEM OF PATIENTS WITH BREAST CANCER RELATED UPPER LIMB LYMPHEDEMA

ROMAIN BARBIEUX [1-6], JULIE REDAWAY [2], PAULINE DE BACKER [3], CAROLINE THOMAS [4], OLIVIER LEDUC [2], ALBERT LEDUC [2-5], PIERRE BOURGEOIS [1], STEVEN PROVYN [6]
[1] *Department of Nuclear Medicine and Multi-disciplinary Clinic-Unit of Lymphology, Institut Jules Bordet, Université Libre de Bruxelles, Belgium,*
[2] *Lympho-phlebology Unit, Department of Occupational and Environmental Physiology, Haute Ecole Bruxelles-Brabant ISEK, Brussels, Belgium*
[3] *Haute Ecole Libre de Bruxelles Ilya Prigogine, Brussels, Belgium*
[4] *Faculté de kinésithérapie, Université de Liège, Leuven, Belgium*
[5] *Service de Kinésithérapie et réadaptation, Université Libre de Bruxelles – Vrije Universiteit Brussel.*
[6] *Anatomical Research and Clinical studies, Vrije Universiteit Brussel*

Introduction: In patients with breast cancer, adequate physical activity showed a beneficial effect during and after the treatment period. However, one of the main complications for patients undergoing Breast Cancer Surgery (**BCS**) remains the possibility to develop lymphedema and for many years physical activity hasn't been recommended for patients with lymphedema. The purpose of this study is to observe the effect of physical activity on the lymphatic system of patients with a Breast Cancer Related Lymphedema (**BCRL**).

Materials and Methods: Lymphoscintigraphic exams of 122 patients with BCRL were analyzed in Jules Bordet Institute for this study. Results were analyzed for both upper limb and for every patient using lymphoscintigraphic clinical criteria. Statistical differences were then calculated between the results of the edematous upper arm and the results of the healthy upper arm.

Results: In 0,8% of the cases, Axillary Lymphatic Nodes (**Ax LNs**) are visible in phase 1 against 27% in phase 2 and 65% in phase 3. In 58% of the cases, collaterals (Dermal Backflows or particular lymphatic nodes) are visible in phase 2 against 74,5% in phase 3. 17,2% of the patients are developing collaterals rejoining the axilla in phase 2 against 45,9% in phase 3.

Conclusions: According to our results, the lymphatic flow and the development of collaterals as well as the extension of those collaterals are increasing with physical activity. For patients developing a BCRL maintaining a certain level of physical activity could be healthy for the lymphatic drainage of the upper limb. Combining physical activity with a Multi Layered Bandage of the upper limb could be even more efficient to increase the lymphatic flow.

SPECT/CT ASSESSMENT OF UNEXPECTED LYMPHATIC DRAINAGES IN PATIENTS WITH PRIMARY LOWER LIMB LYMPHEDEMA (LLLE)

FLORIAN SARAGONI [2], ROMAIN BARBIEUX [1-4], OLIVIER LEDUC [2], ALBERT LEDUC [2,3], STEVEN PROVYN [4], PIERRE BOURGEOIS [1]

[1] Department of Nuclear Medicine and Multi-disciplinary Clinic-Unit of Lymphology, Institut Jules Bordet, Université Libre de Bruxelles, Belgium

[2] Lympho-phlebology Unit, Department of Occupational and Environmental Physiology, Haute Ecole Bruxelles-Brabant ISEK, Brussels, Belgium

[3] Service de Kinésithérapie et réadaptation, Université Libre de Bruxelles – Vrije Universiteit Brussel

[4] Anatomical Research and Clinical studies, Vrije Universiteit Brussel

Introduction: Primary lymphedemas represent a relatively rare but chronic, heavy and disabling pathology. Conservative treatment consists in physical therapy with Manual Lymphatic Drainage (MLD), Multi-Layered Bandages (MLB) combined with physical activity, Pressotherapy (PT) and skin care. Lymphedema management requires a good knowledge of lymphatic anatomy and collateralization pathways bypassing the affected area. The aim of this retrospective study was to evaluate the contributions and interests of SPECT/CT imaging, a new imaging technique that allows 3D visualization, when applied to 1ary LLLE.

Materials and Methods: 47 patients (33 women and 14 men: mean age 44.1 years ranging from 11 to 85 years old) referred for suspected 1ary LLLE (73% with 1rst symptoms before 35 years of age) underwent a standard bipedal planar 3 phases lymphoscintigraphic imaging and a SPECT/CT imaging at the level of the pelvis and abdomen. Classical planar imaging (PI) were compared to SPECT/CT imaging and contributions of the laters (in addition to the results of the formers) were analyzed in terms of demonstration of unsuspected lymphatic drainages and/or better precision of these structures.

Results: One patient was finally classified as normal and 12 showed only functional abnormalities. Among these 12 cases, one showed supra-iliac LN. The other 34 patients showed lymphangio and/or lymphadeno dysplasia with or without lymphatic reflux. SPECT/CT imaging showed and/or precised in 9 (20%) of the 47 patients the localization of LN (signing the presence of lymphatic collateralization pathways) in the following areas: inter-gluteal (in four patients and bilateral in one: all were not seen on PI), anterior abdominal wall (in 2 patients: one was missed on PI), supra-iliac (in 5 patients and bilaterally in one: in all these cases, these LN were suspected on PI). 4 out of these 9 patients had (left) inguinal lymphadenodysplasia with vascular lymphatic reflux originating from these inguinal LN, situation observed in only 6 patients of the series (5 left and 1 bilateral).

Conclusions: In patients with 1ary LLLE, SPECT/CT allowed in the present series to show in one patient out of ten lymphatic drainage pathways unsuspected on the classical planar imaging. Our study highlights and precise the importance and anatomical variability of these collateralization pathways which influence the physical treatments. Patients with suspected 1ary lymphedema should undergo a SPECT/CT in addition to a planar lymphoscintigraphic investigations, especially when the interpretation of the planar imaging is difficult and when lymphatic reflux are observed at the root of the limb originating from the inguinal LN.

LYMPHATIC DRAINAGES TO THE PARAVERTEBRAL LYMPH NODES IN BREAST CANCER PATIENTS

MIRELA MARIANA ROMAN [1], ROMAIN BARBIEUX [1,2,3], OLIVIER LEDUC [2], PIERRE BOURGEOIS [1]

[1] Department of Mammo-Pelvic Surgery, Service of Nuclear Medicine and Multi-disciplinary Clinic of Lymphology, Jules Bordet Institute, Université Libre de Bruxelles, Brussels, Belgium

[2] Lympho-phlebology Unit, Department of Occupational and Environmental Physiology, Haute Ecole Bruxelles-Brabant ISEK, Brussels, Belgium

[3] Anatomical Research and Clinical studies, Vrije Universiteit Brussel

Introduction: The anatomy of the normal lymphatic drainage of the breast is well established and has been described in the past. The lymphatic drainage can be altered after mastectomy, lumpectomy, axillary lymph nodes (LN) dissection, sentinel node biopsy (SNB) after breast/chest wall, supraclavicular and axilla irradiation, chemotherapy. On the other hand the breast reconstruction can also modify these lymphatic drainages but does not increase the risk of Iymphedema. These modifications of the drainage are the consequence for lymphatic edema but are explanatory of certain particular evolutions of the disease, in particular of contralateral axillary, internal mammary, supraclavicular ipsilateral or contralateral LN. we report a series of 6 patients where lymphatic drainages were observed towards to the paravertebral LN.

Materials and Methods: Radionuclide upper limb lymphangiographies were performed according to a well standardized protocol. The upper limbs being in resting conditions and the patient lying on the Gamma camera table, one tenth of one vial of Human Serum Albumin nanosized colloids (Nanocoll R, GE Healthcare, Belgium) labeled with 2 milliCuries of ^{99m}Tc in a volume of 0.2 ml (practically, the technician added 20 milliCuries of 99mTc-04 in 2.0 ml in one vial of Nanocoll and after labeling, had two tuberculin syringes with 0.2 ml each) was injected subcutaneously in the first interdigital space of each hand. Using dual head single photon gamma camera equipped with a parallel-hole all-purpose low-energy collimator, planar imagings (anterior and posterior views) of the injected sites, of the fore-arms and elbows and of the arms and axillas were obtained after a succession of three phases of investigation: after 30 minutes the limbs in resting conditions (phase 1), after 15 minutes of hand-grippings (phase 2) and after one hour of normal activity (phase 3). Dynamic imagings centered on the axillas were also acquired during phase 1 and 2. SPECT-CT was also performed when available (for technical consideration about spect-ct acquisitions and processing: see annex). Additional intradermal Injection of radiocolloids (0.4 ml of the same vial used for previous injections) were therafter performed using tuberculin syringes 1° at the level of the upper and external part of the edematous arm ("phase 4") and/or 2° at the level of the homolateral mastectomised anterior chest wall (usually on the mid clavicular line under the scar of the mastectomy) and/or at the level of the edematous breast (in the mid part of the inferior breast on the line of the nipple) ("phase 5"). Imagings were obtained directly after the injections as well as after stretchings and massagings of the injection site.

