S U M M A R Y

PAPERS PRESENTED DURING THE 1st MEETING
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( President : G. BRUNELLI - Brescia - Italy )
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1st MEETING
OF THE EUROPEAN FEDERATION
OF MICROSURGICAL SOCIETIES

President:
G. BRUNELLI
Brescia - Italy

ROME, ITALY, EXCELSIOR HOTEL (via Veneto)
SEPTEMBER 26, 1992

SATELLITE MEETING:
RECONSTRUCTIVE MICROSURGERY
IN LYMPHATIC SURGERY

Chairman:
C. CAMPISI
Genoa - Italy
INTRODUCTORY LECTURE

Reconstructive lymphatic microsurgery: state of art

C. CAMPISSI

V.-President of the European Group of Lymphology
(GEL)

V.-President and Secretary General of the Italian Society of Lymphangiology
Secretary General of the Latin-Mediterranean Chapter of the International Society of Lymphology
(I.S.L.)

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The Symposium is under the patronage of the Italian Society of Lymphangiology and the auspices of the Latin-Mediterranean Chapter of the International Society of Lymphology and the European Group of Lymphology, here represented by the high personalities belonging to the Executive Committees, such as my Teacher, Prof. Mario CASACCIA, President of the Italian Society of Lymphangiology, Prof. J.A. COSSIO, President both of the Latin-Mediterranean Chapter of the ISL and the Spanish Group of Lymphology as well, and Prof. A. PISSAS, President of the European Group of Lymphology.

Our Meeting gathers a lot of heads of School of Italian Surgery, who accepted with pleasure to belong to the Honorary Committee and to be today present, such as Prof. S. ARMENIO from Siena, Prof. A. DI MATTEO from Rome, Prof. I. DONINI from Ferrara, Prof. S. NAVARRA from Messina, Prof. C. PRIOR from Genoa, Prof. RODOLICO from Catania, without forgetting Prof. M. BARTOLO from Rome and Prof. D. ZACCHEO, as Italian authorities and members of the Executive Committee of the Italian Society of Lymphangiology, and Prof. W. OLSZEWSKI, Past President of the ISL, from Warsaw, Prof. M. FOLDI, Director of Földi Klinik für Lymphologie, from Hinterzarten-Freiburg, Germany, Prof. E.A. SAMANIEGO, President of the Spanish Society of Phlebology, from San Sebastian, as foreign authorities in this field, apart of all other Colleagues coming from the various parts (Countries) of Europe, to give here their precious contribute.

The subject-matter of this Symposium awakes our interest because it is a new and present one, rich of good prospects.

Nevertheless it is necessary to put this subject in order, beginning to fix both the anatomical bases, that Prof. CASTENHOLZ is going to explain, and the physiopathological ones as well, whose undiscussed teacher is Prof. OLSZEWSKI.

Then, Prof. J.A. COSSIO will deal with the clinical patterns of Lymphedema, susceptible of microsurgical treatment.
A particular space of this microsurgical and lymphological morning will be dedicated to the diagnosis, beginning with our School's experience on direct lymphography, with the following reports, on the behalf of a great expert of lymphological radiology, such as Prof. J. BRUNA, from Praha, with a precise reference to the peculiarities of lymphography in paediatric age according to our experience as well. Which role has today the direct lymphography in the diagnostics of lymphedema?

Well, these experts are going to explain us their opinion also to compare it with the criticisms that in these last years regarded this kind of diagnostic investigation.

Nevertheless, the lymphoscintigraphy has improved a lot and nowadays we consider it as one of the indispensable method of depistage and diagnostic information as well.

Prof. P. BOURGEOIS and Prof. E.A. SAMANIEGO are going to speak about it, trying to point out how the standardization of this method stand to succeed in obtaining an easier and more effective use of homogeneous data interpretation.

Then, we will deal with the specific reports on microsurgical field in Europe, referring to derivative lymph-venous microsurgery, which will be point out by Prof. G. INGIANNI, E. SAMANIEGO and KAUFMAN.

We will speak also about our advance that belongs to the Genoese School, that's to say the Laser-Microsurgery coupling.

What are the advantages we can have?

In which cases?

In the second part of the morning, prof. R. BAUMEISTER, P. TREVIDIC, C. BECKER and we will examine the specific microsurgical reconstructive techniques.

