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SUMMARY

Clinical Sciences

XXXIII g.e.l. Congress - Prague, 12-13 May 2007

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Calendar

SOCIETÀ ITALIANA DI FLEBOLOGIA - 5th MEDITERRANEAN CONGRESS OF PHLEBOLOGY - 28 APRIL / 1 MAY, 2007
PORTO HELY (GREECE)

XXXIII CONGRESS OF EUROPEAN GROUP OF LYMPHOLOGY - MAY 12-13, 2007, PRAGUE (CZECH REPUBLIC)

CONGRESO ARGENTINO DE FLEBOLOGIA - 23 A 25 DE MAYO DEL 2007 - TUCUMÁN (ARGENTINA)

INTERNATIONAL UNION OF PHLEBOLOGY (UIP) - WORLD CONGRESS CHAPTER MEETING - 18 AL 20 DE JUNIO DE 2007
KYOTO (JAPAN)

SOCIETÀ ITALIANA DI FLEBOLINFOLOGIA (SIFL) - V CONGRESSO INTERNAZIONALE DI PHLEBOLOGY - 1-4 LUGLIO 2007
CORFÙ

21st INTERNATIONAL CONGRESS OF LYMPHOLOGY - SEPTEMBER 26-30, 2007, SHANGHAI (CHINA)

UNION INTERNATIONALE DE PHLEBOLOGIE (UIP 50) - 16^o CONGRESSO MONDIALE - AUGUST 31 / SEPTEMBER 2, 2009
GRIMALDI FORUM - PRINCIPATO DI MONACO



groupe ment Européen de
Lymphologie

European Group of Lymphology
XXXIII CONGRESS
Prague (Czech Republic) - May 12-13, 2007

Congress Venue:

Hotel Olympik Artemis
U Sluncové, 14 - 186 76 Prague 8

President of the Congress

Prof. Dr. Oldřich Eliška

Local Organizing Committee

K. Benda - H. Houdová - Z. Navrátilová - V. Pavlasová - M. Wald - M. Wittnerová

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ABSTRACTS OF THE SCIENTIFIC SESSION

Session I: Anatomy, physiology and pathophysiology of the lymphatics

SI - 1

SUPERFICIAL LYMPHATICS OF THE MAMMARY AND PARASTERNAL REGION

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This investigation is a continuation of our work concerning cutaneous and subcutaneous lymph drainage of the breast which was published in *Lymphology*, 2005. This observation demonstrated that every breast quadrant itself is drained by one or by two lymphatic collectors, and also by collectors which come from three remaining quadrants. All lymphatics of individual quadrants are connected with a subareolar lymphatic plexus. The dominant outflow of these pathways is into the axillary nodes.

The goal of the present study is to find the natural border between lymphatic drainage of the breast and parasternal lymphatic drainage. The study was performed on 18 female cadavers aged 52-73 years. After local warming of the anterior part of the thorax to temperature 37 degrees Celsius, gradually and slowly by patent blue or by a mixture of patent blue with India ink upon injection cutaneously and subcutaneously on the both sides of the sternum in the level of the second to fifth intercostal space.

Results: If the solution was injected in the distance 4cm from sternum, the dye spreads predominantly to the subcutaneous tissue of the ipsilateral breast. If the solution was injected in the distance 1 cm from sternum, the dye spreads predominantly to the contralateral parasternal side and into the deep ipsilateral parasternal lymphatics.

SI - 2

STUDY ON LYMPHATIC INVASION BY CANCER CELLS IN CASES OF GASTRIC ADENOCARCINOMA

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Materials and method: An investigation with surgically resected stomachs and their regional lymph nodes from cases of primary gastric adenocarcinoma was performed. The histological sections of the stomachs were subjected to immunohistochemistry using monoclonal antibody of D2-40 (DakoCytomation M3619) to detect lymphatic invasion by the tumor cells. The relation between extent of lymphatic invasion, histological types of the carcinomas, stages, and extent of lymph node metastasis was analyzed.

Results: With D2-40 immunohistochemistry, lymphatic endothelial cells always gave clear positive signals along its contours, and endothelial cells of the blood vessels never revealed positive signals with D2-40 antiserum. So that, we could make accurate assessment of extent of lymphatic invasion by cancer cells. Lymphatic invasion by the tumor cells were principally observed in pre-existent submucosal lymphatic vessels. The extent of lymphatic invasion and the extent of lymph node metastasis correlated proportionally. The lymphatic invasion showed tendency to be more extensive in cases of gastric type of adenocarcinoma rather than those of intestinal type. There was no case having lymphatic invasion among cases with carcinoma limited in lamina propria.

SI - 3

INFLAMMATION OBSERVED IN LYMPHEDEMA FREE FROM CLINICALLY RECOGNIZED INFLAMMATORY COMPLICATIONS

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It is well known that after the lymphedema patients suffer from lymphedema-related acute dermatitis, the edema gets worse. However even though there is no such complication observed, some patients become worse in edema. How does it come? To answer the question, this investigation has been performed.

Materials and Methods: Unilateral secondary lymphedema of stage 2 apparently free from inflammation were examined by blood chemistry, histology and histochemistry.

Results: ESR is high and so is inflammatory cytokine ICAM-1. All histology specimens show lymphocytic inflammatory infiltrations (in some case uninvolved and involved extremity are the same extent in infiltration but in some they are different). These infiltrating cells are T-lymphocytes and Th1 dominant. C-NOS is also observed in the lymphatic wall in the edematous tissue.

Discussion: In the last international congress of lymphology, Brazil, 2005, the author has shown there are two kinds of lymphedema of stage 2, the one shows almost no cell infiltrations in the lymphedematous tissue and the other, moderate. May be the former cases does not get worse for a long time and the latter does. Interleukin-1 in the epidermis stimulates T-cells by the help of bacterial super antigen resulting in remarkable inflammation. And c-NOS in the lymphatics with the help of bacteria-stimulated macrophages produces more NO which disturbs the lymphatic contraction. All these favor to produce worsen lymphedema. The author has shown in the past congress that in lymphedema-related acute dermatitis skin surface resident bacteria invades into dermis and its bacterial superantigen induces an intensive inflammation causing fibrosis and tissue changes resulting in lymphatic insufficiency. It is also suspected the same process is going on even in this complication free case, although it is less remarkable and difficult to be clinically recognized. Any lymphedema treatment which minimizes the tissue inflammation is thought to be a good treatment of choice.

SI - 4

STUDY OF THE INFLUENCE OF RADIOTHERAPY ON THE LYMPHATIC SYSTEM AND ON THE DEVELOPMENT OF LYMPHEDEMA

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Background: Radiotherapy is one of the most important risk factors for the development of lymphedema after mastectomy with axillary node dissection.

Purpose: In order to study the effect of radiotherapy on the development of lymphedema in breast cancer patients after axillary node dissection we transferred this problem onto an animal model. This study tries to evaluate the damage done on the lymphatic system and on the surrounding tissues after radiotherapy, and the regeneration process will be followed.

Methods & Materials: Twenty mice (Type NMRI, female, between 20 and 30 gram), are irradiated by brachytherapy (20 Gy). An anaesthetic-cocktail (ketamine and medetomidine) injected before the source of radiation was placed transverse the body of the mouse. After 2 and 4 weeks interval, 10 mice are analysed. Anaesthetics (25% urethane-solution) injected and after an external observation, an incision was done on the breast of the mouse. Trans-illumination microscopy in vivo, digital photography and specific software gave us the opportunity to make an overview of the intern site of the chest wall and so to make a study of the micro-vascularisation of the irradiated region. Direct lymphography in vivo was used to follow the continuity of the lymphatic vessels. Anatomic slides of the damaged structures are kept in formaldehyde and will be analysed in the anatomic-pathologic laboratory.

Results: After 2 and 4 weeks respectively 2 mice died, and so they are excluded from the study. The most important effects seen after 2 weeks are: on the outside redness (6/8) and edema (4/8), and on the inside cleaved skin (4/8), hyper-vascularisation (4/8) and oedema (5/8). There was no damage on the lymphatic system. The effects after 4 weeks are different, mostly on the outside: inhibition growth of hair (8/8) and scaly skin (7/8). The effects on the inside decreased in comparison to the 2-weeks group, hyper-vascularisation (3/8), oedema (3/8) and cleaved skin (4/8). The lymphatic system of all mice still was intact.

Conclusion: After 2 weeks most of the effects are visual on the inside of the skin (hyper-vascularisation, oedema, cleaved skin) in comparison with the results after 4 weeks, most of the effects are seen on the outside (inhibition growth of hair, scaly skin). No damage of the lymphatic system was seen after 2 and 4 weeks.

Future: Extra 10 mice are treated with 20 Gy, the dissection is planned after 8 weeks (April, 2007). These results and the results of the anatomic-pathologic laboratory will be presented at the congress.

SI - 5

SONOULTRASONIC WAVES EFFECT ON OEDEMA INDUCED BY ECCENTRIC CONTRACTION IN RAT SKELETAL MUSCLE

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In our Rehabilitative Center the use of the sonorous waves for the treatment of the oedema is a common practice. The clinical casuistry daily demonstrates the effectiveness of this physical therapy in activating lymphatic drainage and therefore reducing the oedema. In the cases of venous lymph-oedema the clinical evidence demonstrates that sonorous waves are able to influence the mobility of interstitial proteins, that result more easily drained by lymphatic.

To gain a more detailed understanding of the sonorous wave effect in oedema drainage we applied sonorous waves delivered by the Flowave instrument to an animal model of inflammation and oedema induced by eccentric exercise.

Experiments were performed on the soleus muscles of 8 adult male Sprague Dawley rats (250 g average body weight). Eccentric exercise was performed (Heap 2006). Briefly Soleus muscle was indirectly stimulated during its lengthening phase when the animals were pedalling on a custom made cycle.

The animals were divided randomly in two groups. In one the exercised legs was subjected to 5 min treatment with FLOWAVE tip, while the second group had the machine turned off as control group. One hour after the end of the treatment the animals were sacrificed and the soleus muscle was taken off from the exercised and contralateral legs for histology and weight examination.

The wet and histological section data together suggest that an effect on oedema re-absorption was obtained with Flowave treatment, probably due to a specific effect on interstitial proteins but also to a stimulation of lymphatic and bloody vessels from the sonorous waves, reinforcing the effectiveness on the liquid drainage.

In conclusion we obtained a direct measure of oedema in an animal model that can be used to estimate the efficacy of physical therapies.

Session II: Genetics and development of the lymphatic system

S II - 6

DUAL ORIGIN OF LYMPHATIC VESSELS IN MURINE AND AVIAN EMBRYOS

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The embryonic origin of lymphatic endothelial cells (LECs) is not completely resolved yet. Quail-chick grafting experiments have provided evidence for lymphangiogenic potential of various mesodermal compartments of the embryo, whereas studies on murine embryos have been in favour of a venous origin of LECs. Our investigations of NMRI mice from embryonic day (ED) 9.5 to 13.5 with antibodies against the leukocyte marker CD45, pan-endothelial marker CD31 and lymphendothelial markers Prox1 and Lyve-1 demonstrate that early signs of the developing lymphatics are the Lyve-1- and Prox1-positive segments of the jugular and vitelline veins. Then, lymph sacs of the jugular region of ED 11.5 mice express Prox1, Lyve-1 and CD31. Furthermore, scattered cells, positive for all of the four markers, are present in the mesenchyme of the dermatomes, the mediastinum and the epicard before lymphatic vessels are present in these organs. It has been shown that the epicard, cardiac connective tissue and coronary blood vessels originate from a primarily extra-cardiac progenitor cell population: the proepicardium (PE). We have grafted PE of stage 17HH (day 3) quail embryos hetero- and homotopically into chick embryos, which were re-incubated until day 15. Double staining with the quail endothelial cell (EC) marker QH1 and the lymphendothelial marker Prox1 shows that the PE of avian embryos gives rise to blood vascular ECs but not LECs. We did not observe any quail ECs in coronary lymphatics of the chick host, except for a large lymphatic trunk at the base of the chick heart, indicating a lympho-venous anastomosis. Cardiac lymphatics grow from the base toward the apex of the heart. In murine embryos, we observed a basal to apical gradient of scattered Lyve-1⁺/CD31⁺/CD45⁺ cells in the subepicardium at ED 12.5. Our studies provide evidence for scattered lymphangioblasts in murine embryos and show that coronary blood and lymph vessels are derived from different sources, but grow in close association with each other.

S II - 7

VASCULAR HYPOPLASIC CONGENITAL LYMPHEDEMA, CONSEQUENCE OF A MALFORMED ASPECT OF THE CONNECTIVE TISSUE - THEORETICAL PREMISES FOR SELF STEM CELLS (SSC) THERAPY

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Lymphatic capillaries are anatomic and functional microstructures of great complexity, found exclusively in interstitial connective spaces. Extraluminal free borders of the lymphatic capillary endothelium are anchored with fibrillar filaments to the neighbouring connective elements. These micro details are elements of the first lymphatic valve system, mobilized and coordinated by the interstitial and intraluminal fluid volume. Of the structural and functional integrity of this first valve system, depends the efficiency of lymphatic circulation to bring back macromolecules to the blood. The impairments and dysfunctions of these microstructures are translated clinically by vascular hypoplastic congenital lymphedema with onset from birth, from early childhood. All these aspects constitute a complex of non-familial, ultramicroscopic congenital vascular malformations, involving billions of cellular structures, that by summation causes this clinical form of congenital lymphedema. Lymphatic markers can identify these structures blocked by abundant accumulations of hyaluronic acid, hypertrophy processes, adipocytic dysphasia and excessive fibro sclerosis, localized at the periphery of the extremities and in its distal segments. In these cases, initial lymphatic capillary neogenesis, is inefficient and is taking place without anchoring filamentary structures. This congenital lymphedema is the third form of lymphatic vascular malformation, along side with lymphangiomas and those with lymphatic reflux. Congenital lymphedema with intrauterine debut, can be ultrasonographically identify during fetus sexual development follow-ups. Birth management of those children may include placenta and umbilical cord preserving techniques, for later SSC layers harvesting (of epidermal, mezenchimal layers) and storing for purpose of some SSC therapies. SSC can be later administrated as intradermo-hipodermic infusions in lymphedema territories, or i.v. perfusions. In the up mentioned territories local hypodermal microcirculatory dilatations can be induced by perfusion administration to improve vascular external flow for cells, proteins, connective tissue reparatory stimulus (cells, fibres, fibrils). First failures versus first successes in premises of robust formulate hypothesis, can be temporary accepted with some reserve, as a rhetoric exercise example!?