Conclusions: These 6 cases illustrate that using Iymphoscintigraphy +/- SPECT-CT patients with Iymphedema of upper limb/breast (occurring at the time of nodal evolution of their mammary cancer in 2) can show lymphatic drainage not only toward the ipsi and/or contralateral axillary and/or internal mammary lymph nodes but also toward intercostal and/or paravertebral lymph nodes. Surgeons, radiotherapists, physiotherapist, and medical oncologists should consider therapeutic implications.

THE LONG-TERM FOLLOW-UP OF THE PATIENT WITH UPPER EXTREMITY PRIMARY LYMPHEDEMA: A CASE REPORT

TUGCE DUMAN PT, MIRAY HASPOLAT PT, KADIRHAN OZDEMIR PT, BURAK ERTURK PT, SINEM SUNER KEKLIK PT, ILKE KESER PT
Gazi University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Turkey

Objectives: Primary lymphedema is progressive disease that typically affects the lower extremity. It is rarely diagnosed in upper limbs. The aim of this study was to investigate the long-term follow-up of the patient with upper extremity primary lymphedema.

Methods: We present an 18-year-old female patient with isolated left upper limb swelling which was described as PL. The patient was admitted to a cardiovascular surgeon complaining of swelling in the right hand dorsum. After Thoracic Outlet Syndrome and breast tumor were eliminated, she was evaluated for lymphedema. In lymphoscintigraphy was reported that she had an obstruction of the right lymph nodes of upper extremity. The patient was consulted to physiotherapist for exercise and advices for lymphedema. The patient was followed up for 2 years and assessed 6th, 12th and 18th months with home program which was included self-massage with manual lymph drainage, skin care, exercises (active and pumping), and advices for PL. Moreover, both posture and scoliosis exercises were added to the home program because of mild scoliosis. She complained about the increase in swelling as a result of carrying heavy books. The circumference measurement which was performed with tape measure in 4 cm intervals from ulnar styloid process to determine arm volume. The level of lymphedema was predicted from circumference measurement. The lymphedema severity was determined as mild (1-3 cm), moderate (3-5 cm), and severe (5+ cm). "The Disabilities of the Arm, Shoulder and Hand (DASH)", "International Physical Activity Questionnaire (IPAQ-Long Form)" and "Nottingham Health Profile (NHP)" were applied to determine the patient's arm and shoulder functions, physical activity level and quality of life.

Results: The body mass index scores were 20.52 at the beginning and 19.49 at the end. The total difference in circumference measurements was 14.8 cm at the beginning and 13.1 cm at the 6 month, 6.6 cm at the 12 month and 10.6 cm at the 18 month. The DASH-T score decreased from 26.67 to 15.75 points (0-100), and the IPAQ score was found to be physically active (>3000metric/min) at all the assessment. The NHP score increased from 43.91 to 117.31 points (0-600).

Conclusions: According to our results the patient benefit from the physiotherapy program. The quality of life of patient get worsted and the patient explained that it was because of the final week. The quality of life was effected by not only lymphedema but also other factors which cannot be thought as a determinant of the effectiveness of home program. It may be interpreted as the mild PL can be followed up with home program, successfully.

Keywords: Primary lymphedema, upper limb lymphedema, exercise, physiotherapy.

COMPLEX DECONGESTIVE PHYSIOTHERAPY DURING PREGNANCY WITH KLIPPEL TRENAUNAY SYNDROME: A CASE REPORT

ELIF DUYGU, PT, MSc., YESIM BAKAR, PT, PhD, Prof.
Abant Izzet Baysal University School of Physical Therapy and Rehabilitation, Bolu, Turkey

Introduction: Klippel Trenaunay Syndrome (KTS) is an unusually seen syndrome with typical combination of soft tissue or bony overgrowth, dermatological vessel abnormalities, and associated venous capillary or lymphatic malformations. Management is normally conservative and include complex decongestive physiotherapy (CDP), compression stocking, and intermittent pneumatic compression to reduce edema and rarely surgical correction of varicose veins and malformations.

Objective: The aim of the study was to assess the efficacy of complex decongestive physiotherapy for the treatment of KTS in pregnancy with increased edema

Materials and Methods: Patient with 32-week pregnancy with complaints of lymphorrhea and increased edema in her whole left lower extremity admitted to our unit. It was found that pathologic changes in her lymphoscintigraphy and venous Doppler ultrasound. Complex Decongestive Physiotherapy was applied to her five days a week for 2 weeks. Edema and quality of life were assessed with Frustum model and Lymphedema Quality of Life (LymQoL), respectively.

Results: Leg volume changed from 68910 ml to 66788 ml while LymQoL scores changed from 1.73 to 1.63. The severity of lymphorrhea alleviated with the CDP.

Conclusion: Edema volume, and quality of life scores were improved. Complex decongestive physiotherapy can be used effectively and safely in pregnancy with KTS.

Key Words: Klippel Trenaunay Syndrome, Complex Decongestive Physiotherapy, Pregnancy, Quality of Life, Edema.

TURKISH VERSION, VALIDITY AND RELIABILITY OF THE PATIENT BENEFIT INDEX-LYMPHEDEMA

ELIF DUYGU, PT, MSC.[1], YESIM BAKAR, PT, PhD, Prof.[1] İLKE KESER, PT, PhD, Assoc. Prof.[2]
[1] *Abant Izzet Baysal University School of Physical Therapy and Rehabilitation, Bolu, Turkey*
[2] *Gazi University, Faculty for Health Science, Department of Physiotherapy and Rehabilitation, Ankara, Turkey*

Introduction: Benefit of lymphedema treatments are very important in clinical settings especially from patients' perspective.

Objective: To investigate the Turkish adaptation, validity and reliability of Patient Benefit Index–Lymphedema (PBI-L) ensuring direct assessment of the benefit in patients with lymphedema, lipedema and lipolymphedema.

Materials and Methods: Eighty-one patients whose mean age was 47.66±14.23 years, diagnoses were lymphedema, lipedema and lipolymphedema, and who were treated or planned to be treated for these diagnoses were included in the study. PBI-L was adapted to Turkish by considering the stages of the cultural adaptation process and PBI-L was applied to the patients and repeated after one-week interval for the test retest reliability. Short Form (SF-36) was applied for the validity of PBI-L. The test retest validity was analyzed by Intraclass Correlation Coefficient (ICC) and internal consistency was estimated by Cronbach's alpha, and the consistency of the data to factor analysis was evaluated by Kaiser-Meyer-Olkin (KMO) test.

Results: It was determined that ICC value was 0.73 ($p<0.0001$) and Cronbach alpha value ranged between 0.80-0.89. Considering the sub dimensions of PBI-L and SF-36 was used for validity. Low correlation was found between PBI-L total score, mental health, physical function sub dimensions of SF-36 ($r=0.2$, $p<0.05$). Result of KMO statistics was 0.6 and it was found that the questionnaire was not consistent for factor analysis.

Conclusions: The Turkish version of PBI-L is valid and reliable in patients with lymphedema, lipedema and lipolymphedema. However, reassessment of PBI-L validity may be suggested by using a disease specific quality of life questionnaire.

Keywords: Patient Reported Outcome, Lymphedema, Lipedema, Turkish adaptation, Treatment Benefit.

POSSIBILITIES OF COMBINED APPLICATION OF GRAVITATIONAL THERAPY AND SURGICAL TREATMENT FOR PATIENTS WITH LYMPHEDEMA OF LOWER LIMBS

MYSHENTSEV P., KATORKIN S.
Samara State Medical University, Samara, Russia

Relevance: In Accordance with WHO various disorders of peripheral lymphatic drainage have 10% of the world's population and the number of newly diagnosed patients increases. Despite some achievements of the last years, many aspects of diagnosis and treatment of patients with lymph edemas of limbs are far from the final solution.

Purpose: Optimization of the results of patient's surgical treatment with lymphedema of lower limbs.