A discussion will follow to compare the different experiences (figs. 1 - 2).

Which kind of reconstruction we can make?

Autogenous lymph vessel transplantation, autogenous vein transplantation or free lymphatic flaps?

What are the indications?

Then, the medical and physical conservative treatment as alternative, that's to say in antithesis to microsurgery or better together to obtain improved and more lasting results, apart from the advantage of the much more rapidity to obtain a good and definitive result. What can derive from this association?

As far as it is concerned we are going to listening to Prof. A. PISSAS, J.P. BRUN, A. LEDUC and R. CLUZAN's opinions.

Then, other methods such as thermotherapy can have an interesting role in the ambit of conservative treatment of lymphedema associated or not to the microsurgery.

On these subjects you can evaluate the experience we achieved so far.
Bases anatomiques de la microchirurgie réparatrice du système lymphatique (1).

Anatomical aspects for reconstructive microsurgery in lymphatic surgery (1).

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INTRODUCTION

La lymphologie clinique est un domaine à multiples facettes comprenant de nombreuses méthodes de diagnostic et de traitement conservateur, ainsi que des techniques chirurgicales ou microchirurgicales. Signe d’alerte du dysfonctionnement du système lymphatique, l’œdème traduit la défaillance totale ou partielle du drainage tissulaire, normalement protégé par de nombreux volants de sécurité. Les connaissances récemment acquises en lymphologie fondamentale ont éclairé la physiopathologie des différents types d’œdèmes secondaires à une défaillance soit fonctionnelle, soit mécanique du système (1).

Pour prévenir de la récidive ou de l’écueil du traitement clinique du lymphédème, il est essentiel de connaître à la fois les bases structurelles du système, la dynamique du courant lymphatique et les processus histopathologiques qui y participent. C’est pour quoi nous envisageons ici la micro-anatomie, les relations avec les tissus environnants et les propriétés circulatoires des vaisseaux lymphatiques des plus petits aux plus importants. Nous exposerons essentiellement les résultats expérimentaux recueillis au moyen de la microscopie électronique, de la microscopie in vitro et l’injection de nouveaux produits fluorescents chez le rat. La description détaillée de ces techniques a été rapportée antérieurement (2, 3, 4, 5, 6).

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INTRODUCTION

The spectrum of topics essential for clinic lymphology comprises various methods of diagnosis as well as physical treatment and surgical or microsurgical operations. As a guide symptom of lymphatic dysfunction, the edema indicates a state in which tissue drainage mechanisms, normally well balanced by control of many safety factors, are overcharged and, at least, become insufficient. Today, considering new findings in basic lymphology, insights have been obtained even in the pathophysiology of different types of edema caused either by a dynamic or mechanical insufficiency (1).

To assess precisely success or failure of clinical application in edema treatment fundamental knowledge of both the structural organization as well as the dynamics of lymph flow and the histomechanics concerned seems to be of great importance. Thus, the fine structural features, the relations to the surrounding tissue, and the rheological properties of fine and larger lymphatics should be outlined here. Predominantly results of experimental studies based on electron microscopy as well as vital microscopy and new fluorescence techniques applied in situ will be reported. Further details of the studies have been published in previous papers (2, 3, 4, 5, 6).

MORPHOLOGICAL FEATURES OF THE LYMPHATICS

The vascular lymphatic system is composed of vessels provided with different dimensions, morphological properties and functions. Thin-walled vessels are the initial lymphatics and precollectors, which only consist of an endothelium and a small basal lamina, whereas the collecting vessels as draining channels of organs and regions of the body represent thick-walled structures with three well-developed layers similar to that of blood veins.

In the skin and mucous membranes the initial lymphatics and precollectors from phlebus-like systems. Their diameters strongly vary from a few micrometers up to 100 µm and more. The system of collectors is organized after the principle of converging ducts in the body. Lymph nodes serve as stations in
En ce qui concerne le système lymphatique initial, nous n'avons encore que peu de connaissances sur les mécanismes de formation et de circulation de la lymphe. Cependant, des études microscopiques in vivo ont permis récemment de mieux appréhender la structure et les échanges liquidiens à ce niveau. Dans des conditions expérimentales bien définies et en utilisant de nouveaux produits fluoroscents tels que le TFC de dextran et des microsphères fluorescentes, on peut observer directement la formation et le cheminement de la lymphe nécroformée dans les lymphatiques mésentériques et dans les précollecteurs (9, 6, 11, 12). Le résultat de ces expériences peut être résumé ainsi qu'il suit :

1. Dans des conditions normales, les lymphatiques initiaux étant équilibrés, leur poussée à partir du liquide interstitiel se fait par une légère filtration à travers les fines espaces intercellulaires (open junctions), seuls dispositifs expliquant la perméabilité de ces vaisseaux.