Lymphangiogenesis and angiodysplasias

S II - 8

ASYMMETRIC GROWTH OF CORPOREAL SEGMENTS IN ANGIODYSPLASIC SYNDROMES IN PEDIATRICS

C.M. PAPENDIECK

IADT - Universidad del Salvador, Buenos Aires, Argentina

Morphogenesis is the development of the embryonic corporeal shape. Growth as a biological and physical process, is the increase of the corporeal mass – by hyperplasia and or hypertrophy of the tissues, and its harmonic development and maturation. Excess or lack leads to a macro or microsomia. Excess could be on the legs – an enlargement, overgrowth, elephantiasis, hypertrophy and others. Though it is usual to use the term hypertrophy to describe for example the Klippel Trenaunay Syndrome, the concept is previous. Corporeal asymmetries can be identified by specific signs, eg. with direct images, to perform measures, which allows a clear diagnosis. Non harmonic segmentary corporeal hypertrophies, proportioned or not, qualify as Syndromes, among others, due to angiodysplasias – angiodysplastic syndromes. The Wiedemann-Beckwith syndrome is a good example of a harmonic non angiodysplastic hemi corporeal hypertrophy. The best opportunity to diagnose these syndromes, is in perinatology and pediatrics, due to the importance of having the earliest possible diagnosis. Even when the vascular malformation is not seen, it can be an angiodysplastic syndrome. Edema is not growth- but it can be part of its cause or effect. A classic example of an angiodysplastic syndrome with a non harmonic hypertrophy, is the one originally called Klippel Trenaunay syndrome – naevus varicose osteohypertrophique. Naevus means angioma. Different syndromes have as a common denominator angiomatosis, hypertrophy and varicosis. There exist more than 25 types of angiomas, multiple causes of varicose veins, and hypertrophy must mean increase of growth, always including the osseous tissue. Edema means increase of volume, but not growth – the bones development is normal. According to the etiopathogenesis of the edema, some syndromes have it with hypertrophy, possible in the case of deep venous hypertension. The case of the Klippel Trenaunay Servelle syndrome. Then appears the kind of edema. Primary Lymphedema is an example by opposition (Angiodysplastic Lymphedema: LAD I, LAD II): it is the cause of a pseudo hypertrophy, that means an excess of adipogenesis, without increase of bone growth. A good example of dystrophy and dysplasia, of corporeal segments, including the bones, is one type of phleboangiomas, with elongated bones, thinner and curved, possibly ending up being shorter. Others are the intra osseous Lymphangioma, phleboangiomas and hemangiomas. (The Gorham Stout Haferkamp and Maffucci syndrome as example). Only a consensuated semantic analysis allows a unified criteria of clinical definitions, proposal of this analysis

S II - 9

CONGENITAL LYMPHANGIOMA AND LYMPHOEDEMA

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I would like to describe the patient M.V. with congenital lymphangioma and lymphoedema on the left antibrachii. There were repeated operations of lymphangioma and oedema on the left antibrachii during the 60's and 70's. After this there were cicatrices, but the extremity was stabilized, without oedema, without compression. There were repeated subcutis infections in the following years. Although there were subcutis infections, this upper left extremity was not worse than before. The left antibrachii was without oedema, fibrotization and progression. After the last subcutis infection – erysipelas – in December of 2005 the oedema appeared on the left antibrachii with fibrotization and worsen mobility. The patient was not given a compression therapy. During this time the patient was sent to the lymphology ordination. The complete examinations were done there. The relapse of lymphangioma was excluded. Based on these results and clinical picture the patient was admitted to the hospital. After the hospital treatment the lymphoedema was reduced, the left antibrachii was softer and there was better mobilization of the upper extremity. Nowadays the patient is still in charge of lymphology ordination. He does lymphatic massages himself, makes bandages of his upper left extremity and he is stabilized.

Lymphatics and lymph node imaging (nuclear medicine, radiology, sonography)

S II - 10

ADIPOSE TISSUE DOMINATES CHRONIC ARM LYMPHEDEMA FOLLOWING BREAST CANCER: AN ANALYSIS USING VOLUME RENDERED CT IMAGES

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Background: Arm lymphedema is a common complication after breast cancer treatment. Various types of conservative and surgical treatments have aimed at reducing the arm swelling, but most of these have failed due to chronic edema eventually being transformed from an accumulation of lymph fluid to an increased deposition of subcutaneous fat (i.e., to a non-pitting lymphedema). Liposuction is a safe and reliable method for reducing the excess fat without recurring deposition of it. The objective of the present study was to obtain empirical evidence confirming clinical observations of the presence of excess adipose tissue in patients with chronic nonpitting arm lymphedema following breast cancer.

Methods: A total of 11 women with non-pitting unilateral postmastectomy arm lymphedema were investigated and were treated as follows: (1) The proportion of adipose tissue in the aspirate was analyzed. (2) The patient's excess arm volume was measured by plethysmography (PG) and, following treatment by liposuction, was observed until complete reduction of the excess volume was achieved. (3) Volume-rendered CT images (VR-CT) and PG were used to analyze arm volume and excess volume of the lymphedematous arm, the respective volumes being compared by use of regression analysis. Liposuction aspirate was analyzed in terms of the distribution of adipose tissue and free fluid (lymph). (4) The total aspirate volume (fat and fluid) was compared both with the excess arm volume measured by VR-CT and by PG. (5) The aspirate fat volume was compared with the excess fat volume measured by VR-CT. (6) The amount of excess adipose tissue in the lymphedematous arm was estimated using VR-CT.

Results: (1) The aspirate removed under bloodless conditions, achieved by use of a tourniquet, contained 93 percent adipose tissue. (2) A complete reduction of the excess arm volume, as measured with PG, was achieved within 6 months, with a mean reduction of 109%, the treated arm thus becoming somewhat smaller than the normal one. Correlations in terms of correlation coefficient (CC) and the coefficient of regression (CR) were all close to 1: (3) the preoperative PG and the VR-CT analyses of the swollen arm and the excess volume; (4) the total aspirate volume and the excess volume of the arm; and (5) the aspirate fat volume and the excess fat volume. (6) VR-CT was able to estimate the amount of excess adipose tissue in the lymphoedematous arm, showing a mean excess amount of fat of 81%.

Conclusion: VR-CT measurements correlate well with PG measurements. Excess adipose tissue dominates non-pitting chronic arm lymphedema. This excess volume cannot be removed by use either of conservative regimens or of microsurgery. Liposuction can completely remove the excess adipose tissue, leading to complete reduction of the lymphedema.

S II - 11

COLLATERAL LYMPHATIC OUTFLOW IN ARM LYMPHEDEMA

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Introduction: Collateral lymphatic outflow in patients with arm lymphedema depends on the topographic localization of a lymphatic obstruction, on the anatomical variations of the lymphatic system and venous system.

Methods: Collateral lymphatic pathways can be demonstrated by patent blue test, radioisotope lymphography, indirect lymphography, computed tomography, magnetic resonance imaging and most precisely by direct lymphography. On basis of our experience with direct lymphography we shall summarize the main and atypical findings and we shall discuss some other lymphatic outflow known from some anatomical studies.

Results: The main lymphatic collaterals on upper extremity are subcutaneous and cutaneous collaterals. The atypical lymphatic collaterals can be present as lymphovenous communications, extravasation and perivascular or perineural pathways. The collateral circulation can be superficial (epifascial) and deep (subfascial). The epifascial collaterals are more common. From the clinical point of view the presence of any collateral lymphatic circulation is important because it is a sign of existing lymphatic obstruction and sign of possible pathophysiological correction of lymph flow obstruction. The cutaneous and subcutaneous collaterals usually cross the border of the lymph drainage territory - watershed territories through cutaneous network (visible as dermal-back flow) and through different subcutaneous lymphatic collectors (transverse, tortuous). The skin seems to be the main organ of collateral lymph circulation. We have proved on lymphograms the presence of lymphatic collaterals crossing the lymph shed territory borders in all patients with developed lymphedema on the upper extremity. These collaterals are directed to the unaffected areas, where they respect the anatomy and lymph drainage of the region.

Summary: The presence of lymphatic collaterals is sign of obstructed lymph outflow and sign of possible pathophysiological correction. The main lymphatic collaterals on upper extremity are subcutaneous collectors and cutaneous lymphatic network. The atypical lymphatic collaterals can be present as lympho-venous communications, extravasations and perivascular or perineural pathways.

S II - 12

DETECTION OF POSTOPERATIVE LYMPHOEDEMA IN BREAST CANCER PATIENTS USING MULTIPLE BIOELECTRICAL IMPEDANCE ANALYSIS

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Objective: Lymphoedema is a severe postoperative complication after treatment of many breast cancer patients. Early diagnostic tool is needed. Multifrequency bioimpedance analysis (MFBIA) is a method for detection of changes in extracellular water which is the compartment with maximum changes due to lymphoedema.

Methods: We measured a control group of 72 women and a group of 74 patients undergoing a breast cancer surgery during 18 month after the surgery by MFBIA and circumference. Characteristics of the patients were recorded. The detection of lymphoedema was done using MFBIA, circumference measurement and upon the symptoms of the patients.

Results: The average age in the control and tested group was 40,1 and 58,9 years. The average size of the tumour was 15,1 mm. In 23 patients (21%) complete lymphadenectomy was performed, in 51 patients (79%) a detection of sentinel lymph node was performed. Lymphoedema was detected in 8 women (11%). In these patients MFBIA detected lymphoedema 9 month earlier in total than other methods.

Conclusion: MFBIA is a low-cost and precise method for the detection of early stage postoperative lymphoedema. We recommend to incorporate MFBIA into standard dispensatory plan of every patient combined with circumference measurement.

Session III: Surgery treatment of lymphedema

S III - 13

REHABILITATIVE SURGERY OF LYMPHEDEMA: FROM DIAGNOSIS TO EARLY TREATMENT

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The Author reports his wide clinical experience in the microsurgical treatment of peripheral lymphedema. More than 1500 patients with peripheral lymphedema have been treated with microsurgical techniques. Derivative lymphatic micro-vascular procedures recognize today its most exemplary application in multiple lymphatic-venous anastomoses (LVA). For those cases where a venous disease is associated to more or less latent or manifest lymphostatic pathology of such severity to contraindicate a lymphatic-venous shunt, reconstructive lymphatic microsurgery techniques have been developed (autologous venous grafts or lymphatic-venous-lymphatic-anastomoses - LVLA). Objective assessment was undertaken by water volumetry and lymphoscintigraphy. Subjective improvement was noted in 87% of patients. Objectively, volume changes showed a significant improvement in 83%, with an average reduction of 67% of the excess volume. Of those patients followed-up, 85% have been able to discontinue the use of conservative measures, with an average follow-up of more than 10 years and average reduction in excess volume of 69%. There was a 87% reduction in the incidence of cellulitis after microsurgery. Microsurgical lymphatic-venous anastomoses have a place in the treatment of peripheral lymphedema and should be the therapy of choice in patients who are not sufficiently responsive to nonsurgical treatment. Improved results can be expected with operations performed earlier at the very first stages of lymphedema.

Prevention and Treatment of Complications due to Lymphadenectomy

Lymphology in Pediatrics:

diagnostic aspects and therapeutic implications

S III - 14

PREVENTION AND TREATMENT OF COMPLICATIONS DUE TO LYMPHADENECTOMY

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As concerns epidemiological data about the prevalence of lymphedema in the world, about 50 millions are post-surgical lymphedemas and the variability of quoted prevalence rates of lymphedema reported are mainly due to different levels of awareness of the problem, different techniques for measuring limb volume, lack of a universal definition of what degree of swelling constitutes lymphedema, clinical variations (number of pts studied, follow-up period) in the different studies. The surgical operations that can be followed by secondary lymphedema are mainly represented by oncological operations in the ambit of general, gynaecological and urological surgery. On the basis of a prospective randomized study that investigated the effect of a protocol of prophylactic measurements including prospective monitoring and early intervention, it was possible to establish that the prophylactic strategies used in the group of patient undergoing oncological operations appeared to reduce the development of secondary lymphedema and alter its progression in comparison to the control group. Thus, it was identified a protocol of prevention of secondary limb lymphedema that included above all, from the diagnostic point of view, lymphoscintigraphy and, as concerns therapy, it recognized also a role to early Microsurgery.

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LIPOSUCTION NORMALIZES ELEPHANTIASIS OF THE LEG - A PROSPECTIVE STUDY

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Introduction: Patients with long-standing pronounced non-pitting lymphedema do not respond to conservative treatment [CDT (complete decongestive therapy), CCT (controlled compression therapy), compression pumping (CP)] or microsurgical procedures (such as lympho-venous shunts or transplantation) because slow or absent lymph flow, as well as chronic inflammation, cause the formation of excess subcutaneous adipose tissue which cannot be removed by these methods. Previous surgical techniques utilizing either total excision with skin grafting or reduction seldom achieved acceptable, cosmetic and functional results. The swelling of chronic non-pitting arm lymphedema following breast cancer, can be completely reduced by liposuction and has not recurred during more than ten years' follow-up. Encouraged by this experience, we decided to test the effectiveness of liposuction on leg lymphedema.

Patients and methods (median and ranges): 16 patients (12 women and 4 men) with an age of 52 years (21-73) and duration of leg swelling of 16 years (4-50) underwent liposuction due to non-pitting, chronic lymphedema. There were 7 primary (PL), and 9 secondary lymphedemas (SL) following cancer therapy (cervix, penis, melanoma). In the SL regional lymph nodes were removed in 7, and 7 received postoperative irradiation due to local glandular metastasis. Age at cancer treatment and interval between cancer treatment and lymphedema start were 41 years (23-58), and 5 years (0-26) respectively. All patients had received conservative treatment (CDT, CCT, and/or CP) before surgery without further reduction. All were wearing compression garments before surgery. Aspirate total volume, as well as the concentration of adipose tissue in the aspirate, removed under bloodless conditions, were measured. Pre- and postoperative leg volumes were recorded using water pletysmography. The decrease in the excess volume was calculated as a percentage of the preoperative excess volume.