Materials and Methods: There was made an observation of 24 patients (19-64 years old) with lymphedema of lower limbs, who received surgical treatment during complex of antioedematous therapy. Stage I, II and III of disease had 3, 17 and 4 patients respectively. During pre-surgery period they had intermittent pneumatic compression, magnetotherapy, gravitational therapy (Russian patient № 2441635, 10/02/2012). Lymphoveinous shunting operations were performed for: 5 patients with primary lymphedema and with signs of hypoplastic proximal lymphatic vessels; 19 patients with secondary lymphedema of mainly post-traumatic nature. Gravitational therapy course (5-7 sessions; 8-10 minutes on each) was given again beginning with the 5th day of post-operational period.

Results: Complex treatment led to disappearance or reduction of heaviness and bloating in the affected limbs of all patients; the decrease of limb perimeter for 12-15% in 13 patients of I and II stages. Ultrasonic scanning of soft tissues limbs showed: changes of structure (disappearance or reduction of hypoechoic formations in the subcutaneous layer; no considerable changes of III stage patients (reduction of limb perimeters for 5%). Based on results of lymphotropic sample and lymphoscintigraphy there was improvement of lymphatic drainage resorption for 20-22% in 9 patients with I and II stages of the disease.

Conclusion: Thus, the efficiency of gravitational therapy for complex treatment of patients with lymphedema of lower limbs (in case of similar indications to lymphoveinous shunting) mainly depends on the stage of the disease. Provided that I and II stages of lymphedema (characterized by preservation of the structure of lymphatic vessels and soft tissues, and also by functionality of lymphangions), the stimulating effect on the lymph circulation is higher. With the increase of diffuse fibromatous reconstruction of soft tissues limb and with the decrease of perimeter of functioning lymph vessels to III stage of disease, the stimulation of lymphatic drainage with gravitational therapy is less effective.

FIVE-YEARS OF INTERMITTENT PNEUMATIC COMPRESSION IN POSTINFLAMMATORY, POSTTRAUMATIC AND POST-CANCER-THERAPY EDEMA OF LOWER LIMBS

MARZANNA ZALESKA,WALDEMAR L OLSZEWSKI, MARTA CAKALA
Central Clinical Hospital and Medical Research Center, Warsaw, Poland

Background: Chronic edema of lower limbs after dermatitis, trauma, venous ulcers and post-cancer-therapyis a serious disabling complication affecting millions. Cause of edema are chronic inflammation and subsequent venous and lymph stasis. Manual drainage can be applied to a limited number of patients.Problem of large cohorts of patients can only be solved by intermittent pneumatic compression (IPC).

Aim: To investigate a) how effective is a 5 years continuous daily high-pressure, long-inflation time IPC therapy in decreasing limb circumference/volume and tissue elasticity and b) tissue morphological changes an incidental complications.

Methods: Fifty randomly selected patients with unilateral lower limb with post inflammatory, posttraumatic and post-cancer-therapyedema stage II to IV were treated daily for a period of 5 years with a pneumatic device, 8 chamber sleeve, sequential inflation of chambers to 100-120mmHg for 50 sec(total 400sec) and no distal deflation, and 50 sec sleeve deflation time. Changes in limb circumference and tissue tonicity were measured during first year at monthly and later six months intervals.

Results: Durable decrease of limb circumference and increased elasticity were obtained starting after three-months of IPC application.Improvement was most expressed in the calf above the ankle and mid-calf. No complications as thigh ring or chronic genital edema were observed.

Conclusions: IPC takes over transport function of stagnant tissue fluid from insufficient veins and obliterated lymphatics by moving edema fluid to regions with normal drainage. Long term, high pressure IPC, long inflation timing therapy can be safely be recommended to patients with lower limb edema.

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN VENOUS FINDINGS AND QUALITY OF LIFE IN CHRONIC VENOUS INSUFFICIENCY

ÖZLEM ÇINAR ÖZDEMIR, MAHMUT SÜRMELI, SERKAN SEVIM, YEŞIM BAKAR
Abant Izzet Baysal University, Bolu, Turkey

Aim: The aim of the study is to investigate the relationship between venous findings and quality of life, body mass index, and depression in individuals diagnosed with chronic venous insufficiency.

Method: The study included 122 individuals from the Department of Cardiovascular Surgery of Abant Izzet Baysal University who were diagnosed with chronic venous insufficiency and whose mean age was 65.13 5.73. 74 of the individuals included in the study were women and 48 were men. The demographic information of the individuals was recorded. Body mass indexes were calculated from individual height and weight values. Visual Analog Scale for Pain Assessment, the Venous Insufficiency Epidemiological and Economic Study-Quality of Life Questionnaire to determine disease specific quality of life, the Venous Insufficiency Epidemiological and Economic Study-Quality of Life/Symptom Questionnaire to determine venous findings such as weight feeling on legs, pain in legs, edema-swelling, night cramps, temperature and burning sensation, Nottingham Health Profile to evaluate general quality of life and Beck Depression Scale to assess depression levels in Venous Insufficiency were used.

Results: 79.1% of the individuals participating in the study were in primary education, 5.4% in high school, 9.3% in university education and 6.2 was not literate. In the analysis of the correlation, it is found that, there was a moderate correlation between pain values to venous findings and the Venous Insufficiency Epidemiological and Economic Study-Quality of Life Questionnaire; and there was a weak relationship between the physical activity sub-parameter of the Nottingham Health Profile and the body mass index (respectively; r=-0.308, p=0.001; r=-0.343, p=0.000; r=-0.200, p=0.027, r=-0.179, p=0.048). In addition, there was a high correlation between venous findings and the Venous Insufficiency Epidemiological and Economic Study-Quality of Life Questionnaire (r=-0.785, p=0.000), moderate correlation between venous findings and Nottingham Health Profile total (r=-0.508, p=0.000) and sub parameters in pain (r=-0.491, p=0.000), energy level (r=-0.326, p=0.000), physical activity (r=-0.454, p=0.000), emotional reaction (r=-0.306, p=0.001); and low correlation between venous findings to sub-parameters of Nottingham Health Profile in social isolation (r=-0.291, p=0.001) and sleep (r=-0.289, p=0.001), Beck Depression Scale (r=-0.297, p=0.001) and body mass index (r= 0.223, p=0.014).

Discussion: In conclusion, it was determined that the increase of Venous findings in individuals with chronic venous insufficiency and the higher the body mass index, affects the quality of life and depression negatively. Chronic venous insufficiency is a life-long progressive and chronic disease. Symptoms of the disease increase with age. For this reason, necessary precautions should be explained to the individual from early ages and emphasis should be given to the use of compression stockings, aiming at increasing the quality of life with prevention of the progress of the symptom in later periods.

THE EFFECT OF GENDER ON PAIN AND QUALITY OF LIFE IN CHRONIC VENOUS INSUFFICIENCY

SERKAN SEVIM, ÖZLEM ÇINAR ÖZDEMIR, MAHMUT SÜRMELI, YEŞIM BAKAR
Abant Izzet Baysal University, Bolu, Turkey

Aim: The aim of the study is to examine the effect of gender on pain and quality of life in individuals diagnosed with chronic venous insufficiency.

Method: The study included 55 individuals who were referred to Abant Izzet Baysal University Cardiovascular Surgery Department with the diagnosis of chronic venous insufficiency. 26 women and 29 men were included in the study. The demographic information of the individuals was recorded. The Visual Analog Scale for pain assessment, the ChronIc Venous Insufficiency Questionnaire to assess disease-specific quality of life, the Nottingham Health Profile to assess general quality of life, and the Beck Depression Scale to assess depression levels were used.

Results: 70% of the individuals participating in the study were primary school, 4% had high school education, and % 4.3 were not literate. There was no significant difference in pain levels according to gender ($p > 0.005$). There was a significant difference only in energy level ($p = 0.012$) in subparameter of Nottingham Health Profile. There was also a significant difference between the genders in the level of disease specific quality of life and depression ($p = 0.001$, $p = 0.008$).

Discussion: As a result, although there was no difference between men and women in terms of pain, it was found that women were worse in terms of quality of life and depression compared to men. In our case, there are not enough studies to investigate the symptoms related to chronic venous diseases and their relationship with quality of life and depression. Because chronic venous insufficiency is a chronic and progressive disease, it affects life and daily activities and psychological well-being of person. At the same time, the quality of life is also affected when the symptoms start because the illness occurs before the first symptoms, such as pain, restlessness, occur. For this reason, the early stages of the disease should be delayed and the quality of life of the individuals should be ensured by telling what the patients with chronic venous insufficiency should do from the early period.

THE INFLUENCE OF THE ARM SLEEVES ON HEMODYNAMIC OUTCOMES DURING AN INDUCED UPPER LIMB OEDEMA

PASTOURET F.[1], ANCIELLO-TAFFANEL M.[2], LEDUC O.[2], ZIRAK C.[3] HUBAR I.[4]
[1] *Compression Therapy Research Unit, Papignies, Belgium*
[2] *Lympho-phlebology Unit Department of physical therapy (ISEK) Haute Ecole P.H. Spaak., Brussels, Belgium*
[3] *Plastic Surgery Department, Molière Hospital, Brussels, Belgium*
[4] *Area manager medi Belgium*

Background: Compression therapy is an essential component in the treatment of venous and lymphatic pathologies involving an oedema.