2. Lorsqu'une substance dans le liquide interstitiel, les substances interstitielles deviennent plus perméables et le liquide fuit massivement irruptive dans le lymphatique initial. Ce phénomène qui augmente drastiquement la quantité de lymphe formée dépend de la structure histologique des vaisseaux qui se distinguent par la constatation de l'interstices d'atomes (anchoring filaments). D'autres larges communications entre espace interstitiel et lumière vasculaire ont été mises en évidence dans le mésentère et dans d'autres tissus (13). Ce dispositif favorise l'échappement du liquide interstitiel vers la lumière vasculaire.

3. La progression de la lymphe nécroformée dans le lymphatique initial et les précollecteurs dépend de la vitesse de sa formation, à bas ou à haut régime. Dans de nombreuses expériences, on peut constater un écoulement rythmé. Ce rythme est souvent fonction des mouvements respiratoires de l'animal, mais peut également être dû à des mécanismes de succion exercé en aval par les collecteurs.

4. Un autre phénomène important est le fait que la lymphe nécroformée, dès son dégagement dans les lymphatiques, y est débarrassée des particules étrangères qu'elle renferme. Ainsi, des corpuscules en suspension sont capités par l'endothélium, adhéreant aux irrégularités de la face endothéliale de ces vaisseaux, et restent de ce fait plus ou moins longtemps écartés du courant lymphatique. La plupart de ces éléments est finalement phagocythés par les cellules endothéliales. Ce qui conduit à penser que les lymphatiques initiaux sont dotés de propriétés immunologiques, jusqu'à présent reconnues dans les organes lymphatiques et aux autres constituants du système de défense de l'organisme.

**EN CONCLUSION**

Cet exposé ne concerne que l'anatomie générale des vaisseaux lymphatiques. Nous avons insisté sur la structure microscopique de ces conduits et leur aspect fonctionnel. Nous ne nous sommes pas proposé de décrire l'anatomie descriptive et topographique des lymphatiques des différentes parties du corps. (Pour de plus amples renseignements sur ce chapitre particulier de l'angiotologie lymphatique, voir 13.)

A l'adresse des cliniciens microchirurgiens, il nous faut insister pour conclure sur un certain nombre de points. Le système lymphatique en général, haut lieu de confrontations immunologiques entre cellules isolées et tissus, représente un dispositif fondamental dans lequel toutes les structures vasculaires, vaisseaux sanguins comme lymphatiques, jouent un rôle de premier plan. Les techniques expérimentales modernes ont montré que les lymphatiques, des plus fins aux plus gros, sont des structures bien différenciées, non représentées à la fois dans les organes lymphoïdes et dans les autres tissus. Ainsi, le processus vital de formation de lymphe à partir de l'ensemble du milieu interstitiel ne peut-il se réaliser que grâce à un équilibre harmonieux entre

caused by the fact, that on the base of histochecnics, the vessels dilate by the stretching of the anchoring fibrils. In mésentery and other tissue even broad preformed interconnec- tions between the interstitial spaces and the vascular lumen have been evidenced (13). In such a case easy drainage of the tissue is possible for the vessels concerned.

3) The primary lymph is moved within the initial lymphatic and precollectors depending on the existing mode of lymph forma- tion either at low or fast speed. In many experimental studies, rhythmic movement of the lymph could be recognized. The rhythm is often correlated with the breathing system of the animal and sometimes, obviously influenced by sucking for- ces, produced by the subsequent collector system.

4) As an important phenomenon it could be recognized that the primary lymph, while passing the lumen of the first vessels, is already cleared from foreign material. Thus, particular matter is captured by the endothelium adhering to the irregu- lar luminal profile of these vessels and so removed from the lymph for a short or longer time period. Most of that material is finally impacted by phagocytosis of the endothelial cells. The observation lets suggest that the initial lymphatics are already provided with significant immunological proper- ties, which, in vitro, have been only ascribed to lymph nodes and other parts of the body defence system.