Results: Aspirate volume was 4249 ml (1360-6940), and the concentration of adipose tissue was 92%. Preoperative excess volume and ratio (swollen/healthy leg) were 4312 ml (n=16). Postoperative percentage reductions were 56% at 2 weeks (n=16), 75% at 4 weeks (n=16), 88% at 3 months (n=16), 85% at 6 months (n=13), 104% at 1 year (n=13), 107% (n=8) at 2 years, 124% at 3 years (n=2), and 125% at 4 years (n=2).

Conclusions: These preliminary results demonstrate that liposuction is also effective for treating long standing chronic, non-pitting, leg lymphedema. Conservative methods and microsurgical procedures cannot remove the hypertrophied adipose tissue (induced by inflammation and the slow or absent lymph flow), which is a prerequisite to achieving complete reduction. Although lower extremity lymphedema has been refractory to treatment because of the combination of fat accumulation and dependency, liposuction provides reductions in volume of up to more than 90% that are maintained through constant use of compression garments post operatively for up to two years. The short term results are extremely encouraging and warrant continuing follow-up.

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LIPOSUCTION OF POSTMASTECTOMY ARM LYMPHEDEMA COMPLETELY REMOVES EXCESS VOLUME: A THIRTEEN YEAR STUDY (QUOD ERAT DEMONSTRANDUM)

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Introduction: Breast cancer is the most common disease in women, and up to 38% develop lymphedema of the arm following mastectomy, standard axillary node dissection and postoperative irradiation. Limb reductions have been reported utilizing various conservative therapies such as manual lymph and compression therapies. Patients with longstanding, pronounced, non-pitting lymphedema do not respond to conservative treatment because diminished lymph flow and inflammation result in the formation of excess subcutaneous adipose tissue. Previous surgical treatments utilizing either total excision with skin grafting or reduction seldom achieved acceptable cosmetic and functional results. Microsurgical reconstruction involving lymphovenous shunts or transplantation of lymph vessels, although attractive as a physiological concept, cannot provide complete reduction in chronic non-pitting lymphedema because it does not eliminate newly formed, subcutaneous adipose tissue collections.

Patients and methods: 94 women with non-pitting edema, a mean age of 64 years (41-89) and a mean duration of arm swelling of 9 years (1-38) underwent liposuction. Mean age at breast cancer operation and mean interval between breast cancer operation and lymphedema start were 52 years (34-80), and 3 years (0-32) respectively. The total volume of aspirate was measured. Pre- and postoperative arm volumes were recorded. The decrease in the edema volume was also calculated both as a percentage of the preoperative edema volume, as well as a ratio between the volumes of the edematous and healthy arms.

Results: Aspirate mean volume was 1955 ml (845-3850). Preoperative mean edema volume was 1729 ml (570-3195). Postoperative mean reduction values were 98% at 3 months (n=94), 103% at 6 months (n=91), 107% at 1 year (n=85), 110% at 2 years (n=77), 115% at 3 years (n=75), 113% at 4 years (n=73), 112% at 5 years (n=71), 111% at 6 years (n=61), 113% at 7 years (n=43), 115% at 8 years (n=33), 116% at 9 years (n=27), 113% at 10 years (n=20), 114% at 11 years (n=16), 131% at 12 years (n=11), and 104% at 13 years (n=5), i.e. the lymphedematous arm was somewhat smaller than the healthy arm. The preoperative mean ratio between the volumes of the edematous and healthy arms was 1.53, rapidly declining to 1 at 3 months, and less than 1 after 1 year.

Conclusions: These long-term results demonstrate that liposuctioning is an effective method for treatment of chronic, non-pitting arm lymphedema in patients who have failed conservative treatment. Because of adipose tissue hypertrophy, it is the only known method that completely reduces excess volume. The removal of hypertrophied adipose tissue induced by inflammation and slow or absent lymph flow is a prerequisite to complete reduction. The newly reduced volume is maintained through constant (24-hour) use of compression garments postoperatively.

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PROVIDING A SURGICAL LYMPHOEDEMA SERVICE - THE FIRST 2 YEARS IN DUNDEE, SCOTLAND

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A surgical service offering liposuction for appropriate lymphoedema patients was established in Dundee, Scotland 2 years ago, following a visit to Dr Brorson in Malmo by the lead surgeon. In the first 2 years, a total of 18 patients (17F; 1M) have been assessed, 13 with lymphoedema of the upper limb and 5 with lymphoedema involving the lower limb. 12 patients had upper limb lymphoedema secondary to breast cancer treatment, with 1 patient developing lymphoedema shortly after a thyroidectomy. All lower limb lymphoedema cases were congenital, with 2 patients having bilateral swelling.

Guidelines for new surgical procedures were introduced by the National Institute for Clinical Excellence in 2005. Liposuction for lymphoedema was considered to be a new procedure, resulting in a lengthy delay in the provision of treatment while appropriate authorisation was obtained.

To date, 5 patients have undergone liposuction for lymphoedema of the upper limb, with a further 7 awaiting surgery, 6 for upper limb and 1 for lower limb. 4 patients have been referred for pressure garment and massage therapy, and 5 patients have been declined any surgical intervention. The surgical procedure and postoperative care is identical to the protocol described by Dr Brorson. The mean preoperative volume difference was 1297 (943-1680) mls, with a mean of 1385 (1125 – 1650) mls of fat being removed. Within a few months postoperative oedema has resolved, resulting in minimal volume difference between the limbs. All patients have been delighted with the results of treatment and would recommend it to others in a similar situation.

In summary, we have shown that it is possible to provide effective treatment for chronic lymphoedema using the liposuction protocol developed in Malmo. We will continue to offer this treatment and further develop an integrated lymphoedema service in Scotland.

LIPOSUCTION IN CHRONIC ARM LYMPHEDEMA. WHEN, HOW, AND WHY

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In 2005 our Surgical Clinic of the 2nd School of Medicine of Charles University and the Teaching Hospital of Motol have begun to perform symptomatic procedures in chronic lymphedemas with lipohypertrophy. The range of operations includes extremity debulking, extensive lipectomy of the abdominal wall, reduction resection of scrotum soft tissues, and epifascial lipohypertrophy liposuction in secondary arm lymphedema.

The indication of liposuction in female patients with chronic lymphedema (according to Brorson) is primarily the failure of long-term complex conservative therapy and the progression of lipohypertrophy of epifascial tissues.

So far we have conducted liposuction in 17 female patients. All of these cases have involved a secondary arm lymphedema induced by complex treatment for homolateral breast cancer.

The operation is conducted under total anaesthesia, in bloodless field (tourniquet), with intravenous or, where applicable, oral penicillin ATB prophylaxis, with the prevention of deep venous thrombosis and thromboembolism by means of s.c. low-molecular heparin and postoperative administration of proteolytic enzymes (Wobenzym 2x5 tbl) to improve microcirculation in the operated area. The average duration of the surgery has been 90 minutes. Compression sleeve is applied to the arm immediately after the operation and the arm is maintained intermittently elevated. From day 2 after the operations, patients usually no longer require analgesics. The average duration of hospital stay is 5 days. Following demission from hospital patients are referred back to specialised outpatient unit, where further care is provided by a lymphologist and a lymphotherapist. Our clinic follows up on the patients in month 3 and 12 after the operation, and afterwards on an annual basis. As before the operation, during the follow-up visits a clinical examination is conducted as well as subjective evaluation by the patient, measuring of the volume, and photo documentation. Lymphoscintigraphy is indicated before the operation and 12 months after the operation.

The largest arm asymmetry has amounted to 2.905ml (right arm 6.762ml versus left arm 3.857ml), the smallest asymmetry has been 628ml (right arm 3.138ml versus left arm 3.813).

The average amount of aspirated tissue has been 1.588ml. The lowest volume aspirated has been 1200ml, the largest 2.400ml.

The average difference between the volumes in arms before operation has been 1.584 ml.

The average difference between the volume in arms in postoperative month 3 and 12 has been -61ml (minus). This means that symmetry of arms has been practically achieved.

No immediate postoperative complications have been observed. One of the patients has experienced deep venous thrombosis one week after the operation. With adequate therapy all her problems have been eliminated.

All patients have been fully satisfied with the results of the operation and consider their new condition (weight and volume symmetry) very good. The most frequent comorbidities caused by asymmetry in chronic lymphedema with lipohypertrophy have been significantly reduced.

At present arm liposuction is considered an established method at our workplace and in 2007 we would like to commence leg liposuction maintaining the same indications and identical pre- and postoperative algorithms.

Session IV: Non-surgery treatment of lymphedema I

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ITALIAN GUIDELINES ON LYMPHEDEMA

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Italian Ministry of the Health Commission on Lymphedema Guidelines

Lymphedema, as in primary and in secondary forms, represent a chronic and disabling pathology that among Italian population is in constant increase. Lymphedema must be considered as a vascular and not dermatological disease. All forms must be studied, over then clinical examination, also with lymphoscintigraphy. It's desirable that lymphoscintigraphy should be executed also in blood related of patient affected from lymphedema in order to realize a real "primary prevention".

The execution of the exam, for a preventive aim, must be certified by a specialist with a great experience about. The pathology can be officially recognized only after the confirmation of requirements of the clinical and lymphoscintigraphic exams.

After the official certification, (in all forms of lymphedema), patient is invited to be inscribed in an official Regional Register.

Modalities in providing of compression garments in relation of clinical stages:

- II therapeutic compression (patient contributes for 50% of total amount).
- III therapeutic compression (patient contributes for 25% of total amount).
- IV therapeutic compression (completely free provided by National Health Assistance Service).

Specialists able in prescription:

Angiologists, physiatrists, general and vascular surgeons, oncologists, or other experienced specialists.

Should be guaranteed, at least, an instrumental and clinical annual check.

After the inscription in the specific register of pathology, patient must be excluded in the payment of the sanitary fees for the following specialist examinations: Angiology, Physiatry, general and vascular surgery, onchology.

Among the instrumental exams, exemption can be extended to Lymphoscintigraphies that follows the first one basing of a specialist request and echodoppler of the limbs in the annual checks.

Disability from lymphedema is difficult to describe because it includes very often aspects of somatic, psychological, sexual, relational and social life; for these matters the description of the single clinical case (primary and secondary one) must be performed utilizing the **International Classification of functioning**, the real, complete and universally recognized today (not Barthel or FIM).

Effectiveness of treatments: criteria of evaluation.

To testify (also in official documents of assistance centres regarding FKT and nurses) the effectiveness of the performed treatments in order to compare it in a subsequent check:

Clinical exam with survey of the measurements of the limb in comparison with the contra-lateral relating in with the body weight.

Instrumental exams (echodoppler with high resolution echography of the soft tissues) and questionnaire on the quality life as SF36 or other valid tool.

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COMPANY PRESENTATION: CIRCAID NON-ELASTIC BANDAGING: THE DUTCH EXPERIENCE

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One of the cornerstones in the treatment of lymphedema is compression therapy by means of bandages or compression stockings.

However, bandaging is not an easy job, especially not for unskilled persons and patients. Although medical compression stockings are more easy to apply, they also can present difficulties in daily practice. Some patients can not put them on and off without help. In other cases there is still formation of edema during the day, despite a proper elastic stocking with high pressure.

About 2 years ago the NijSmellinghe Hospital in Drachten (NL) introduced non-elastic bandages (Ready-Fit® by CircAid® Medical) as part of the edema therapy. Non-elastic bandages can be applied at a relative low resting pressure, assuring a comfortable fit – even in supine position. During walking the circumference of the calf muscle changes with each step. Under a non-elastic bandage however, the calf muscle can not expand outwards and each muscle movement is translated into high pressure pulses in the tissue. Due to this high working pressure the use of non-elastic bandages is very effective in ambulant compression therapy.

The compliance of these non-elastic bandages is very high because they are easy to apply by the patients themselves. The fit is very comfortable because of the low resting pressure – in contrast to elastic bandages and/ or stockings with a high resting pressure. The patient can adjust the bandages to create the required pressure at any moment.

For night time use – when it is not desired to wear an arm or leg stocking – the hospital prefers Graudate® bandages (CircAid® Medical). The pressure pattern underneath these bandages can be monitored accurately by using a special measuring technique that each patient will be able to do themselves very easily, so they will benefit from a truly graduated compression.

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MANUAL OR PNEUMATIC RETROGRADE DRAINAGE IN SECONDARY UPPER LIMB LYMPHOEDEMA: AT THE BEGINNING AND AT THE END OF A CURE

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Purpose: Volumetric effect of a 4 kPa or 10,7kPa external pressure has been evaluated in secondary upper limb lymphoedema (SULL).

Methods: A retrograde drainage is carried out manually with \pm 4kPa manually (MLD) and pneumatically (PRD) with a 7 chambers boot (QIM914,2). The PRD was used twice: once with 4kPa, once with 10.7kPa. Relative volume changes (%_V) of the upper forearm were recorded with a Hg plethysmograph (SeriMedPL2) gauge fitted 10 cm below the elbow. Study was carried out at the first and last day of an intensive cure. At present, 13 consecutive women (61 years old) with massive (+74%_Vol) and old (7 years, 1 month) SULL completed the study.

Results: At the first day, there was little reduction of oedema with MLD: $-0.42\% \delta V$. PRD experienced a progressive decongestion: $-0.88\% \delta V$ at 4kPa; $-9,51\% \delta V$ at 10.7kPa. At the last day of cure, oedema reduced about 34% of initial volume. Volumetric forearm decrease reached $-0.88\% \delta V$ manually, $1.77\% \delta V$ by means of a 4 kPa PRD and $11.91\% \delta V$ by means of a 10,7kPa PRD. Whatever pressure or technique, there was very high difference between DLM and PRD techniques. With 10.7kPa, decrease is noticeably higher. After management, improvement persisted with a slow additional reduction of $-0.02\% \delta V/\text{min}$ with DLM and a slow reappearance ($0.02\% \delta V/\text{min}$ with PRD10.7kPa). Results maintained the same after 4kPaPRD.