Objective: This study aimed to determine which type of compression arm sleeve (flat knitting and circular knitting) class II compression has an effect on the capillary filtration, on the swelling limitation of the upper limb in an experimental oedema situation.

Method: This experiment was conducted on six healthy women aged 20 to 25 years, who underwent an arm compression (70 mmHg) in order to create an experimental oedema. During this swelling's short period, the total forearm swelling (TFS), the percentage of maximum venous outflow in the first second (MVO) when the arm compression is removed and the capillary filtration rate (ml / min) were measured by an artisanal air plethysmograph (APG), without arm sleeve, with flat and circular knitted arm sleeves (randomised order).

Results: A certain influence was established by wearing a flat knitted compression on TFS and MVO during the experimental oedema situation.
Wearing a flat knitting arm sleeve significantly limits the volume increase (19% of swelling reduction) of the forearm compared to the value of TFS without compression, while round knitting doesn't significantly limit the volume increase (15%).
MVO was significantly increased when wearing flat knitted compression (around 21%) or circular knitting arm sleeve (around 13%) compared to the value of MVO without compression. The results concerning capillary filtration are more contrasted.

Conclusion: The results confirm the importance of considering the type of knit of the compression sleeve and no longer solely the compression class.

Keywords: Compression sleeves, Experimental oedema, Air plethysmography, Capillary filtration, Maximum volume outflow.

INTEREST OF 3D RECONSTRUCTED LIMB TO BUILD A CUSTOMIZED MULTICOMPONENT BANDAGE FOR THE TREATMENT OF A LOWER LIMB LYMPHOEDEMA WITH PARTIALLY AMPUTATED CALF. CASE REPORT.

PASTOURET F.
Compression Therapy Research Unit, Papignies, Belgium

Introduction: Multicomponent bandage (MCB) is an essential part in the treatment of lower leg lymphoedemas. However, 2 layers bandages applying methods proposed by manufacturers don't result in selected pressures nor in a digressive pressure gradient and the proposed methods are not adapted for every type of case. For specific lymphedema's patients, the therapist has to find a bandage application method to obtain specific therapeutic criteria as the final stiffness of the assembled bandage, the expected pressures and a specific pressure gradient.

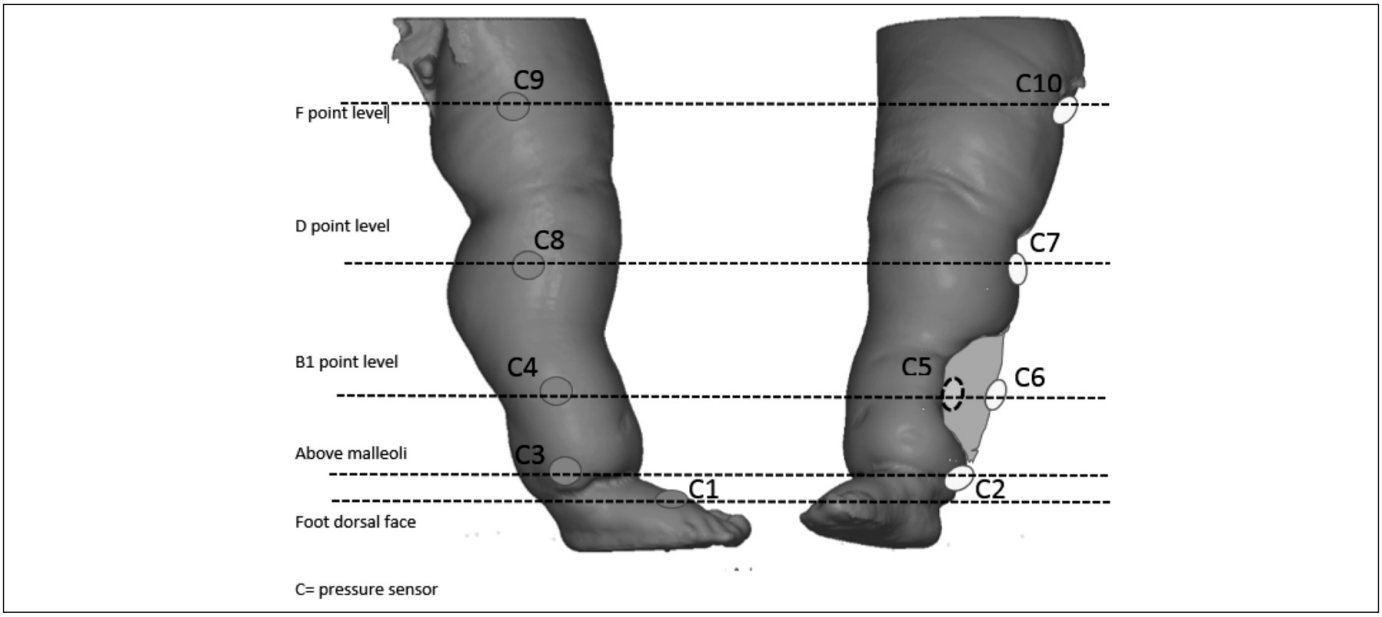
Objective: The aim of this study is to build a custom MCB with selected pressures and a digressive pressure gradient for a patient with lymphedema and partially amputated calf, who cannot stand high pressure levels on her limb.

Method: This experiment was conducted in 2 phases; first, on the 3D reconstructed lower limb and second on the patient herself.
1. From the simulated limb, a very light foam prosthesis of the partial amputated right calf was customized in order to fill in the loss of the calf tissue under the future bandage. A 2 mm thickness custom silicone pad (medi® silicone for custom made liners, density A-5) was designed to be the skin interface layer of the prosthesis due to the skin scares properties.
Pressure sensors were applied at 10 different selected points (Cf. Picture 1).
MCB consists on a first layer of tubular cotton jersey put directly on the skin, a second single layer of Mobiderm® (minimal overlap, no tension) and a last single layer of Biplast ®. Biplast® overlap method was adapted with a constant band tension to obtain 20-25 mmHg at dorsal face of the foot (100% of pressure) and a digressive pressure gradient on the rest of the limb. The foam prosthesis was placed on the silicone pad which was directly applied on the simulated limb under the MCB.
2. Bandage applying method was finally tested on the patient. Pressures were assessed in the same 10 locations on the real right limb in standing position and during walking. Dynamic Variation Pressure Indexes (DVPI) were calculated at each selected points (difference between maximal pressures and minimal pressures during walking) which represent "the local massage effect" or "pump effect" under bandage.

Results: On the patient, measured pressure at dorsal foot was 23 mmHg and external and internal digressive pressure gradients (E, IDPG) were obtained. For example: IDPG (C2: 61%, C7: 43%, C10: 43%). DVPI (mmHg) demonstrated high massage/pump effects at the dorsal foot face (16), above the malleoli (8-6) and under the prosthesis (16), due to the final resistance of the assembled bandage. The custom multi-layer bandage was well tolerated by the patient during experiment.

Conclusion: Working on 3D reconstructed limb to prepare a customized MCB is a new concept in compression therapy that allowed decreasing the time patient's investment.
Custom prosthesis with the silicone interface enabled to normalize the leg's shape, to protect the scare tissues and to obtain a high massage/pump effect on the skin graft which is a very important skin care benefit during the treatment. Final pressure, pressure gradients, DVPI and final resistance of assembled bandage are very satisfying and are leading to an optimal bandage tolerance by the patient.

Keywords: Multicomponent bandage, 3D reconstructed lower limb, Lymphoedema, Customized prosthesis, Gradient pressure, Dynamic variation pressure index.



Picture 1: Pressure sensors locations on the 3D reconstructed limb Nb: C5 is located under the prosthesis and C6 on the prosthesis.