**FINAL REMARKS**

This report concerns the anatomical basis of the lymphatic ves- sels. Thus, emphasis was laid on the fine structural features of these structures and on the functional aspect as well. No attempt was made to give a precise description of the topography and systemic anatomy of the lymphatics in different regions of the human body. (For further instructions of that particular field of lymph angiology, see 13.)

For clinicians working in the field of microsurgery, some general concluding remarks should be pointed out here. The lymphatic system is often correlated with the breathing system of the between single cells and tissue exhibits a base on which all vascular structures, blood vessels as well as lymphatics, take an outstanding role. Modern techniques in experimental morpho- logy have shown that fine and bigger lymphatics are well dif- ferentiated structures which form integrated elements within lymphatic organs and other tissue. Thus, a vital process like lymph formation happening everywhere in the connective tissue is only possible, if vascular functions and histochecnics interact in a well-balanced manner. On the other hand, precontrol of the primary lymph by the endothelium of initial lymphatics as evi- denced by vital microscopy proves another significant immunobi- ological mechanisms, which is wellknown phenomena of the living cells of sinuses in lymph nodes. Moreover, it has been demonstrated by rheological observations in experimental ani- mals that there exists a close rheological interrelationship between the initial lymphatic system and the lymph collectors on the base of sucking forces, which, together with histochec- nics, promote the primary lymph. Keeping these facts in mind the surgeon has to realize that every interference in the system of lymphatics after produced by operative or diagnostic proce- dures may affect not only a single structure or a limited tissue area, but, in a rule, also most remote parts of the lymphatic system in the body.
Lympho-venous-microsurgical anastomosis in the treatment of lymphedematous limbs.

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SUMMARY

Microsurgical procedures in reducing lymphedema of the limbs may improve the patient's condition but it is still a current unsolved problem. There are differences made in considering primary and secondary lymphedema, the upper and lower extremity and patient-history.

The clinical manifestation of lymphedema is partially reversible, being only able to improve and not heal the condition. The various microsurgical techniques show reasonable results yet their evaluation is not comparable.

According to our experience with 52 patients and a maximum follow-up of ten years we concluded that:

1. Lympho-venous anastomoses were not effective in patients having a lower limb lymphedema.
2. Lympho-venous-anastomosis were not possible in patients with a primary lymphedema.
3. The natural predilections in secondary lymphedema of the upper limb can be decreased but not stopped.
4. A selection of suitable patients is mandatory to avoid bad results.

However microsurgical lympho-venous-anastomosis plays an important part in the therapy of secondary upper limb lymphedema and should be seen as a routine procedure in big microsurgical units.

INTRODUCTION

The resective therapy of the lymphedema is limited to a few particularly cases (fig. 1). A microvascular lympho-venous-anastomosis as well as lympho-lymphatic transplantations or venous grafts represent a more physiological way of treatment. Microlymphatic surgery exists now for 25 years and yet all of the problems are not solved in treating the lymphedematous limbs despite of many optimistic articles.

There are many different reasons for this: being related to the pathology of the lymphedema itself, to the localisation and to the different patients.

For example, there are basic differences in primary and secondary lymphedema. In primary lymphedema, lymphpholicucts are hypoplastic or non functioning leading to a breakdown of the centripetal lymph flow. In these cases lymphovenous or lympho-lymphatic connections cannot give satisfying results.

Due to the localisation there are also different bemo- and lymphodynamic conditions which can eventually harm the lympho-venous or lympho-lymphatic anastomosis.

The third factor, the patient itself is of outmost importance. The history of the lymphedema, the reversibility of the intestinal changes like fibrosis and the chronic subacute infection of the lymphatic system advise us to carefully select adequate patients for the microlymphatic procedures.

Independently from the kind of microlymphatic procedures two requirements have to be fulfilled:
1. Enhancing the natural but actually reduced lymphatic output and
2. bypass the lymphatic stop at the root of the extremity.

METHODS

We only want to briefly discuss our microsurgical technique for performing the lympho-venous-anastomosis because it has already been discussed elsewhere (fig. 2, 3). The elementary conditions for performing this operation are:

1. suitable lymphcollectors in the involved extremity;
2. no tissue fibrosis;
3. no infection.