Conclusion: Promoting greater decongestion, a 10.7kPa PRD may offer additional benefit for women with old SULL. Light DLM procured a slight additional secondary effect.

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THERAPY OF LYMPHEDEMA OF GERIATRIC PATIENTS – POSSIBILITIES AND LIMITS

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According to the increasing average length of life, the amount of geriatric patients in lymphological centres increases too. The care of the geriatric patients involves consistent approach and very good diagnostic, analytic and synthetic proficiency of the physician.

The geriatric patients very often go with polymorbidity, social problems and abnormal drug abuse.

The most frequent reasons of lymphedema of elder people are secondary changes of lymphatic system due to trauma, orthopaedic operations and cellulitis. This health diseases is accompanied with social and psychical problems, all dimensions of quality of life are disturbed.

The evaluation of health condition is the most important at the beginning of the complex decongestive therapy of lymphedema. We need to have a respect to possible contraindications of lymph drainage and compression, we also have to consider mobility of the patient, his social and psychical status. The basic for creation of the individual therapeutic plan is the evaluation of all criterias. This plan ensures high effectivity of the therapy minimalises the risks of complications of complex decongestive therapy and makes the compliance higher.

The aim of this contribution is the evaluation of the geriatric population with developed lymphedema which was treated in 2002 - 2006 in our lymphological centres.

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COLLAGEN TYPE I ATTENUATES LYMPHORRHEA FOLLOWING AXILLARY LYMPHADENECTOMY: A PROSPECTIVE RANDOMIZED CLINICAL TRIAL

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AIM: Postoperative lymphorrhoea is a major complication of axillary lymphadenectomy. The aim of this work is to study if the intraoperative use of collagen type I can decrease postoperative lymphorrhoea in patients with breast cancer.

Material-methods: We studied 30 patients who underwent breast surgery with axillary lymphadenectomy of level I and ___ nodes. All patients were randomized in two groups: group A (n=16) patients had their axillary bed covered with collagen type I (CellerateRX powder) at the end of the operation and group B (n=14) patients served as controls. All patients had axillary drains. Postoperative data collection included the amount of daily drain discharge, postoperative pain using a VAS scale and the amount of analgesics consumed.

Results: Both groups were comparable regarding age of the patients, the stage of disease and the number of lymph nodes removed. The average postoperative lymphorrhoea was less in group A patients compared to controls (502 ml vs. 643 ml) and that difference was even bigger in patients who had more than 10 lymph nodes removed (495 ml against 743 ml of group B, $p < 0.01$). Postoperative pain was similar in both groups (76 vs. 83mm on the 1st postoperative day and 23.6 vs. 25mm on the 3rd day), as were analgesia requirements.

Conclusion: Collagen type I (CellerateRX powder) appears to attenuate postoperative lymphorrhoea in patients undergoing axillary lymphadenectomy especially when >10 lymph nodes are removed.

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LYMPHEDEMA FOLLOWING PELVIC LYMPHADENECTOMY

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Objectives: The objective of this study is to assess alterations of lymphatic anatomy and physiology resulting from pelvic lymphadenectomy.

Method: Forty-two patients who presented with symptomatic lower extremities swelling following pelvic surgery underwent whole body lymphoscintigraphy. Symptoms included uncomfortable pelvic and lower extremity swelling, and/or genital discomfort, recurrent infections, skin breakdown, impaired wound healing, limited range of motion, and alterations of cosmesis. Pelvic lymphadenectomy had been performed for management of uterine cancer (12 patients), cervical cancer (8 patients), ovarian cancer (5 patients), prostate cancer (6 patients), bladder cancer (3 patients), and melanoma (8 patients).

All patients demonstrated clinical evidence of lymphedema of lower extremities, pelvis and/or genital areas. The onset of lymphedema varied from several days to five years after surgery. The clinical presentation of lymphedema was correlated with the findings by lymphoscintigraphy and TERASON Ultrasound System t3000.

Discussion: Several distinct patterns of altered lymphatic flow were demonstrated, and they correlated with the location and character of clinical signs and symptoms. The importance of early identification and treatment of lymphedema, and the correlation of radiographic and clinical findings are discussed.

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MANAGEMENT OF GENITAL LYMPHOEDEMA

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Facts: Face, thoracical and genital lymphoedema are a big challenge for the therapists – especially in comparison to the regular treatment of the oedemas of the extremities. The prescription of the manual drainage is not the problem, but there is a special challenge to the bandaging and to the material.

Inpatient management in the Lympho-Opt clinic: Skincare, manual lymphdrainage, pneumopressotherapie with trousers (Lymphapress), treatment with sound waves (Flowave), treatment in an electrostatical field (Hivamat), softlaser, pulsed magnetic field, multilayer bandage, active exercising, therapeutical dancing, Qigong, Lympho-Opt walking, psychotherapy, health education and diet.

Results: At the end of the inpatient treatment we supply the patients with medical garments like a flat knitted trouser - one or more parts with inwoven suspensorium for men or a bag for t-shaped compression parts for woman to make a compression of the scrotal or labial part. At the beginning of the treatment most patients with genital lymphoedema had severe psychological problems. Further the possibility of walking was increased. Depending on our management of the oedema the patients get a win situation for better life style.

Summary: In special lymphological cases the inpatient treatment with new kind of therapy is as necessary as an optimal outpatient treatment that takes care of the individual situation of the patient in his further life.

Workshop III - Wobenzym in the therapy of lymphedema and woundhealing - 26

THE EFFECTIVENESS OF PROTEASES IN TREATING DISORDERS OF LYMPHATIC DRAINAGE

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In combination with Complex Decongestive Therapy, pharmacotherapy is the basis of the complex treatment of lymphedema. An assortment of peroral proteolytic enzymes are the drugs of first choice in the Czech Republic. From a pharmacological viewpoint, these belong to the class of drugs termed systemic enzymotherapy (most often Wobenzym tbl. and Phlogenzym tbl.).

The principal pharmacological effects of orally administered proteinases in relation to the pathophysiology of lymphedema are following:

- proteolytic and especially, fibrinolytic effect of proteinases lead to disintegration of lymphatic plugs, and to the restoration of lymphatic vessel patency. Thus, products of proteolytic cleavage of extravasally deposited fibrin and other proteins are more easily removed;
- enhanced permeability of soft tissues (interstitial space);
- proteinases facilitate and improve clearance of undesirable pathogenic immune complexes which in high concentrations block correct function of phagocytes.
They both remove circulating, aggregated, and tissue-bound immune complexes and inhibit their production;
- proteinases activate of macrophage and NK cells;
- proteinases also selectively reduce expression of certain surface adhesion molecules and their receptors (CD4, CD44, CD54, CD80, CD106, fibronectin receptor).

The pharmacological effects of these combined enzyme preparations act on many levels of pathophysiological mechanisms which evoke and maintain lymphedema. These drugs are therefore able to interrupt the vicious circle and to improve lymphatic circulation in the affected region.

(to be continued)

Continuation - 26

THE EFFECTIVENESS OF PROTEASES IN TREATING DISORDERS OF LYMPHATIC DRAINAGE

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Systemic enzymotherapy used in treating primary lymphoedema was studied by Džupina et al. in 2000. He administered complex physical therapy to 12 women with primary lymphedema of the lower extremity for a period of 4 weeks. In half of these patients, Wobenzym was added to the treatment regimen at a dose of 3 coated tablets thrice daily for a period of 6 weeks. In the first 4 weeks, both groups exhibited a statistically significant reduction in the volume of the limb. In the following 6 weeks, reduction of lymphedema was seen only in the group of patients using Wobenzym.

A notable effect of Wobenzym in treating secondary lymphedema of the upper limb in patients after complex therapy for breast cancer was demonstrated in a series of studies performed in the Czech Republic (Bechyně, Tomanová, Bechyňová 1994; Wald, Adámek, Prausová 1997; Macháňová, Rysová 1997).

Our personal experiences may be summarised into the following points:

- Wobenzym tbl. is considered as the drug of first choice in the pharmacological treatment of lymphedema. In patients with unwanted side-effects (which occur rarely and consist of gastrointestinal discomfort), Wobenzym is substituted for Phlogenzym, which is given at half the dose of Wobenzym
- we consider the lowest dose for therapeutic maintenance to be 2 x 5 tbl of Wobenzym daily
- In older patients with untreated secondary lymphedema at the 2nd and 3rd stage, Wobenzym therapy is initiated at a dose of 2x10 tbl. daily. Once improvement has been achieved (measured objectively as a diminishment of the oedema), CDT is continued along with a maintenance dose of 2x4 to 5 tbl, depending on the individual response of the patient.
- In cases of secondary lymphedema with unsatisfactory response to CDT, or when the beneficial effects of physical therapy are unable to be maintained for longer periods of time, a medium dose of systemic enzymes (2x7 tbl. daily) is started. Once clinical response is achieved, the dose is lowered to the maintenance dose of 2x5 tbl. daily.
- In clinical silent forms of lymphedema (latent phase is diagnosed by lymphoscintigraphy), Wobenzym is initiated at a dose of 2x7 tbl. daily for a period of 3 - 6 months. Upon normalisation of the finding on lymphoscintigraphy, the drug is discontinued and the patient is followed-up.
- In patients receiving radiotherapy, we recommend Wobenzym prevention at a dose of 2x5 tbl. which is continued until complete remission of the postirradiational changes to the soft tissues has been demonstrated.
- Concomitant administration of systemic enzymotherapy and antibiotics in lymphedema patients with secondary bacterial infections of the subcutaneous tissue is recommended. This leads to an improved delivery of the antibiotics by the blood to tissues, and therefore leads to a more rapid regression of the clinical symptoms and a reduction of reinfections.

Workshop III - Wobenzym in the therapy of lymphedema and woundhealing - 27

PRELIMINARY RESULTS IN THE STUDY OF THE THERAPEUTIC EFFECTS OF PROTEOLYTIC ENZYMES USED FOR LYMPHEDEMA IN CRURAL ERYSIPELAS

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In this lecture, the authors describe the preliminary results in treating secondary lymphedema after crural erysipelas.

Patients that had reached the end of the inflammatory stage of crural erysipelas and in whom developed or worsened a pre-existing lymphedema were included in the study. The treatment regimen included compressive therapy in combination with medication comprising proteolytic enzymes - Wobenzym tablets at a dose of 10 tablets 3 x daily for a period of 3 months.

Evaluation of patients' subjective problems was done using questionnaires.

Objective evaluation included clinical examination; measurement of the volume of the affected limb; measurement of the thickness of subcutaneous tissue by duplex doppler ultrasonography at a pre-defined location; recording of the centripetal venous flow by duplex doppler ultrasound; and lymphoscintigraphy scanning with quantitative measuring of the transit time and percentage accumulation of radioisotope in regional lymphatic nodes before therapy initiation, after 3 months of therapy with Wobenzym, and 3 months after completing the treatment. The total time of follow up was 6 months. Results of selected biochemical parameters are also presented.

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LYMPHEDEMA AS A COMPLICATION AFTER SURGERY OF THE HEAD AND NECK

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This study deals with the complex therapeutic care of patients with lymphedema of the head and neck. Emphasis is placed on manual lymphodrainage, compressive therapy and systemic enzymotherapy. In the case-reports presented, we show the importance of this treatment method, which leads to a significant improvement of the quality of life for the patient both after surgery and/or irradiation.

Workshop III - Wobenzym in the therapy of lymphedema and woundhealing - 29

THE IMPORTANCE OF THE LYMPHATIC SYSTEM IN HEALING OF CHRONIC WOUNDS

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For 6 years, the Centre for Chronic Wound Care has intensively focused on the treatment of chronic wounds, and based on the experience gained during this period, it may be attested that local therapy alone will not resolve all of the problems associated with poorly-healing wounds. At the time of the initial patient examination we certainly concentrate on the character of the defect, but a far greater importance is placed on searching for the pathophysiological aetiology of the disordered healing. In other words, a centred investigation of the general state of health from a biological-psychological-social standpoint.

Wound healing is part of a complex cascade of reactions, which include among others coagulation, inflammation, angiogenesis, epithelialisation, fibroplasia, remodelling or granulation, and contraction. Both cellular and humoral responses are paramount to these reactions. So that healing can proceed physiologically, it is essential that not only local factors requisite for tissue healing are present, but also systemic conditions which affect the body as a whole are present.

Among the most common causes of disordered wound healing are impaired microcirculation effecting decreased perfusion, oxygenation and nutrition, and disordered lymphatic and venous drainage of the injured tissue. The ensuing inflammatory complication only worsens the situation and puts further demands on the lymphatic drainage. The consequence of even the most trivial disorder of healing is edema, aseptic or bacterial inflammation, fibrosis in the soft tissues, and deposition of fibrous adhesions in the free spaces.

In her lecture, the author emphasizes the complex therapy of soft tissue oedema. Elimination of the swelling is an elemental requisite of physiological wound healing. From a pharmacological standpoint, perorally-administered proteases are the drugs of first choice for improving the function of the lymphatic system in the treatment of edema. These drugs belong to the group classified under systemic enzymotherapy. The principal pharmacological action of proteases in relation to healing include:

- improved microcirculation by increasing lymphatic drainage and promoted venous return
- influencing coagulation
- increasing permeability of the intercellular space
- enhanced immunocomplex clearance, which lead to aseptic inflammatory reactions
- reduction of fibrinous exudate
- fibrinolytic and native analgetic effect
- regulation of the cytokine cascade in the injured area (TGF-beta)

A further important aspect in the treatment strategy is the optimal combination of therapeutic methods used. We consider the combination of enzymotherapy with ozonotherapy and magnetostimulation as very effective.

Therapy by Magnetostimulation is applied by the VIOFOR system. The effect of the alternating magnetic field produced by this appliance is normalisation of cellular membranes, improved ion exchange across the cell membrane, and concomitant increase in enzyme activity and oxydation-reduction processes. A significant acceleration of catabolite exudation and detoxification of cells occurs, and cellular nutrition and growth also increases.