DECONGESTIVE TREATMENT IN UPPER LIMB LYMPHEDEMA RELATED TO BURNS SEQUELAE. A CASE REPORT

VICENTA PUJOL-BLAYA [1], Mª LL TORRENT [2], ANTONIETA FALCO [1]
[1] *Lymphedema Unit.*
[2] *Burns Unit.*
[1,2] *Physical Medicine and Rehabilitation Department. Hospital Universitari Vall d'Hebron, Barcelona, Spain*

The incidence of lymphedema secondary to burns is uncertain; there are no epidemiological studies in the scientific literature.
We present the case of a burned patient with an affectation of the 80% of the body surface with second and third-degree burns of years of evolution.
The patient has required multiple corrective surgical procedures, presenting important retractions and amputation of upper extremities phalanges.
In spite of everything, the patient partially maintains her autonomy thanks to the functional clamp of both hands. In the postoperative course of an excision of a periarticular calcification of the elbow, presents clinical edema of the hand dorsum and first right phalanx with the loss of manual ability.
On examination, a pitting edema without stemmer sign is detected due to the absence of skin folds.
The predisposing factors for lymphedema were the circumferential involvement and depth of the burn, scar retraction and the trauma derived from the intervention.
In our case, the challenge was to find a customized decongestant system with which maintain her autonomy, thus we opted for a self-adjusting low elasticity device with lymphatic padding precast adjustable compression wrap with lymphatic padding.
Self-adjusting systems allow us to regulate working pressure during the day (dynamic stiffness index) while molding to different surfaces.
They have the additional advantage that they allow self-management with respect to the pathology reducing health costs derived from therapy.

Bibliography

1 - Lymphat Res Biol. 2004; 2(1): 11-24.
Incidence and prevalence of lymphedema in patients following burn injury: a five-year retrospective and three-month prospective study.
Hettrick H, Nof L, Ward S, Ecthernach J.

2 - Can J Plast Surg. 2004 Summer; 12(2): 79–80.
Lymphedema of the upper extremity following circumferential burns
Chenicheri Balakrishnan, MD, Lisa M Bradt, RN, Abdullah J Khalil, MD, and John M Trupiano, MD

BREAST CANCER RELATED LYMPHEDEMA ON A MALE WITH SEQUELAE OF CEREBRAL PALSY

V PUJOL-BLAYA [1], DANIEL PEDRERA [1], ESTHER TORO-TAMARGO [1], Mº DEL MAR MELENDEZ PLUMED [1], MÓNICA GOMEZ [2]
[1] *Physical Medicine and Rehabilitation Department.*
[2] *Physioterapy Departament.*
Hospital Universitari Vall d'Hebron, Barcelona, Spain

The breast cancer prevalence on men is around <1% approximately. The incidence of secondary lymphedema is uncertain, due to the fact that there aren't any epidemiologic studies in the scientific literature.
We present the case of a male patient who is 56 years old and who is affected by cerebral palsy with spastic hemiplegia. The ROM of the right upper extremity is no-functional; with an incapacity to fine-tune objects, difficulty to perform the claw and to control the clamping force since birth.
Due to breast cancer that requires suboptimal lymphadenectomy plus adjuvant radiotherapy, he presented a moderate lymphedema of distal predominance since the first year after surgery that has been progressing owing to the lack of mobility and the increase of untreated central neurological spasticity.
A treatment was applied comprising a complete decongestive therapy, sequential infiltration with botulinum toxin type A 100UI (Xeomin®) in pectoral musculature to decrease the spasticity; and stretching exercises aimed at increasing the shoulder ROM. In the maintenance phase, a custom-made containment garment class II, with adaptations, was prescribed for daytime use.
With this treatment, both significant decrease in lymphedema and functional improvement in upper extremity were achieved. Currently, he can use the arm as an assistant in the basic tasks of his daily life.

Conclusion: The combined treatment with sequential muscular infiltration with botulinum toxin and decongestant therapy of lymphedema in a disabled patient has been shown as a safe and effective treatment to improve the patient self-management.

TRUNK LYMPHEDEMA: COMPARISON OF TISSUE DIELECTRIC CONSTANT (TDC) IN PATIENTS WITH AND WITHOUT UPPER EXTREMITY LYMPHEDEMA

ALPER TUĞRAL PT, MSc, YEŞIM BAKAR PT, PhD, Prof.
Abant Izzet Baysal University School of Physical Therapy and Rehabilitation, Bolu, Turkey

Introduction: Incidence of the breast cancer-related lymphedema (BCRL) was reported to 20-36%, and recent reports assume these rates might be higher. BCRL is not affecting the extremities only, but also trunk parts in patients who suffer BCRL. While reports have been limited to show the incidence of trunk lymphedema, it was stated that after 3-4 years breast cancer surgery, patients could suffer from lymphedema in the axilla (22%) and their upper back (10%). Lymphedema of the trunk causes dysfunctionality, discomfort along with other symptoms which all contribute the one's decreased quality of life. Thus, this study was aimed to compare Tissue Dielectric Constant (TDC) of the trunk in patients with and without BCRL within 5 years after breast cancer surgery.

Objectives:

Method-Design: A total of 50 patients who underwent the breast cancer surgery were included. 29 of 50 (58%) patients had no lymphedema (Group 1) while 21 of them (42%) (Group 2) had not. Moisture Meter-D compact (MMDc, Delfin Technologies, Kuopio, Finland) was used for measuring the dielectric values of the patients in both sides 10 cm inferior point of the axilla in 2.5 mm depth where MMDc allows to measure. TDC ratios were calculated by dividing affected side's TDC value to the unaffected side's after triplicate measurements were done for each point. Averaged TDC value was recorded via device's software automatically.

Results: There was no significant difference in regard to time spent after surgery (1.96±1.21 vs 2.57±1.37 years), age and BMI between groups ($p>0.05$). TDC values of the affected side's and ratios between groups were not significant (35.05±7.53 and 1.10±0.26 for Group 1, 33.41±4.99 and 1.06±0.16 for Group 2).

Conclusions: Trunk lymphedema has been overlooked through in many lymphedema studies which they focused mostly on extremity lymphedema. This study showed that there is no difference in regard to affected side TDC values of trunk among breast cancer patients with or without lymphedema. It might be caused because of the RT, CT histories were not different between groups ($p>0.05$) (data not shown). Although it was reported that trunk lymphedema appears at the rate of 23-48% in breast, there are not enough studies. Further studies needed to clarify about trunk affection in regard to BCRL.

Keywords: Tissue Dielectric Constant, Breast Cancer, Lymphedema, Breast cancer-related lymphedema.

THE EUROPEAN JOURNAL
OF
lymphology
and related problems
VOLUME 29 • No. 76 • 2017
INDEXED IN EXCERPTA MEDICA

DOES LOWER EXTREMITY LYMPHEDEMA AFFECT QUALITY OF LIFE, FUNCTIONALITY, AND KINESIOPHOBIA?

ALPER TUĞRAL, YEŞIM BAKAR

ALPER TUĞRAL, PT, MSc (Corresponding Author)
Abant Izzet Baysal University, School of Physical Therapy and Rehabilitation, Gölköy Campus, 14030-BOLU
Tel: +90374 2541000-2311
Fax: +90374 253 46 63
e-mail: tugral.alper@gmail.com

YEŞIM BAKAR, PT, Ph.D., Prof.
Abant Izzet Baysal University, School of Physical Therapy and Rehabilitation, Gölköy Campus, 14030-BOLU
Tel: +90374 253 46 61
Fax: +90374 253 46 63
e-mail: ptyesim@yahoo.de

ABSTRACT

Background: Lymphedema is a chronic condition that affects patients in multiple aspects. It is associated with some kind of problems such as functional limitations, heaviness feeling, disruption of appearance, psychological stress and recurrent infections. It is a well-known fact that sedentary lifestyle and inactivity worsen the situation. As a result of misconceptual beliefs, lymphedema patients may avoid exercise and activity in addition to restricting themselves. Avoidance of activity may cause kinesiophobia and it worsens the situation by affecting the functionality and quality of life. Thus this study was aimed to investigate the effect of lower extremity lymphedema on functionality, kinesiophobia and quality of life.

Method: 17 lower extremity lymphedema patients and 18 healthy participants were recruited to this study. Quality of life was measured with Lymph Quality of Life questionnaire, kinesiophobia with Tampa Scale of Kinesiophobia and functionality with the Lower Extremity Functional Scale.

Results: Results showed that having lower extremity lymphedema affects the quality of life ($p<0.001$) and functionality ($p=0.001$), except for kinesiophobia ($p=0.372$). Outcomes measures were correlated to each other in moderate to high level ranges from $r=0.49$, $p= 0.045$ to $r=0.69$, $p=0.003$.

Conclusion: In conclusion, it can be interpreted as early detection of lymphedema related complications such as kinesiophobia and loss of function and management of them may prevent the decreasing of the quality of life.

Keywords: lymphedema, kinesiophobia, quality of life, functionality

1. INTRODUCTION

Lymphedema is described as an accumulation of protein rich fluid in interstitial spaces as a result of the corrupted function of lymphatic structures. Lymphedema is a chronic condition and affects patients in life-long period [1]. As there is no curable condition, conservative treatment modalities should be applied properly for each patient specifically. Lymphedema is associated with some kind of problems such as functional limitations, heaviness feeling, disruption of appearance, psychological stress and recurrent infections [2]. It is a well-known fact that untreated lymphedema gets worse [3]. If it does not get any management, chronic inflammation, cellulitis, pain, cosmetic deformities, constraint in movement, mobility problems and incapable of using functionally of affected extremity might occur [4].