Ozonotherapy is capable of ameliorating the energetic equilibrium at the cellular level. When cells are exhausted of energy, or because of the disordered microcirculation and impaired permeability of the intercellular spaces by sufficient oxygen exchange, the mitochondria are not capable of supplying the cell with sufficient energy. Ozone is made up of active oxygen radicals that are readily dissolved in fluids. Should it therefore reach the blood, it is immediately bound to erythrocytes, and consequently permeates into the extracellular matrix. Once it crosses the cellular membrane, it is catabolised into O₂. Ozone may be applied intradermally, subcutaneously, intramuscularly, intravenously, intraarterially, and locally.

Another indispensable part of favourable healing is podological intervention and rehabilitation. Furthermore, it is essential to involve the patient in the process of healing. This includes regular wound dressing. It is also helpful to educate the patient's family during the course of treatment.

Local treatment involves a spectrum of modern dressings nowadays available on the market. These are most certainly of the highest quality, and quite effective, but they are not all-redeeming. In order to use them, one must have a perfect knowledge of the physiology of skin and the individual phases of wound healing, as well as thorough familiarity with the dressing materials. During the periods when the patient is not well compensated (be it cardiovascularly, nutritionally, haemodynamically, etc.), these dressings are not used. In these patients, a multi-disciplinary approach is stressed, whereby the general state of health may be stabilised.

Session V: Non-surgery treatment of lymphedema II

S V - 30

INTERNATIONAL CLASSIFICATION OF FUNCTIONING AND LYMPHEDEMA UNABILITY EVALUATION

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The standard disability scales that are usually used in clinical practice (Barthel, FIM, SMWT, etc.) don't have the specifics to give an adequate clinical picture of lymphedema. The International Classification of Functioning (I.C.F.) that recently has been adopted in clinical practice (even though still not utilized on a large scale bases) is proving itself to be a valid and efficient clinical tool which analyses the needs of a disabled person in a more global context. It transforms the limited 'medical model' (based on the simple listing the physical impairments) to a more sophisticated multidimensional approach - "bio-psico-social model" - that not only evaluates the bodily biological damage but also the psychological and behavioural repercussions the patient manifests, as well as his interaction with the environment and the environmental factors which facilitate or limit the level of integration of the disabled person. The I.C.F. analysis shows the degree of assistance necessary which has to be provided by caregivers that are part of the rehabilitation team (family, friends, health/social care professionals, etc.). What we obtain from this scale is a clear and articulated picture of each single disorder, before beginning any kind of treatment.

I.C.F. contain the subgroups (domains) that describe the following conditions:

- interest in the abnormal bodily structure (*s*)
- interest in specific bodily functions (*b*)
- integration of the disabled patient with the environment and his reduced ability in certain aspects of daily living as well as his capability to relate with others (*d*)
- patient dependence on other people (family, friends, health/social care professionals, others) or prosthesis or special garments, environmental factors in the activities of daily living (*e*).

The present study has been conducted on 269 patient with lymphedema (176 of the upper limb, 93 of the lower limb), age range 0 to 82 years old, 189 females and 80 males. The clinical phase of the participants of the study were the most evolved (III, IV and V). All the patients were submitted to clinical examination (comprehensive of the measurements of the circumferences of the limbs, at various levels and in comparison), and instrumental examinations; lymphoscintigrafic exam, high-resolution ultrasound and computerized tomography. All the patients underwent a complete protocolized clinical treatment which was personalized for each subject.

After the treatment cycle the data highlights that there was a reduction of the value of the qualifiers correlated to the need of assistance of a caregiver, on behalf of participants of the study, in addition an improvement of personal performance and relationship ability and in some cases the elimination of secondary ailments induced by the rehabilitation intervention (ex. muscular atrophy).

The study highlights the importance of the availment of a classification tool that better defines the levels of disability of a patient with secondary lymphedema, which considers the complex clinical picture that implies an intensive rehabilitation cycle in an acute phase, continuous monitoring and the necessity of maintenance re-training cycles.

S V - 31

LYMPHEDEMA AND PELVIC MASS FOLLOWING TOTAL HIP REPLACEMENT

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Two cases are presented.

Case 1: A 78 years old active woman reported left leg swelling. She had undergone total left hip replacement three years previously. Physical examination revealed a pelvic mass with lymphedema of the left leg. Lymphoscintigraphy demonstrated findings consistent with secondary lymphedema in the left leg. CT of the pelvis revealed a 4.5x4.0 cm. mass of fluid density in the left lower pelvis extending to the acetabular component of the left hip prosthesis.

Conclusion: Pelvic mass with lymphedema.

Case 2: A 68 year old man with history of chronic lymphedema of the left leg following lymphadenectomy for melanoma thirty years earlier developed worsening of lymphedema and leg discomfort two years after total hip replacement. The patient failed to respond to all conservative modalities of lymphedema management. Lymphoscintigraphy confirmed severely impaired lymphatic drainage from the left leg. CT of the pelvis demonstrated a 5.3x6.0 cm. pelvic mass of fluid density extending to the acetabular component of the left hip prosthesis. The patient underwent surgical removal of the cystic cavity as well as metallic and bony debris from the pelvis, with relief of pressure on the remaining left iliac lymphatic vessels. Post operatively his lymphedema improved significantly.

Conclusion: Two cases are presented with similar, but unusual, complications of total hip replacement: synovial cysts causing of aggravating lymphedema. Lymphedema may present as unusual but treatable complication of total hip arthroplasty.

S V - 32

DISTICHIASIS AND LYMPHEDEMA

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Lymphedema-Distichiasis syndrome, a rare cause of hereditary lymphoedema, is an autosomal dominant disorder that classically presents as lymphedema primarily of the limbs and double rows of eyelashes (distichiasis). The first description of the combination of lymphedema and distichiasis was reported in 2000 by Neel and Schull (1954) and is linked to a mutation on chromosome 16 in the forkhead transcription factor FOXC2.

Because of irritation of the cornea (corneal ulceration), patients are usually investigated and treated by ophthalmologists.

Case report

A 52 - year old male patient presented with a 2 year history of progressively worsening edema of the face, which predominantly affected the upper eyelids, and which greatly impaired activities of daily living.

He was investigated at length in the department of ophthalmology for this idiopathic edema of the eyelids. Upon presentation at our lymphological out-patient department we noted the presence of double rows of eyelashes. The cause of the lymphoedema of the face, and predominantly the eyelids was determined to be primary lymphedema. Standard protocol involves performing lymphoscintigraphic examination followed by immediate initiation of peroral therapy with proteolytic enzymes (Wobenzym 2 x 8 tbl. daily). After regression of the fibrotic changes, Complex Decongestive Therapy, including compression, is started. After several months' of complex therapy, the patient's state of health was stabilised. Subsequent plastic surgery of the upper eyelids is done, and this completes the extensive therapeutic program. The patient was problem-free within 6 months postoperatively, requiring only compression at night.

S V - 33

A NEW METHOD TO ASSESS GARMENT'S SUITABILITY IN POSTMASTECTOMY LYMPHEDEMA

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Methods: We designed a score system to assess garment's suitability. 112 women with postmastectomy lymphedema were included in this prospective cohort study to evaluate the garment with this system.

The suitability score system was designed by consensus of the team (doctor, lymphotherapist and orthopaedic technician), following the common complaints of the patients and the main errors seen in the garments' fitting.

The items checked in the armsleeve were: circular or flat knit, accurate measurement, strangulation at the axilla or in other region, fixation mechanism, elbow, wrinkles, correct pressure at the wrist, redness at the inner elbow and hand swelling.

In the gauntlet, we checked: knit, accurate measurement, strangulation at the wrist, length of fingers and cyanotic fingers. Each correct item was assigned 1 point in the score and the addition of points for every item gave us the final score (maximum 10 for armsleeve, 5 for gauntlet).

Results: 111 patients were wearing armsleeves and 84 gauntlets.

The mean of the score of the armsleeve was 8.97 points (95%CI: 8.7-9.2) and the mean of the gauntlet's score was 4.5 (95%CI: 3.7-5.2).

The most frequent errors of fit were: redness at the inner elbow (40.5%), overpressure at the wrist (14.4%), and hand swelling (12.6%).

The most frequent problem with the gauntlet was cyanosis at the fingers (35.7%) and incorrect fingers length (12.6%).

Conclusions: The suitability score system can be a clinical useful tool to check the fit and to detect errors of the garment. In our sample the score obtained was good, nevertheless some problems were observed: redness at the inner elbow and cyanotic fingers. Further research is needed to validate this method and determine the utility of this assessment system.

S V - 34

THE ROLE OF COMPRESSION GARMENTS IN THE LONG-TERM MANAGEMENT OF POSTMASTECTOMY LYMPHEDEMA

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Methods: 112 women with postmastectomy lymphedema were included in this prospective cohort study to evaluate the efficacy of hosiery in maintaining the volume of the affected limb and to assess the adaptation of the garment. The volume was calculated with the circumferential measurements. We defined the "Change of volume" as the percentage of change from the baseline at 1st, 6th and 12th months after the adaptation of the garment. The garment was assessed following a system of score to measure its suitability. The median age of the sample was 60.8 years (range 37-81) and 68.1% of them had received Complex Decongestive Therapy previously.

Results: Baseline volume was 3045ml (95%CI:2891-3199), and baseline oedema was 346ml (95%CI:282-410). The patients were wearing the armsleeve a mean of 11.4 hours per day (95%CI:10.7-12.2), and the gauntlet 7.0 hours per day (95%CI:5.9-8.0). The volume was measured at 1st month in 68 patients, at 6th months in 71 patients and at 12th months in 51. The volume decreased at 1st month (-1.5%; 95%CI:-2.6 to -0.3), but increased a little after 6 months (0.5%; 95%CI:-1.0-2.0) and 12 months (1.6%; 95%CI:-0.4-3.5).

The volume increased more in severe stages of lymphedema (p=0.071), but this was not significant.

No relation was found between the change of volume and the time of compliance with the garment.

High score of the garment was related to a lower increase of volume at 6th and 12th months (p=0.008 and p=0.021 respectively).

Conclusions: Although the garment's effect on reducing the volume is lost at 6 months, it can maintain the volume for a longer time with a little variability that is not clinically significant. This means that compression garments play an important role in maintaining arm volume at long-term management, even later than recommended. Moreover, a good suitability of garment carries a better result.

S V - 35

INTERNATIONAL COOPERATION IN TREATMENT OF HEAVY LYMPHEDEMA - A CASE REPORT

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This study reports on a female, 40 years old, with extremely heavy lymphaticovenous insufficiency of lower extremities, whose progression subsequently led to the patient's total invalidization caused by the absolute lack of mobility. In this stage the patient must have been hospitalized for a long period. After a series of consiliary examinations, a complex medical treatment plan was prepared, which is currently being realized. We hereby describe the whole complex treatment schedule, as now being realized by Dr Franz Schingale's Lympho-Opt Clinic in Germany; and, furthermore, by the Faculty Hospital Motol, Prague, Czech Republic, where the patient has already undergone repeated surgical treatment by Dr Martin Wald. The respective outpatient treatment is currently being realized by the Center for Preventive Medicine, Prague and Dr. Lehmann her G.P.

S V - 36

THE COMPLEX THERAPY OF PRIMARY LYMPHEDEMA

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Primary lymphedema is chronic disorder originating on the basis of lymphatic system abnormalities and it involves mainly extremities. According to timing of the onset, an oedema is classified as congenital, praecox and/or tarda lymphedema. According to patophysiology, a primary lymphedema is classified as hypoplastic, hyperplastic, idiopathic and/or hereditary (Nonne-Milroy disease, Meige disease).

The diagnosis is established on a patient history, characteristic findings on physical examination, exclusion of the other types of oedema. Lymphoscintigraphy is necessary in some uncertain cases.

Therapy is the same for all oedema types. All patients are treated with so called "complete decongestive therapy (CDT)". This is a combination of manual lymphatic drainage, intermittent pneumatic compression and compressive bandaging.

The minority of the patients can be managed with surgery or medication.

Authors present a cohort of 44 patients who were treated at the Lymphology Centre of Department of Dermatovenereology from January 2000 to December 2006. The diagnosis was established on the above mentioned scheme. The majority of the patients underwent CDT, at least one cycle (each cycle consists of 20 manual lymphatic drainages, intermittent pneumatic compression and compressive bandaging). Each patient was instructed in long-term self-management of the lymphedema, which means compression therapy (bandage or elastic stocking), self manual lymphatic drainage, intermittent pneumatic compression and exercises.

The efficiency of the therapy is periodically evaluated by changes in the volume with serial measurements of circumferences of the limbs. All patients are continuously followed up.

Session VI: Non operative treatments of lymphedema III

S VI - 37

GOALS AND SUGGESTIONS ABOUT REHABILITATION TREATMENT OF MASTECTOMY COMPLICATIONS

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We observed that many post-mastectomy patients treated in our setting show functional deficit of various entity in the superior limb omolateral to mastectomy.

A deeper evaluation of these patients reveals further complications of rehabilitative interest, involving especially the cervico-dorsal column, and that can be localized even far from the surgery site. These disorders provoke modification in body scheme.

Often limbs without important functional limitation show clinical and echographic hypotonotrophy.

These muscle imbalance may produce flogosis of osteomyoarticular apparatus or arthrosis, arising sometime precocious lymphedema. We can assume that all patients undergone to mastectomy should be precociously treated with physical therapy also if lymphedema is absent.

Our aims are: - 1. avoiding functional limitations, that are hardly treatable (such as "frozen shoulder");
- 2. reducing risks of secondary lymphedema.

We have studied 60 pts affected by secondary lymphedema of the upper limb: 30 (group A) were treated with CDP and 30 (group B) (with similar clinical evolution) with CDP + hydrokinesitherapy. After 15 treatments we observed in the group B an increasing of the articular excursion of the shoulder > 25% respect to the group A and a decreasing of the pain (pain scale) > of 22% respect to the group A. We think that a good physiotherapy should consider the patient as a whole, treating the anatomical sites involved, with particular attention to pain.

In this view an useful support may come from hydrokinesitherapy. The immersion of the patient in an environment with partial reduction of the gravity allows movements otherwise difficult out of the water. The hypotonic muscles are less stressed during the exercises performed in water. Muscle contractures take benefits from muscle relaxation exerted by the immersion.

Working on recruitment, muscular strenghtening and ROM (Range Of Movement), we have to take advantage of the water resistance and support (of various shape and size). Water exerts also a compressive effect (following the "Stevino Law"), producing a drainage of the dipped limb. We conclude that hydrokinesitherapy is useful in precocious rehabilitation of such patients, above all in association with the combined physical treatment of lymphedema.

S VI - 38

LYMPHOLOGY IN PEDIATRICS

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The term "lymphatic dysplasia syndrome" includes primary (idiopathic) lymphedema syndromes, congenital chylothorax, idiopathic effusions (often chylous). The lymphatic dysplasia syndrome encompasses effusions of the pericardium, pleura, peritoneum, and lymphedema, without an identifiable cause, such as cancer or injury, and in absence of lymphangiomas, lymphangiectasis, and lymphangiomatosis. Searching for the terms "congenital lymphedema" and "lymphangiectasia", 27 and 12 entries, respectively, were found using Online edition of Mendelian Inheritance in Man (OMIM). Searching for the terms "ascites chylous" 7 entries were found using Online edition of Mendelian Inheritance in Man (OMIM). Searching for the terms "peripheral lymphedema", "intestinal lymphangiectasia", "generalized lymphedema", and "pulmonic lymphangiectasia" 41, 5, 85, and 17 entries, respectively, were found using London Dysmorphology Data Base. In addition, 67 entries could be found in a database for chromosome anomalies (the Human Cytogenetic Data Base). The majority of patients who are affected by lymphatic dysplasia syndromes have hypoplastic or aplastic peripheral lymphatics. One-third have obstructed proximal lymphatics. A few have hyperplastic peripheral lymphatics. Finally, some have incompetent lymphatic valves that develop into megalymphatics. Lymphedema is divided into two major groups, primary and secondary. Primary lymphedema is caused by a primary abnormality or disease of the lymph conducting elements of the lymph vessels or lymph nodes. According to the age of onset, primary lymphedema is defined as congenital (appearing at birth), precox (onset at puberty, age range 9-25 years), and tarda (after age 35). Secondary lymphedema is edema caused by disease in the nodes or vessels that began elsewhere (neoplastic or filarial) or began in the cellular-nonconducting elements of the nodes (lymphocytic proliferative disorders). Secondary lymphedema may also occur following surgical removal of lymph nodes or vessels; such as in mastectomy for breast cancer. Congenital lymphedema may be caused by a) congenital aplasia or hypoplasia of periferal lymphatic, b) congenital abnormalities of the abdominal or thoracic lymphatic trunks, and c) congenital valvular incompetence, usually associated with megalymphatics. In the newborn, chylothorax, chylopericardium, and chylous ascites, as well as generalized lymphatic dysplasia may occur as separated or associated entities. More generally, all causes that may generate non-immune fetal hydrops, may also be the cause of lymphedema of the newborn or cavity effusions evidentiated at birth. Diagnosis and management of a newborn affected by primary lymphedema is a challenge. Early diagnosis during the neonatal age is very important to prevent the rapid evolution of lymphedema. The diagnosis of lymphedema is mainly clinical and relies primarily on family history and physical exam. Initially, the edema is soft and pitting, but over the course of months and years, the swelling becomes hard and "non-pitting" and the skin thickens. Early diagnosis during the neonatal age is very important to prevent the rapid evolution of lymphedema.

We report some examples of congenital lymphatic dysplasias in newborns, with a particular regard to congenital chylothorax that very often occurs at birth as a severe complication.

Finally, we discuss the diagnostic flow-chart that more generally encompasses all conditions presenting as non-immune hydrops fetalis.

Epidemiology, classification and staging of lymphedema, quality of life, social issues

S VI - 39

INCIDENCE OF LYMPHEDEMA AFTER AXILLARY DISSECTION

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The study is aimed at estimating the incidence of lymphedema at 1, 2 and 5 years after surgery and at estimating the its relationship with post-surgical complications and other baseline clinical data.

All consecutive patients candidates to radical or conservative surgery for breast cancer with axillary dissection, were enrolled in a longitudinal study with evaluations before surgery (T0), at 15 days (T1), at 6 (T2) and 12 months (T3) and at 2 (T4) and 5 years (T5) after surgery.

At each evaluation time patients submitted to physiatric evaluation: comparative measurement of both arms, shoulder range of motion, pain, skin and functional complication due to radiotherapy. At baseline also the presence of concomitant disease was evaluated while post-surgical complications (seroma, hematoma, functional limitation, winged scapula, pain) and dismetabolism (hypertension, overweight, diabetes) were registered at T1.

Lymphedema was defined as an increase of 1 cm in the average of the measurements on the operated arm with respect to healthy one. Results were the following. Of the 327 patients enrolled, 246 were followed up until 1 year, 76 at 2 and 20 at 5 years. At 1 year the incidence of lymphedema was 17.1% (95% CI 12.3-21.8) while at 2 and 5 years, due to low number of patients, it was 26.3% (95% CI 16.2-36.4) and 40.0% (95% CI 16.5-63.5) respectively. In all cases lymphedema was mild (mean difference between two arms 1.0 to 2.0 cm) or moderate (mean difference 2.5 to 4.0 cm). The patients with lymphedema had one or more post-surgical complications at T1. Among the baseline and post-surgical complications examined, only patients with scar problems (sticking or retracted scar) showed a higher incidence of lymphedema within the first year from surgery (31% vs 15%, $p = 0.025$). Concerning other complication not statistically significant higher incidence of lymphedema was present among patients with shoulder limitation (21% vs 16%) and hypertension (22% vs 15%).

S VI - 40

MANAGEMENT IN LIFE-RÉGIME: AN IMPORTANT PART OF LYMPHEDEMA PATIENTS' "SELF TREATMENT"

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"Self-treatment" became to be an important part of lymphedema patients' management. Under specific conditions it is a solution to solve difficulties in accessibility, unavoidable time and travel costs related to regular treatment in specialized centres (very often distanded).

Patients' "self-treatment" includes: (a) skin care, (b) arrangements in life-regime, (c) self-lymphdrainage, (d) self-bandaging, (e) intermittent pneumatic lymphdrainage, (f) supportive physical and breathing exercises, (g) self-measurement of limbs' volume, (h) "Nordic walking" with external support and (i) appropriate sport and free-time activities.

Fundamental principles of the arrangements in pts' life-regime are: to eliminate any everload of lymphatic resorption and transportation and to strengthen all possible lymphokinetic factors for improvement of the lymph system function.

The author presents and specifies life-regime arrangement of lymphedema pts' in following spheres: (a) skin and body care, personal hygiene, (b) dressing, (c) household and profession, (d) health care, (e) recreation and sport activities, holidays and (f) nourishment. Basic recommendations are pointed out.

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BIOMECHANICAL STUDY OF THE GAIT IN PATIENTS WITH LYMPHEDEMA

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Introduction: The increase of the leg mass due to the lymphedema has several implications on the biomechanics of gait. Human gait can be roughly divided in two phases: stance and swing, depending on the activity of each leg. During stance, the limb is on the ground and must support the body weight while the contralateral limb swings forward to achieve a step. We hypothesize that the increase in the mass of the affected leg will cause difficulties in the swing phase. The step would be shorter and would impact with the ground with higher forces both vertical and horizontal (braking). In addition, it is expected that gait would be asymmetric with shorter steps in the affected leg.

Material and methods: We conducted a pilot study to evaluate gait abnormalities in two patients with unilateral and bilateral lymphedema. The patients walked on a force plate of the system NED/IBV AMH (IBV, Valencia Spain) while the ground reaction forces (GRF) under their feet were recorded and analysed.

Results and discussion:

UNILATERAL LYMPHEDEMA: The vertical forces were larger in the non-affected leg, while the horizontal braking forces were bigger in the affected leg suggesting a gait compensation mechanism by the non-affected side.

BILATERAL LYMPHEDEMA: Gait was slow and the vertical GRF pattern was flat, not showing the typical 2-peak shape. This might indicate flat foot with reduced ankle mobility or a mechanism to minimize the excessive loads at weight-bearing and take-off caused by the large weight of the patient. Finally, the large medio-lateral forces found, suggest gait stability problems.

Conclusion: These patients showed larger ground reaction forces with abnormal patterns, including compensation with the unaffected leg. This might cause biomechanical complications related to osteoarthritis or falls (lack of stability during gait) affecting severely the quality of life.

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LYMPHEDEMA AND COMPLIANCE

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Consensus Document of International Society of Lymphologia consider Combined Physical Therapy the most effectiveness approach to care lymphedema.

This therapy is however inadequate if not supported by patient compliance, especially in the maintenance of reduced swelling.

The aim of this study is to find the most suitable way to evaluate and increase compliance in patients with lymphedema.

For this reason was conducted a study with data bases (PUBMED/MEDLINE, and PEDro), using the following key words: lymphedema, compliance, combined physical therapy.

It wasn't found any publication about method of assessing compliance as outcome.

As a result it was needed a new search, using addicted key words: compliance, physical therapy, chronic disease, in order to consider lymphedema as a chronic illness.

Although in literature the words compliance and adherence are generally considered two synonymous, these terms have not the same meaning.

COMPLIANCE is the faithful execution made by patients of prescribed treatment protocol but it does not indicate also the active involvement to the own treatment and the acceptance of the disease.

ADHERENCE means the active and voluntary involvement of the patient both in the planning and implementation of the treatment and in positive coping.

Adherence is a multidimensional phenomenon determined by the interplay of five sets of factors, termed also "dimensions", of which patient-related factors are just one determinant. The common belief that patients are solely responsible for taking their treatment is misleading and most often

reflects a misunderstanding of how other factors affect people's behaviour and capacity to adhere to their treatment.

The five dimensions are:

1. social/ economical factors
2. health system factors
3. condition-related factors
4. therapy-related factors
5. patient-related factors

The knowledge of behaviour changes' models is fundamental to improve adherence in chronic disease and lymphedema is part of this group.

As a conclusion adherence is a primary determinant of the effectiveness of treatment because poor adherence attenuates optimum clinical benefit. Good adherence improves the effectiveness of interventions aimed at promoting healthy lifestyles.

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LYMPHATICS COMPLICATIONS IN DRUG ADDICT PATIENTS

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The incidence of vascular complications due to drug abuse is at present increasing due to new types of drugs. The vascular complications related to drug abuse may affect venous, arterious and lymphatic vessels: ischemia following intra - arterial injection, arterial and venous pseudoaneurysm, septic thrombophlebitis and puffy hand syndrome.

We report the cases of four patients long - term intravenous drug users (heroin), two males and two females, mean age 32.5 years (28 - 34 years) presented puffy hands. These patients had been heroin addicts for five to thirteen years, mean duration 8.2 years, and had stopped injections for 2 - 6 years (mean 3.8 years).

Three of this patients participating in a buprenorphine substitution program. The edema appeared several years after heroin cessation (2 - 4 years) mean 2.5 years. The puffiness was bilateral and the hand swollen from the proximal segments of the fingers to the wrist. Artery Duplex ultrasound was normal, 2 patients presented sequella of superficial venous thrombosis of the back of the hand. The lymphoscintigraphy performed in 2 patients was consistent with deep lymphatic destruction in one patient, the second one presented lymphatic insufficiency.

Repeated injections of drugs in or outside the veins destroy the lymphatics and could provoke venous thrombosis and infections. Puffy hand syndrome appears to be end result of lymphatic destruction.

S VI - 44

EPIDEMIOLOGY OF LYMPHEDEMA IN CZECH REPUBLIC: DEMANDS OF SPECIALIZED HEALTH CARE VERSUS REALITY

K. BENDA

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In CZ necessary statistical data concerning epidemiology of lymphedema are not available (lock in obligatory national register). Only possible way to obtain the data in questions is to approximate and compare relevant data published by lymphological societies of Middle European countries – f.e. Germany, Austria, Italy.

Publisher data indicate that in CZ (11 millions of inhabitants) suffer from chronic lymphedema (grade 2nd) approximately 8.500 pts. (Average incidence in EU reaches 775 pts. on 1 million). Average frequency on out-patient basis management is pointed out to 1 procedure a week (52.000 interventions/year). Approximately 1/3rd of lymphedema pts. need to be hospitalized during initial treatment period for at least 3 weeks (advanced and complicated lymphedema) demanding cca 200 beds for disposal.

Functional, coherent chain of specialized lymphocentres in CZ does not exist yet. Out-patients clinics, evidenced by the Czech Society of Lymphology in number of 11, operate “lege artis” (under the supervision of M.D.-lymphologist) in 7 main regions only. The capacity of those working places is insufficient and decreases the availability and continuity of timely specialized care provided to lymphedema pts. and so, jeopardized them from the risk of delayed management. There are approximately 15 beds in the hospitals appointed exclusively for lymphedema patients.

During last ten years more than 400 lymphotherapeuts obtained official qualification and accreditation. Roughly, only 150 of them have been practicing in lymphology on full time basis.

The task and goal of the Czech lymphological society is to effort and improve the conditions and assert full capacity of specialized treatment for lymphedema patients in CZ.

Session VII: Phlebolympheemas

Lymphatics and woundcare

S VII - 45

COOPERATION OF LYMPHOLOGIST AND ANGIOLOGIST IN DIAGNOSTICS OF LOWER LIMBS EDEMA

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The most frequently diagnosed edemas of lower limbs are lymphedema, phlebedema and lipedema. Concerning aetiology there is often their combination especially combination of lymphedema and phlebedema. The cooperation of lymphologist and angiologist during investigation of various types of edema is mentioned in this paper. Digital photoplethysmography (DPPG) of venous system of lower limbs plays an important role in diagnosing of edema with participation of chronic venous insufficiency. Authors emphasize the benefit of this modern out-patient method in specification of diagnostics of conditions connected with venous insufficiency in the Centre for treatment of edema.

S VII - 46

INPATIENT MANAGEMENT OF ULCERS IN THE LYMPHO-OPT

F.-J. SCHINGALE

Lympho-Opt Klinik, Pommelsbrunn, Germany

Ulcers that were treated in ambulatory offices for several month or even years were sent to our clinic.