Lower extremity lymphedema patients experience physical symptoms such as heaviness, loss of strength and even muscle-skeleton pain if this condition was chronic. Those all contribute to reducing mobility, independence and social isolation that interfere the one's quality of life and functionality [5]. Studies indicated that the severity of lymphedema might be a major component of the affecting patients' quality of life [6]. Patients who have lymphedema avoid using their affected extremity. This condition might be the result of misleading of patients upon exercise. Unacknowledged patients believe that if they use affected extremity even in daily life, lymphedema can manifest or gets worse if there is lymphedema already. This situation decreases the quality of life along with the restriction of joint movement and increasing edema severity. Eventually, functionality of the affected extremities is influenced negatively. Kinesiophobia can be described as vulnerability feeling both the fear of movement or activity and painful injury or reinjury [7]. It was stated that strong correlation between daily life activity performance and kinesiophobia [8]. Symptoms of lymphedema might affect the patients in multiple aspects. Especially the existence of edema affects patients not only in a psychological way but also fear of movement feeling. This situation might be get worsed as well as increased lymphedema severity. Researchers reported that there was a strong correlation between edema severity and fear of movement or kinesiophobia [9].

In the literature, there is a number of studies had been conducted on exercise benefits. Complex Decongestive Physiotherapy (CDP) is a well-known and accepted concept as the gold standard for conservative management of lymphedema. Exercise is one of the main components of this concept. Exercise, not only beneficial for the lymphedema patients but also activates the muscle-joint pump as the primary facilitator of the lymph transport [10]. As mentioned above, lymphedema patients restrict their activity or exercise themselves as a result of misconception. In contrast to this, scientific findings support the exercise as it is beneficial for

the patient not worsening of the situation. On the other hand, studies indicated that a sedentary lifestyle is a major risk component that increases the development of lymphedema [11]. To join a regular exercise program and persistence help keeping the stable weight in addition to preventing obesity as known as another major risk for lymphedema [12]. Studies showed that even having obesity only could worse situation or trigger the lymphedema [13]. It was indicated that upper extremity exercises combined with ten minutes breathing exercises improved heaviness and firmness feeling and provide a reduction in arm volume [14].

Secondary lymphedema constitutes the great majority of incidence of lymphedema. Cancer survivors can be benefited from exercise acquisitions such as decreased exhausting, increased strength, flexibility, body image and quality of life. It was stated that combined resistive and aerobic exercise do not aggravate or trigger lymphedema in upper extremity cases. Besides, resistive exercises can be applied with minimal risk of lymphedema in addition to alleviating symptoms and increasing muscle force in upper extremity lymphedema patients [15].

In the light of mentioned above, this study was aimed to investigate kinesiophobia in lower extremity lymphedema patients compared with healthy subjects. There were also aims of study such as to investigate relations among functional level, quality of life and the kinesiophobia.

2. METHOD

2.1 Participants of the study

After ethical approval (Abant Izzet Baysal University Ethical Committee 2015/150) consent was taken, the study was started. Two groups, experimental and control group, were included in this study. All participants were informed about this study by researcher both oral and written. Written informed consent was taken from all participants. Inclusion criteria were determined as follows: being a volunteer to recruit this study, aged between 18-75, having lower extremity lymphedema and being capable of filling and answering questionnaires. Exclusion criteria were determined as follows: being involunteer to recruit this study, having lower extremity edema associated with systemic diseases, incapable of filling and answering questionnaires, having mental and cognitive problems, having an active infection or condition. Power analysis was conducted for 80% power, 14 participants were needed to reach this power in each of the groups [16]. 31 participants were evaluated before the recruitment. Six of them had refused to recruit to study, three of them had an active infection, three of them were living in out of the city and two of them had lower extremity edema associated with systemic disease. Thus, this study was started with 17 participants in experiment group. A total of 20 healthy participants were asked to include in the control group. Two of them refused to recruit study, yet control group was completed with 18 participants.

2.2 Procedures

All patients were recruited in lymphedema unit at Abant Izzet Baysal University School of Physical Therapy and Rehabilitation. Evaluation of participants was started with a demographic data form. The form includes questions such as gender, age, height, weight, medical history etc. After demographic data form was applied, disease-related aspects of information were asked and documented also. Those were the duration of lymphedema, type of lymphedema; radiotherapy or chemotherapy exposition, the number of lymph node removed for the secondary lymphedema cases. Then, information was given to them about questionnaires. After all, participants were asked to fill out them.

2.2.1 Lymph Quality of Life Questionnaire

Lymph Quality of Life Questionnaire (LYMQOL) was used to determined participants' health-related quality of life. LYMQOL contains four domains: symptoms, body image/appearance, function, and mode. In lower extremity, LYMQOL-Leg was performed. A total of 26 questions was asked to fill by participants grading in "not at all", "a little", "quite a bit", and "a lot" [17]. Points scoring system is made by as follows: "not at all": 1 point, "a little": 2 points, "quite a bit": 3 points, and "a lot": 4 points. Quality of life level was determined to the degree of points achieved. Higher points indicate better quality of life while the lower points indicate the opposite. LYMQOL-VAS is a scale placed at the end of the questionnaire and it investigates the general quality of life score on a 10-point scale. As mentioned before, it is the same scoring as with LYMQOL itself.

2.2.2 Tampa Scale of Kinesiophobia

Participants' level of kinesiophobia was determined with the Tampa Scale of Kinesiophobia (TSK) questionnaire. It consists of 17 questions. Each question is scored according to 4-point Likert Scale system. "Strongly disagree" =1, "disagree"=2, "agree"=3 and "strongly agree"=4. Yet, some questions are scored the opposite way. The fourth, eighth, twelfth and sixteenth questions are reverse scored. The score ranges from 17 to 68. Higher scores indicate a high level of kinesiophobia [18]. Turkish validation and cultural adaptation was performed in 2011 by Yılmaz Tunca et al [19]. Participants were asked to fill out the most proper option for each question then score was calculated.

2.2.3 Lower Extremity Functional Scale

Lower Extremity Functional Scale (LEFS) was used to determine participants' level of function. Binkley et al. [20] developed this questionnaire in 1999 on the purpose of the evaluation of lower extremity function in patients who suffer musculoskeletal dysfunctions. LEFS consists a total of 20 questions and each question is scored zero to four points at five grade. Those grades were "extreme difficulty or unable to perform an activity", "quite a bit of difficulty", "moderate difficulty", "a little bit difficulty", "no difficulty". The lower the score the greater the disability. The maximum score is 80. Percent maximal function can be calculated as follows: (LEFS score)/80*100. All participants were asked to think about their swollen legs because of lymphedema and then fill out the questionnaire. Turkish validation and cultural adaptation was performed by Çıtaker et al. [21].

2.3 Statistical Analyse

The data was analyzed by using IBM SPSS 20.0 software (IBM Corporation, New York, USA). For continuous variables,

descriptive data were presented as mean (X) and Standard Deviation (SD) while categorical variables were represented as percent (%). Kolmogorov-Smirnov (KS) and Shapiro-Wilk (SW) normality tests were conducted along with histograms. Finally, a decision was made whether the data is normally distributed or not. If there was a normal distribution, independent t tests were performed to differentiate between two groups' values. Yet, if there was a non-normally distribution, Mann-Whitney U test was performed. P value of lower than 0.05 was accepted as statistically significant.

3. RESULTS

A total of 35 participants (17 lymphedema, 18 healthy) were recruited in this study. Demographic data of each group was presented in Table 1. When compared the groups to each other, there were differences in weight and BMI as expected before due to lymphedema (p=0.002).

In the lymphedema group, 14 participants were female and 3 participants were male. Regarding the type of lymphedema, 11 had primary and 6 had secondary lymphedema. Lymphedema severity was graded according to the International Society of Lymphology (ISL) grading system. The large majority (82.3%) of participants were in advanced level. Duration of lymphedema was also in a chronic. Table 2 shows the disease-specific characteristics of participants involved in lymphedema group.

When analyzed the LEFS, TSK, LYMQOL, and LYMQOL-VAS between the two groups, a significant difference (p=0.001 and p<0.001) was obtained in all outcome measures except for the TSK (p=0.372). The values that were obtained are presented in Table 3.

When correlation was investigated between outcome measures and BMI there was also a significant difference (r: 0.491 to r:0.687,

Table 1. Demographic data of the participants.