As chronic venous disease develops a phlebo-lymphostatical insufficiency and – how Eliska showed – the lymph collectors in this area are disturbed, we start with the decongestive complex therapy and with a treatment to get a better microcirculation.

The documentation is done by a modul for documentation on our PC.

The treatment, following the quality management of our clinic, is done in several steps:

- debridement
- ulcers (most of them are infected): treatment with ozon gas 60-80ng/ml
- softlaser radiation
- management of ulcer with different hydrocolloid pads
- ulcer in phase of granulation: ozon gas 20-30ng/ml
- CO₂-gas for better microcirculation
- Flowave
- manual lymphdainage
- intermittent pneumopresso therapy
- multilayer bandaging
- Lympho-Opt walking
- pain management,
- if necessary: reduction diet
- gymnastic, therapeutical dancing, qigong
- health education
- if necessary: shaving done by plastic surgery, sclerotherapy or other operations
- medical compression therapy

Depending on the ozone therapy in high concentration, we even are able to treat ulcers with MRSA. After one week in most cases the ulcer is free of bacterias.

Depending on the bandaging and the walking in the bandage we have better elasticity of the scar of the ulcer.

Varia

Varia - 48

SHOULDER PAIN IN ARM LYMPHOEDEMA: REVIEW OF 19 PATIENTS

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Objectives: To describe the aetiology of shoulder pain in patients with postmastectomy lymphoedema. To analyze pain evolution, shoulder movement range and arm volume after therapy protocol carried out in our unit.

Material and methods: Retrospective study in 19 women with postmastectomy lymphoedema and ipsilateral shoulder pain treated with NSAID'S, physical therapy with ultrasound, specific shoulder kinesitherapy and/or subacromial corticosteroid infiltration.

Inclusion criteria were: patients with lymphoedema grade II, III and IV with shoulder pain not previously treated with combined descongessive therapy (CDT).

Collected data were: age, pain location, time of pain onset, type of pain (mechanical or neuropathic), pain measurement according to analogical visual scale (AVS), oedema location, lymphoedema stage, shoulder range, arm dominance, arm volume.

Results: Age mean 60 years (range: 47,8-77,6).

The patients referred mechanical pain in 89,5% of cases and neuropathic pain in 10,5%. Right arm was affected in 52,6%. Dominant arm was affected in 63,2%.

Time of pain onset was median 4 months (range 1-38).

Aetiology of shoulder pain was subacromial impingement with integrity of rotator cuff in 47,4%, subacromial impingement with partial or complete rotator cuff tear in 42,1%, others 10,5%. Before our evaluation 36,8% of the patients did not receive treatment for their pain, 5,3% received a corticosteroid infiltration in the shoulder and 47,4% were treated with NSAID'S. Our treatment consisted: electro and thermotherapie and shoulder kinesitherapie in 63,2% cases, subacromial corticosteroid infiltration 26,3%, NSAID'S and kinesitherapie 10,5%.

After treatment we observed a mean of 4,1 cm mean in decrease of pain. Increase of shoulder range with 52,2° average abduction, average flexion 37,5°, average internal rotation 36,6°, average external rotation 20,5°. Average volume decrease 8,3%.

Conclusions: The most common aetiology of shoulder pain was subacromial impingement with or without rotator cuff tear, most frequent in dominant arm lymphoedema stage II. Our treatment protocol improved pain relief and shoulder range. The patients who received corticosteroid infiltration did not presented increase of arm volume.

Although our goal was not to treat lymphoedema we observed a mild decrease of arm volume in our patients. We did not found statistically significant relationship between volume decrease and decrease of pain neither increase of shoulder motion and decrease of volume, probably due to a small sample size.

We observed a significant association between increase of shoulder range and pain decrease after treatment.

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DYSFUNCTION AND SECONDARY LYMPHOEDEMA IN TRAUMATOLOGY, COMPLEX THERAPY OF BURN TRAUMA

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Dedicated to Miloslav Bechyně, M.D.

Introduction: In peace, in war or in armed conflict (terrorist attacks), the number of traumas rises dramatically. Burn trauma and polytrauma and their impact on organism represent an extensive problem - both medical, social and economic. This pilot study represents a possible solution.

Aim of the study: To prove the necessity of timely application of acupuncture (ACU) and myofascial - manual lymphatic drainage (MMLD) as complementary methods in treatment of burn trauma and polytrauma, which are very effective.

Set of patients: The authors have followed 225 patients with burn trauma (23 years) and 91 with trauma (fractures), in the period of 11 years.

Methodology: 1) Acupuncture - is the most important intervention in the information networks. According to methods of Loskotová. 2) Standard treatment of burn trauma and polytrauma. 3) Myofascial - manual lymphatic drainage (MMLD) – is the most important complement to general therapy which consists of manual lymphatic drainage (MLD) methodology, that has an effect on the system circulation, influences oncotic pressure and improves the transportation of deponating as well as circulating immunocomplexes. Always not only in the hinterland of the appropriate body part, but encompassing the entire range according to the MLD methodology. And in combination with MLD we use technics of myoskeletal medicine (MsM), especially therapy of trigger points of muscles and fascia.

Results: 223 patients with burn trauma (99%) healed within 4 weeks, with reduction of the burn shock, analgesics, tranquilizers and antibiotics; without any scarring and necessity of rehabilitation. The infection does not develop and immunodeficiency induced by cytokines does not occur. Timely application of the first ACU is substantial - the earlier the application (up to 30 minutes) the faster and better the healing result; it triggers the recursion of all the initiated pathological processes. 91 patients with trauma of locomotive system with secondary lymphoedema their therapy was reduced of 25%, without signs of algoneurodystrofia of post trauma.

Conclusions for practice: In treatment of secondary lymphoedema in traumatology is necessary to use MMLD to achieve faster healing and better results.

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THE INJECTION ENZYMOTHERAPY OF THE RECURRENT ERYSIPELAS BY HYALURONIDASE

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The aim of this presentation is to discuss a differentially-diagnostic procedure for determining the diagnosis of this serious disease, possibilities of optimizing the outpatient and inpatient therapy, searching the causes of origin and development, and the necessary parallel treatment. We will explain in detail the strategy of complex therapy of the recurrent erysipelas, according to the frequency of occurrence in the individual localities using the accessible methods. We will stress the most effective original Czech method using the subcutaneous circular infiltration by hyaluronidase around the entire affected area in accordance with Prof. Konopík. The authors present 30 years of experience with using this method.

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COULD PRIMARY LYMPHOEDEMA CAUSE GENERAL SIGNS AND SYMPTOMS?

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Authors present case reports of three postmenopausal obese women with similar subjective complaints of long-lasting intermittent oedemas of different body parts. No potentially serious abnormalities which could cause oedemas, were detected by a huge screening examinations. A limb lymphoscintigraphy showed at least slightly impaired transport capacity of the lymph veins. The patients suffered from edemas on the face, the neck, the limbs, the thorax and the abdomen, as well. The common complaints were feelings of liquid flow over their whole body, mainly unilaterally, dyspnoe and oliguria. We tried to relieve the troubles mainly by manual lymphatic drainage as well as by intermittent pneumatic compression of the limbs. Unfortunately, two of three patients had to stop the therapy due to symptoms of excessive whole body flow and pain. A non-peripheral manifestation of lymphoedema causes an extreme psychic stress and it is difficult to treat.

Varia - 52

LYMPHEDEMA AND OBESITY

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Obesity is currently considered to be one of the most crucial health problems; furthermore, obesity stems chiefly from the lifestyle changes accompanying the overall globalization, and is its most severe medical sequel as well. The advent of the newest investigation methods, and, concomitantly, the prompt paradigmatic changes, are now changing our understanding of the many metabolic roles of the adipose tissue itself. We are now just becoming to understand that obesity is one of the most important factors predisposing to a plethora of other civilization diseases. Many lymphologists now accept that treatment of obesity must be considered an integral part of lymphedema treatments. Notwithstanding, unfortunately, the really effective treatment is only seldom put into effect. There exist various reasons why this is so; nonetheless, I can see – as one of the main causes – the fact that lymphedema is almost invariably (or at least most frequently) associated with the gynoid obesity, and not the *android* one. The effective treatment of gynoid obesity is, however, far *more complicated* than the treatment regimes successfully adopted in android obesity; the latter, then, is usually connected with the metabolic X-syndrome. And, as is evident, current obesitology is nearly exclusively concerned with the *android* and not *gynoid* obesity.

In my report I am further trying to present the differences in diagnosing either obesity types. I also append our center's experiences with the application of so called e-health or telemedicine attitudes toward the complex long-term treatments in both obesitology and lymphology.

Sunday, May 13 - Hall II - Congress of Czech Society of Lymphology

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MANUAL LYMPHODRAINAGE, PART OF SPORT REHABILITATION - CASE REPORT

E. UHLÍK, H. VÁCHOVÁ, M. WALD

Prague, Czech Republic

Lympho I - 54

THE SIGNIFICATION OF THE LYMPH THERAPY IN TRAUMATOLOGY AND ORTHOPAEDY

H. VÁCHOVÁ, Z. DEMUTHOVÁ

Prague, Czech Republic

Lympho I - 55

COMPLEX TREATMENT OF CHRONIC WOUNDS IN LYMPHEDEMA

D. PERŮTKOVÁ

Olomouc, Czech Republic

Lympho I - 56

INTERVENTIONAL DIAGNOSTIC AND THERAPEUTIC PERFORMANCES IN PEDIATRIC PATIENTS - NURSE'S VIEW

P. PROCHÁZKOVÁ, P. URBANČIKOVÁ, G. PAULUSOVÁ, L. KAŠPERLÍKOVÁ

Ostrava, Czech Republic

Lympho II - 57

POSSIBILITIES OF E-HEALTH IN PREVENTION AND TREATMENT OF LYMPHEDEMA

R. VLASÁK

Prague, Czech Republic

Lympho II - 58

LIPOSUCTION IN CHRONIC ARM LYMPHOEDEMA. WHEN, HOW AND WHY?

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Lympho II - 59

DISCHIASIS AND LYMPHOEDEMA

M. WALD, H. VÁCHOVÁ, J. URBAN, J. ADÁMEK

Prague, Czech Republic

Lympho II - 60

ANXIETY AND DEPRESSION - COMPLICATING FACTORS OF LYMPHEDEMA PATIENTS PSYCHOTHERAPY

M. BENDOVÁ

Brno, Czech Republic

Posters

P - 1

THE PHYSIOTHERAPIST IN THE TREATMENT OF LYMPHOEDEMA: THE USE OF SELECTED INSTRUMENTAL EXAMS

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Through collaboration with other members of the rehabilitation team, the physiotherapist follows the patient from the initial examination up to the planning of the rehabilitation project.

Above all, she collaborates with the lymphologist in the study of lymphoscintigraphy in order to evaluate the morpho-functionality of the lymphatic system, important to a selected execution of the manual lymphatic drainage.

She also collaborates in the morphological analysis of the tissue with eco-colour-Doppler, necessary for the application of special manoeuvres in the manual lymphatic drainage and in the choice of adequate thickness in the construction of multilayer bandaging. Therefore, through the use of these instrumental exams, the rehabilitation process in the treatment of lymphoedema can be further personalized.

P - 2

FINE STRUCTURE OF THE ABSORBING LYMPHATIC VESSEL AND INTRAVASATION MODALITY OF THE CANCER CELL

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The topographic distribution and the fine structure of the tumor-associated absorbing lymphatic vessel in the B16 Melanoma and T84 adenocarcinoma subcutaneous tumor mass of nude mice and in adenocarcinoma mouse prostate in transgenic mice were studied to demonstrate the modality of the cancer cell transendothelial migration and the role of the lymphatic pathway in the metastatic diffusion. Furthermore, the structural characteristics of the lymphatic vascular system canalisation, that allow to discriminate between the vessels with high absorbent capacity, distinctive of the mucous and submucous network and vessels with lymph flow and conduction function (precollectors, pre- and postlymph nodal collectors, etc.), are specified.

The presence of lymphatic vessels was revealed by LYVE-1 and D2-40 markers, only at the borders of the tumor mass and in the peritumoral tissue. These vessels are characterized by a monolayer of endothelial cells joined each other by overlapping contacts and often they contract close connection with the cancer cell evolved in the invasive phenotype. The serial ultrastructural pictures of the latter and their three-dimensional model reconstructions allow to evidence the modality of their passage from the interstitial matrix into the lymphatic vessel lumen that takes place by means of intraendothelial channel formation without committing the interendothelial junctions. The intraendothelial channel is formed by the peculiar behaviour of the non nuclear cytoplasm of two adjacent endothelial cells and is the first morphological documentation of the cancer cell intravasation into lymphatic circulation and its lymph node metastatization. The molecular bases that control the constitution of the intraendothelial channel and the mechanism of the active transendothelial migration of the cancer cell are unknown, but the role of the vascular endothelial growth factor -C and D, and of the chemoattractants released from matrix and from lymphatic endothelium seems to be accepted.

This study was supported by grants from the University of Parma (FIL) and from the Cariparma Foundation.

P - 3

COMPLIANCE WITH COMPRESSION GARMENTS IN 112 POSTMASTECTOMY LYMPHEDEMA PATIENTS

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The problem of compliance with garments is known and the improvement of their suitability is a challenge in order to enhance volume maintenance and patient's quality of life.

Methods: 112 women with postmastectomy lymphedema were included in this prospective cohort study to evaluate the compliance with garments. Garments were assessed following a system of score to measure their suitability. Patients were asked about the number of hours per day that they were wearing their garment and their satisfaction with it. The median age of the sample was 60.8 years (range 37-81) and the affected arm was dominant in 50%.

Results: The patients were using the armsleeve a mean of 11.4 hours per day (95%CI:10.7-12.2), and the gauntlet 7.0 hours per day (95%CI:5.9-8.0).

No relation was found between the time of compliance with the garment and the independence of the patient to put it on (p=0.973). The age, the Body Mass Index, the chronicity of lymphedema, the baseline volume and baseline oedema did not have a significant effect on the use of the garment.