	Lymphedema (n=17) X±SD	Control (n=18) X±SD	p	t
Age (years)	51.47±15.40	48.22±11.20	478	-717
Height (cm)	160.59±8.94	162.66±9.12	501	680
Weight (kg)	94±24.58	71.44±11.96	**2**	**-3421**
BMI (kg/m²)	36.7±10.44	27.13±4.12	**2**	**-3531**

BMI: Body Mass Index, t test, p<0.05

Table 2. Disease specific characteristics of participants in lymphedema group.

		n:17	%
Type of lymphedema	Primary	11	647
	Secondary	6	353
Grade of lymphedema (According to ISL)	1	3	176
	2	6	353
	3	8	471
Duration of lymphedema	0-5 years	5	294
	5-10 years	7	412
	10 years or more	5	294

ISL: International Society of Lymphology

Table 3. Comparison of LEFS, TSK, LYMQOL and LYMQOL VAS parameters between the groups.

	Lymphedema (n=17) X±SD	Control (n=18) X±SD	p	z
LEFS	40.37±19.4	63.22±16.7	**0.001**	-3.193
TSK	43.18±6.82	39.44±7.73	372	-893
LYMQOL	2.27±0.66	1.38±0.47	**p<0.001**	-3.918
LYMQOL-VAS	5.18±2.13	8.11±1.88	**p<0.001**	-3.658

LEFS: Lower Extremity Functional Scale, TSK: Tampa Scale of Kinesiophobia, LYMQOL: Lymph Quality of Life Questionnaire, LYMQOL-VAS: Lymph Quality of Life Questionnaire-General Quality of Life, z: Mann Whitney U test, p<0.05

p<0.005) in all parameters in lymphedema group. Correlation values are presented in Table 4.

4. DISCUSSION

This study showed that having lower extremity lymphedema affects the quality of life and functionality while it has no affect on kinesiophobia.

It is a well-known fact that having BMI over 30 kg/m^2 is an important risk factor for lymphedema. Even some studies indicated that having BMI between 25-30 kg/m^2 is a serious component for manifesting lymphedema [22]. In this study, there was a significant difference in BMI between groups as expected before. It was thought that participants who had lymphedema had avoidance and fear upon movement so that inactivity or lack of movement might trigger the obesity. This was also supported by our results in which significant negative correlation was gained between BMI and LEFS. It is known that inactivity or sedentary lifestyle inhibit the use of muscle-joint pump though it is an effective transport mechanism for lymph fluid, participants should be strictly informed about obesity and its possible effects on their condition.

One of the major components of the complex decongestive physiotherapy, as accepted as the gold standard treatment regimen of the lymphedema, is exercise. Exercise facilitates venous and lymphatic flow physiologically in an affected extremity via activating the muscle pump mechanism [23]. Yet, individuals with lymphedema especially the cancer survivors, avoid exercise because of the misconceptual beliefs such as exercise might aggravate lymphedema. Fear avoidance beliefs cause abandonment of exercise and movement in totally as chronic nature of the condition is getting worse in conjunction with it. Recent studies indicated that exercise activates the muscle-joint pump mechanism that good for lymph transport rather than it is harmful for lymphedema [24].

There is no study that indicates harms of exercise upon lymphedema. Although there are many studies in the literature in which resistive exercise can be done with minimal risk, a combination of resistive and aerobic exercise does not cause the increased lymphedema severity. Even those studies indicated that exercise increases the quality of life, strength and provide social, emotional and functional well-being [15].

Lymphedema might cause muscle-joint pain due to the experience of heaviness feeling in it. Kinesiophobia might develop in addition to aesthetics issues. As far as we know, there is only one study that investigates kinesiophobia and lymphedema.

This study was reported that kinesiophobia levels significantly decreased after CDP [9]. However, this study was conducted with upper extremity lymphedema patients.

There is no study in lower extremity lymphedema patients related to this topic.

It was thought that there was no significant difference in TSK because of participants might have had difficulty to understand questions of TSK. Besides, the TSK questionnaire consists of questions associated with pain. Lymphedema is characterized by heaviness and loadness feelings. Thus, participants of this study might answer the TSK questionnaire improperly.

Quality of life of lymphedema patients is affected in multiple aspects such as emotional changes, diminished physical and social functions. Those all affect the one's quality of life and functionality. Along with the diminished quality of life and functionality, kinesiophobia quite likely occurs after then. Ingrained kinesiophobia aggravates the adverse effects of lymphedema so that a vicious cycle might occur. In this study, LYMQOL questionnaire was used to determine the quality of life of patients. Both in general and health related aspects, a significant difference was obtained between groups.

After gynecological cancer surgery, cancer survivors who had lower extremity lymphedema reported that diminished function, incapable of doing activities and loss of work in their daily life [25]. There is no study that LEFS was used for lymphedema patients. Studies mostly related on the functionality of patients in an early phase after orthopedic surgeries [26]. The functionality of participants in their lower extremity was investigated with LEFS in this study. There was a significant difference in LEFS between groups. LEFS also was shown to be correlated with other outcome measures. It was shown that the quality of life was shown to be directly correlated the functionality. Functional tests such as six-minute walk test may be used for the evaluation of the functionality of lymphedema patients objectively. Yet, in some situations, for instance, higher age or having another internal issue along with lymphedema might cause this test unable to perform. In our opinion, LEFS may be used to evaluate the functionality of patients with lymphedema in that conditions.

Table 4. Comparison of the relationships among TSK, LEFS, LYMQOL and BMI in lymphedema group.

	TSK		LEFS		LYMQOL		BMI	
	r	p	r	p	r	p	r	p
TSK	1000	–	-578	**19**	650	**5**	613	**9**
LEFS	-578	**19**	1000	–	-640	**8**	-687	**3**
LYMQOL	650	**5**	-640	**8**	1000	–	491	**45**
BMI	613	**9**	-687	**3**	491	**45**	1000	–

LEFS: Lower Extremity Functional Scale, TSK: Tampa Scale of Kinesiophobia, LYMQOL: Lymph Quality of Life Questionnaire, LYMQOL-VAS: Lymph Quality of Life Questionnaire-General Quality of Life, z: Mann Whitney U test, p<0.05

5. CONCLUSION

We think that early detection of patients who have a risk of kinesiophobia development is an important issue in the respect of changing treatment strategies and better treatment outcomes. Yet, evaluation of kinesiophobia should be specified just as health specific quality of life questionnaires. Thus, each disease has some unique symptoms in itself, evaluation of kinesiophobia in lymphedema patients must contain lymphedema-specific questions. In this way, kinesiophobia can be evaluated objectively. There is no questionnaire that measures the exercise barriers for lymphedema patients. We think that there is a need a questionnaire which investigates the problems of lymphedema patients during their exercise session and reasons of avoiding exercise. Further studies are needed in this area.

Lymphedema is not a curable condition. As it has a chronic nature, life-long management of lymphedema is an important issue. Herein, health professionals, especially the physiotherapy and nursing professionals must aware that informing patients who have lymphedema about obesity, sedentary lifestyle, inactivity and those related consequences that affects the condition have a place in the matter. Long-term results of kinesiophobia may lead to permanent loss of work, disability and increasing of the economic burden.

There were also some limitations of this study. Small sample size might be a factor regarding unable to achieve the significance level in TSK. To investigate the functionality of lower extremities, LEFS was used. However, functional tests such as Six minutes' walk test or other could have been used to gain more objective results.

ACKNOWLEDGEMENTS

This study was funded by Scientific Research Project committee of Abant Izzet Baysal University with the project number 2016.01.01.1040.