We analysed the relationship between the problems detected with the suitability assessment system and compliance. Only hand swelling was associated by a significant decrease in the compliance (11.9 versus 8.4 hours per day, p=0.001).

The patient's satisfaction with the garment was bad in 4.7%, mild 13.1%, good 62.6% and excellent 19.6%. When patients were more satisfied with the garment, they used it longer during the day (p=0.020).

No association was found between the score of the suitability assessment system and the time of compliance (p=0.117).

Conclusions: The patients wear their armsleeves the main part of the day but they often put off their gauntlets. The main factors influencing the use of the garment are the undesirable effect of hand swelling and the patient's satisfaction with the garment.

P - 4

COMPRESSION AND LYMPHEDEMA UNAVOIDABLE UNION IN THE COMPLEX REHABILITATING DECONGESTIVE TREATMENT

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The compression with bandages and stockings represents a method of fundamental importance in the mixed decongestive treatment of the limbs, easy to manage, preceded by a suitable preparation of the patient and of course it's a method that, more than every other, guarantees long-lasting in short and long term results avoiding repeated and discouraging relapses. In the introduced work we present the basic physiopathological knowledge of the elastic and ipoelastic bandage with the description of the intrinsic components of manufacture both of the bandages and of the stockings, united to the principles of emodynamic action on the anatomical structures subjected to compression. Particular importance has been given to the demonstrated examples of bandages on the limbs in virtue of the fact that this method, more than every other, is characterized by a strong practical component and by the correct application of them. We recall, in fact, the limits and the problems due to a wrong application of bandages and the optimization of the satisfaction of the subject, moment of particular importance in determining the success of the waited result. In the end we report the experience obtained by the author on a population of 72 patients affected by lymphedema at upper and lower limbs subjected to mixed decongestive treatment with elastocompression carrying off satisfactory results both in centimetre terms of the measured circumferences and in terms of quality of the life in these subjects, already strongly tried by this disability that, if neglected, can often determine quite the total compromising of the normal activities of life (ADL).

P - 5

SPLEEN UPTAKE OF CIRCULATING METAL MICROPARTICLES

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The pervasive environmental pollution of today's world has resulted in the frequent detection of microparticles of heavy metals in the tissues of humans and animals living in areas of significant contamination of local waterways and of the food chain. In order to study the precise organ distribution of minute amounts of heavy metals, we have applied x-ray microanalysis to the observation of samples by scanning electron microscopy. To test the advantages and limitations of this methodology, we have investigated the in situ distribution in major organs of mice of injected microparticles of mercury, a frequent heavy metal polluter.

As a paradigm of a lymphoid organ we have chosen the spleen. We report here on the detection of mercury particles in the spleen of BALB/c mice by x-ray microanalysis coupled with scanning electron microscopy. Most of the intravenously injected mercury particles that were found in the mouse spleen were observed inside resident macrophages. Often, individual splenic macrophages had ingested several microparticles of mercury. Some of the mercury-positive cells were seen inside splenic lymphatic vessels. Quantitative measurements of the number of mercury particles revealed that the spleen was responsible for the removal of less than 2% of circulating mercury particles, much less than the number of mercury particles observed in kidneys (around 9% of the total). As expected, the liver stored almost 90% of mercury microparticles that had been introduced in the blood stream.

This work documents that the topography of individual microparticles of mercury can be obtained by submitting the samples to x-ray microanalysis coupled with scanning electron microscopy, and that this approach is suitable for harvesting quantitative data on the precise heavy metal distribution in the different domains of body, namely in lymphoid organs. This work was founded by grants from FCT (POCTI/FEDER).

P - 6

THE LYMPH SACS - AN IMPORTANT PHASE IN THE DEVELOPMENT OF THE LYMPH SYSTEM (LYS)

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Introduction: The relationship of the development of the both lymph- and blood vessels still remains a discussed question. In the clinical practice incidence of even cases of peripheral inflections upon lymphatics (primary lymphedema) and veins (varices) is rather frequent. We present a summary of our studies of the evolution of the lymph- and blood vessels in representatives of vertebrates by means of light and electron microscopy.

Methods: We have proved different ways of morphogenetical processes during the blood and lymph formation in representatives of reptiles, birds and especially mammals including man on 180 embryonic series and 104 histologic set of specimen. For study of jugular sac formation 3D reconstruction of sections *Stenella attenuata* was used. Electronoptically we have followed the development of vascular wall in embryos and fetuses and structure of the microvessels in human peritoneum.

Results: The first primordia of LYS – 2 jugular lymph sacs – originate from mesenchymal slits in cervical region. The similar 2 lumbar (iliac-inguinal) sacs, 1 retroperitoneal lymph sac and 1 cisterna chyli develop later. Right and left thoracic ducts connect the jugular lymph sacs with cisterna chyli. The lymph sacs are transformed into groups of lymph nodes and larger lymph vessels during the early fetal period. In the development of the lymph system of extremities the both central as well as peripheral primordia of the LYS participate. The small lymphatics are found electronoptically towards the end of the embryonal period when the wall of individual type of blood vessels and the connective tissue are being differentiated.

P - 7

TREATMENT OF LYMPHEDEMA WITH SHOCKWAVE THERAPY: PRELIMINARY STUDY

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We have been treating 35 patients affected by primary or secondary lymphedema of upper and lower limbs. Admission criteria: age between 20 and 70, complaints lasting more than 1 year with associated localized or diffuse tissural fibrosis. Exclusion criteria: specific therapy over the past 7 days, pregnancy, coagulation disorders, tumor, acute phlogosis.

Patients were treated for 4 sessions, 2.500 impulses each. The energy flow density during treatment was equal to a working pressure of 2 bar. Treatment frequency was 4 Hz in multiple shock mode. Never was used local anesthesia.

The radial shockwaves are pneumatically generated and emitted at the tip of the applicator and coupled into the human tissue, until to a depth of up to 35mm. The effects on the tissue are: increasing of the metabolic processes, antiphlogistic and vasodilatation and neoangiogenesis with correlate increase of the fluid transport.

Patients were evaluated 2 weeks and 1 month after treatment. They show a medium decreasing of the 32% of the circumference of the limb and a subjective and objective reduction of tissural consistence, above all in fibrotic areas.

We observed side affects such as local irritation, petechia, hematomas, swelling and low pain 24-36 hours after treatment. Only in 1 patient the suspension of treatment was required. By the high resolution echography we observed a reduction of the skin and suprafascial tickness, corresponding to the clinical observations.

In conclusion, in our preliminary study, we can affirm that this kind of shock wave therapy is very useful in primary and secondary lymphedema.

Starting from March 2007, in Italy, this therapy is distributed by the national sanitary insurance.

P - 8

AXILLARY LYMPHATIC MASSAGE OPTIMIZES THE SENTINEL LYMPH NODE LOCALISATION BY BLUE DYE TECHNIQUE

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Introduction: Lymphatic mapping using blue dye, radiolabelled colloid or both to identify the sentinel lymph node in breast cancer surgery is becoming the standard of care. In the validation phase of the ALMANAC trial surgeons achieving a localization rate of $\geq 90\%$ using a combined technique of blue dye and radioisotope proceeded to the randomization phase in which the success rate for localization of the sentinel lymph node was 98%.

We report a technique of blue dye alone, which we have developed locally in Stoke on Trent, using the axillary and breast massage after subcutaneous injection of 2 ml of Patent Blue dye. This novel massage optimizes the localisation of a blue lymphatic duct in the axilla and leads to successful identification of the blue sentinel lymph node.

Material and Methods: We injected 2ml of 2.5% undiluted blue dye subdermally in the retroareolar area at the upper outer quadrant of the breast. Based upon the principles of Manual Lymphatic Drainage (MLD) the axilla is then massaged to empty the axillary lymph nodes. The next step of massage was from the axilla towards the injection site. The final step is to massage from the injected area towards the axilla to drain the blue dye into axillary lymph nodes.

Results: A blue sentinel lymph node was identified in 144 of 168 patients without massage, a localisation rate of 85%. In 167 patients with axillary lymphatic massage technique the blue sentinel lymph node was identified in 163 patients thus improving the localisation rate to 97%.

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LYMPHATICS OF THE PLEURA: MICROSTRUCTURE, INFLAMMATION AND DRAINAGE OF HEAVY METAL PARTICLES

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The pleural space can be viewed as a lymphatic space that is drained through either one of its two leaflets. We have used rodents to perform a detailed study of the surface morphology of the parietal and visceral leaflets of the pleura, using scanning electron microscopy, and we have investigated the in vivo drainage of microparticles of calcium tungstate injected in the pleural space of mice. Calcium tungstate is a heavy metal salt that can be used as an elective marker of the drainage of microscopic particles.

Our electron microscopy studies documented that the parietal pleura contain scattered small openings, as it has been shown before, and the visceral pleura, although devoid of any holes, contained an extensive subpleural network of lymphatic vessels. Intrapleural injection of tungsten particles led to an acute inflammatory reaction with a first peak of inflammatory cells (neutrophils and macrophages) that was observed 24 hrs after the intrapleural inoculation. At this timing, more than half of the inflammatory macrophages showed intracellular particles of tungsten. The tungsten-positive macrophages adhered later to the inner surface of the pleural wall and, in some instances, were able migrate through the mesothelial layer. Tungsten particles were detected in mediastinal lymph nodes as early as one day after intrapleural injection, whereas hilar lymph nodes of the lung were devoid of metal particles at least up to 7 days. However, tungsten-positive macrophages were captured in the lymphatic vessels located underneath the visceral pleura. These observations indicate that there are two pathways of drainage of particles present in the pleural space of mice: a fast pathway that will carry the majority of the exogenous particles into mediastinal lymph nodes, whereas a minority of the particles will cross the visceral leaflet of the pleura, probably carried inside migrating macrophages, and will enter the rich network of subpleural lymphatic vessels. This work was founded by grants from FCT (POCTI/FEDER).

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TRISOMY 20QTER AND LYMPHEDEMA

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Clinical case

• R. A. DoB 22/11/1989 • No abnormal familial information • One half-sister from her mother • Uneventful pregnancy • Normal size at birth

Other Clinical Signs

• Delayed psychomotor development: cytogenetic evaluation was regarded as normal. • Transient lymphedema of the right foot in 05/2002. • Seen in the outpatient clinic 14/6/2003 at age 13 years 7 months • Persistent lymphedema of the right leg in 10/2002 • Normal biological evaluation, lymphography: normal aspects

Different Syndromes must be evocated

• Discussion of algodystrophic syndrome on lymphography and thermography • Discussion of Milroy syndrome • Discussion of Hennekam syndrome and based on developmental delay but there was no lymphangiectasy

Genetic Investigations

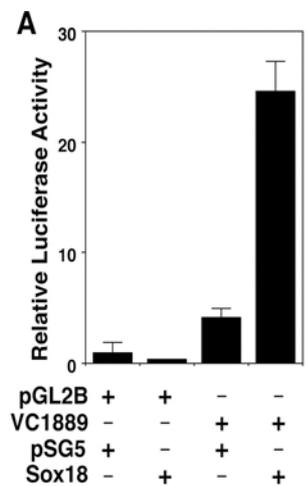
• High resolution cytogenetic analysis and subtelomeric Fluorescent In Situ Hybridization (FISH): complex chromosomal anomaly with 10qter deletion and 20qter trisomy, 20qter: localization of Sox18 gene, Sox18: implicated in the control of the development of lymphatic vessels. Hypotrichosis - lymphedema – telangiectasia: Familial mode of expression, Recessive mutation, Dominant mutation, Missense mutations in the DNA binding domain (D) or non sense mutation (R) of Sox18, Action of Sox18 on the regulation of expression of VCAM-1. Sox18 and VCAM-1 Regulation of the expression of VCAM-1 promoter by Sox18 in Cos-1 cells, Hosking, B. M. et al. J. Biol. Chem. 2004; 279: 5314-5322.

Mechanisms

• Triple expression of SOX18 related to the presence of three copies: dosage effect with abnormalities in case of three copies.
• Translocation in the close range of Sox18: suppression of the expression of the gene.
• Studies are still ongoing to precisely locate the break point of the translocation.

Conclusion

We hope that the next studies will locate precisely the break point of the translocation.



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EVALUATION OF THE EFFECT OF DEEP OSCILLATION (HIVAMAT®) ON TISSUE CHANGES OF THE BREAST IN PATIENTS WITH SECONDARY BREAST LYMPHEDEMA

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Introduction: Many women with breast cancer develop secondary lymphedema of the arm, chest wall, and breast following treatment. The available epidemiological data is insufficient but our clinical experience suggests that the incidence of breast lymphedema is likely to increase as more women undergo breast-sparing surgery. Unlike lymphedema of benign origin involving the limbs, breast lymphedema can be very painful.

Aim: The aim of the study presented here was twofold: to investigate the symptoms and functional impairment in women with secondary lymphedema of the breast on the one hand and to assess the therapeutic benefit of deep oscillation supplementing manual lymphatic drainage on the other hand.

Material and Method: Inclusion criteria: age 18-80 years, breast lymphedema, at least 6 weeks since last irradiation. Assessment: subjective pain evaluation using a visual analogue scale (VAS), photographic documentation, assessment of the range of motion of the shoulder and cervical spine (neutral-0 method, Zebris motion analysis system, muscle function test according to Janda) and analysis of body surface in the breast area using a 3D measuring system. Treatment group (n=11): 4-week course of 12 sessions of manual lymphatic drainage supplemented by deep oscillation (Hivamat®, Physiomed Elektromedizin AG, Germany) and control group (n=10) treated by manual lymphatic drainage alone.

Results: Deep oscillation resulted in significant, clinically relevant, pain reduction. This effect was not observed in the control group. Swelling was subjectively assigned a score of 5.9 on the VAS by the patients at the initial examination. Patients in both groups reported significant reduction of swelling. The reduction of swelling was objectively confirmed by 3D measurement in the both group. The results of our pilot study suggest that additional deep oscillation supplementary to manual lymphatic drainage can significantly improve outcome in terms of pain alleviation and volume reduction in patients with secondary breast lymphedema compared to manual lymphatic drainage alone. Deep oscillation is a beneficial supplementary approach in treating breast lymphedema.