REFERENCES

1. Földi M, Földi E.: *Földi's Textbook of Lymphology*. 2nd ed. Mosby/Elsevier, GmbH Munchen, Munchen, Germany. 2006; pg 297-299.
2. Casley-Smith JR: *Measuring and representing peripheral oedema and its alterations*. Lymphology, 1994; 27(2): 56-70.
3. Ostby PL, Armer JM, Dale PS, Van Loo MJ, Wilbanks CL, Stewart BR: *Surveillance recommendations in reducing risk of and optimally managing breast cancer-related lymphedema*. J Pers Med, 2014; 4(3): 424-447.
4. Rockson SG, Rivera KK: *Estimating the population burden of lymphedema*. Ann N Y Acad Sci, 2008; 1131(1): 147-154.
5. Finnane A, Hayes SC, Obermair A, Janda M: *Quality of life of women with lower-limb lymphedema following gynecological cancer*. Expert Rev Pharmacoecon Outcomes Res. 2011; 11(3): 287-297-
6. Tiwari P, Coriddi M, Salani R, Povoski SP: *Breast and gynecologic cancer-related extremity lymphedema: a review of diagnostic modalities and management options*. World J Surg Oncol, 2013; 11(1): 1.
7. Swinkels-Meewisse EJCM, Swinkels RAHM, Verbeek ALM, Vlaeyen JWS, Oostendorp RAB: *Psychometric properties of the Tampa Scale for kinesiophobia and the fear-avoidance beliefs questionnaire in acute low back pain*. Manual Ther, 2003; 8(1): 29-36. doi:http://dx.doi.org/10.1054/math.2002.0484.
8. Linton SJ, Ryberg M: *A cognitive-behavioral group intervention as prevention for persistent neck and back pain in a non-patient population: a randomized controlled trial*. Pain, 2001; 90(1-2): 83-90.
9. Karadibak D, Yavuzsen T, Saydam S: *Prospective trial of intensive decongestive physiotherapy for upper extremity lymphedema*. J Surg Oncol, 2008; 97(7): 572-577. doi:10.1002/jso.21035
10. Schmitz KH, Ahmed RL, Troxel A, Cheville A, Smith R, Lewis-Grant L et al.: *Weight lifting in women with breast-cancer–related lymphedema*. N Engl J Med, 2009; 361(7): 664-673.
11. Hayes SC, Janda M, Cornish B, Battistutta D, Newman B: *Lymphedema after breast cancer: incidence, risk factors, and effect on upper body function*. J Clin Oncol, 2008; 26 (21): 3536-3542.
12. Edwards TL: *Prevalence and aetiology of lymphoedema after breast cancer treatment in southern Tasmania*. Aust N Z J Surg 2000; 70(6): 412-418.
13. Greene AK, Grant FD, Slavin SA: *Lower-extremity lymphedema and elevated body-mass index*. N Engl J Med, 2012; 366(22): 2136-2137.
14. Moseley AL, Piller NB, Carati CJ: *The effect of gentle arm exercise and deep breathing on secondary arm lymphedema*. Lymphology, 2005; 38(3): 136-145.
15. Kwan ML, Cohn JC, Armer JM, Stewart BR, Cormier JN: *Exercise in patients with lymphedema: a systematic review of the contemporary literature*. J Cancer Surviv, 2011; 5(4): 320-336.
16. Faul F, Erdfelder E, Lang AG, Buchner A: *G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences*. Behav Res Meth, 2007; 39(2): 175-191.
17. Keeley V, Crooks S, Locke J, Veigas D, Riches K, Hilliam R: *A quality of life measure for limb lymphoedema (LYMQOL)*. J Lymphoedema, 2010; 5(1): 26-37.
18. Vlaeyen JW, Linton SJ: *Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art*. Pain 2000; 85(3): 317-332.

19. Yılmaz ÖT, Yakut Y, Uygur F, Uluğ N: *Tampa Kinezyofobi Ölçeği'nin Türkçe versiyonu ve test-tekrar test güvenirliği*. 2011; 22(1): 44-49.

20. Binkley JM, Stratford PW, Lott SA, Riddle DL: *The Lower Extremity Functional Scale (LEFS): scale development, measurement properties, and clinical application*. Phys Ther, 1999; 79(4): 371-383.

21. Citaker S, Kafa N, Kanik ZH, Ugurlu M, Kafa B, Tuna Z: *Translation, cross-cultural adaptation and validation of the Turkish version of the Lower Extremity Functional Scale on patients with knee injuries*. Arch Orthop Trauma Surg. 2016; 136(3): 389-95.

22. Fu MR, Axelrod D, Guth AA, Fletcher J, Qiu JM, Scagliola J et al.: *Patterns of Obesity and Lymph Fluid Level during the First Year of Breast Cancer Treatment: A Prospective Study*. J Pers Med, 2015; 5 (3):326-340

23. Chang CJ, Cormier JN: *Lymphedema interventions: exercise, surgery, and compression devices*. Semin Oncol Nurs 2013; 29(1): 28-40. doi:10.1016/j.soncn.2012.11.005

24. Hayes S, Reul-Hirche H, Turner J: *Exercise and secondary lymphedema: safety, potential benefits, and research issues*. Med Sci Sports Exerc, 2009; 41(3): 483-489.

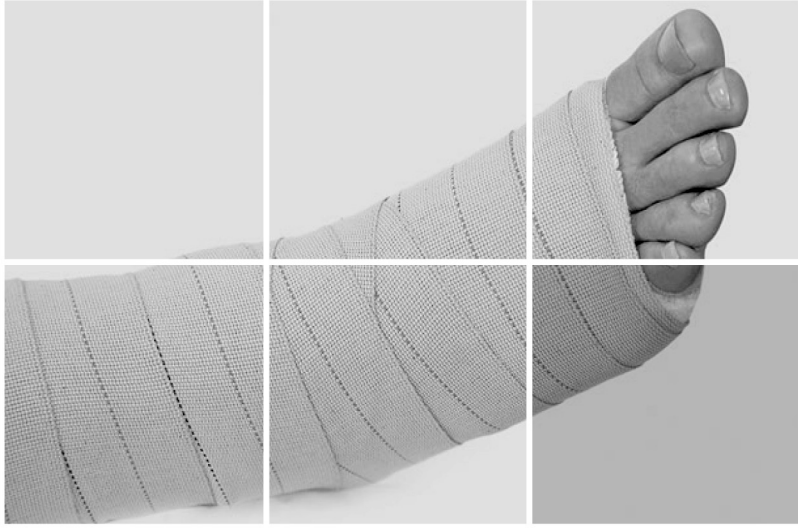
25. Novackova M, Halaska MJ, Robova H, Mala I, Pluta M, Chmel R et al.: *A prospective study in detection of lower-limb lymphedema and evaluation of quality of life after vulvar cancer surgery*. Int J Gynecol Cancer, 2012; 22(6): 1081-1088.

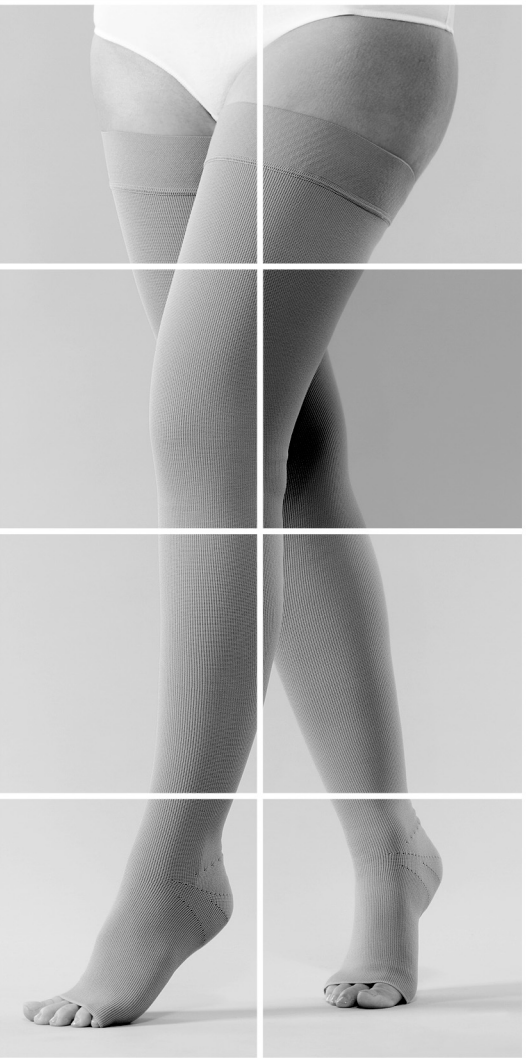
26. Pua Y-H, Cowan SM, Wrigley TV, Bennell KL: *The lower extremity functional scale could be an alternative to the Western Ontario and McMaster Universities Osteoarthritis Index physical function scale*. J Clin Epidemiol, 2009; 62(10): 1103-1111.

A COMPLETE PROGRAM FOR THE TREATMENT OF LYMPHOEDEMA

CIZETA *PRESS*®

Short extensibility bandages





VARISAN® FLAT

Flat knitting elastic garments, standard and made to measure

LINFORoll®

Medical device for the lymphatic drainage

GÜTEZEICHEN MEDIZINISCHE KOMPRESSIONS-STRÜMPFE RAL

ASQUAL COMPRESSION MÉDICALE

CONFIDENCE IN TEXTILES Tested for harmful substances according to Oeko-Tex® Standard 100 No. 074156.0 CENTROCOT

CIZETA MEDICALI S.p.A. - Via IV Novembre, 46
20012 Cuggiono (MI) Italy
Tel. +39 02.97.21.81.1 - Fax +39 02.97.24.07.34
www.cizetamedicali.com - info@cizetamedicali.com

CIZETA 1872 MEDICALI

SCIENCE & MEDICAL QUALITY