The pre- and postoperative circumference measurements are taken from differing levels on both extremities (fig. 4). Ten years ago with our first cases we calculated the volume by water displacement (fig. 5). To quantify the postoperative results isotopical investigations of the lymphatic clearance were used.

We stopped using this method because most of our patients were extremely bored by the procedures and refused it.

The simple measurements of the circumference are less precise yet deliver enough information for evaluation and are easier on both the patients and the surgeons.
FIGURE 1
Elephantiasis of the left leg.
The young patient is virtually unable to walk.
No microsurgical procedure can be helpful.
Only a remove therapy can be performed.

FIGURE 2
Invasigation anastomosis between a larger vein and a lymphvessel.

FIGURE 3
Three months after the operation histological finding
of a lymphovenous anastomosis.
The endothelial sheet is complete without any step.
Lymphatic laser-microsurgery: experimental research and original clinical applications.

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SUMMARY
The authors report their experimental studies and clinical observations regarding the use of CO2 laser in lymphatic microsurgery. The effects and advantages brought about by CO2 laser in their experimental studies on rats in performing lymphatic microanastomoses are particularly pointed out. 8 clinical observations of lympho-chyleledema of lower limbs and genitalia, associated to chylous ascitis, are reported. Clinical outcome proved the remarkable advantages obtained by using laser ray welding power to cut and close insufficient and dilated lymphatic and chylous collectors. In over 3 year clinical follow-up no relapse of the pathology occurred in any patient.

INTRODUCTION
According to its different actions, CO2 laser can be used in surgery for cut, coagulation, carbonization, vaporization and welding. Laser ray, used at low powers, carries out hemostasis of blood vessels, till 1 mm, in caliber, and seals lymphatic collectors, without determining any serious tissue damage. The reason of this action lies in denaturation of proteins and architectural disorganization of tissues due to hyperthermia, due to a low power energy used on small surfaces. Some biochemical modifications occur as well: increase of protein synthesis, modulation of enzymatic activities, intra- and extracellular pH variation, stimulation of mitochondrial activity with ATP increase.
These particular effects of laser ray proved very interesting and useful in lymphangiography, particularly if associated with microsurgical techniques.

MATERIALS AND METHODS
Recent experimental studies of us on rats aimed at using CO2 laser welding effect for lymphatic microanastomoses, without putting any stitch, thus avoiding possible endothelial damage (Fig. 1).
"Laser-made" lymphatic anastomoses would find suitable clinical applications above all to prevent post-mastectomy and post-lymphadenectomy lymphoedemas, especially in cases undergoing radiotherapy, and also to treat chronic lymphoedemas of extremities. Further experimental verifications will maybe allow to use "laser-made" lymphatic microanastomoses for clinical observations.
Our clinical experience in using CO2 laser consist in managing lympho-chyleledema of lower limbs and genitalia, due to gravitational back-flow, and chylous ascitis. We carried out "antigravi
tational ligatures" of insufficient and dilated lymphatic and chylo
us collectors, using CO2 laser ray welding power to cut and close vessels (Fig. 2).
Post-operative course was particularly favourable in all of the cases, proving the remarkable advantages deriving from the use of laser.
Out of 8 observations of lympho-chyleledema of lower limbs and genitalia, associated to chylous ascitis, in 3 patients it was neces
sary to performed also the reductive plasty of genitalia (Fig. 3, a-b).
Microsurgical lymphatic angioplastics operations, moreover, were carried out at the groin, using derivative techniques either using lymph nodes or directly lymphatic collectors.
No relapse of the disease was observed at over 3 years from operation by now.
FIGURE 1
"Laser-made" lymphatic-venous anastomosis on rat: new laser red guide-ray at the site of anastomosis.

FIGURE 2
"CO2 Laser-made" section-closure of a dilated lymphatic collector.

FIGURE 3, a - b
Clinical observation of a lympho-chylosis of lower limbs and genitalia treated by laser antigravitational lymphatic closures, bilateral lympho-venous shunts at the groin and reductive plasty of genitalia, before a) and after b) 3 years from operation. Of note, lymphosotic verrucosis of the stratum was treated by CO2 laser as well.
Autogenous lymphvessel transplantation.

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The interposition of autogenous lymphatic grafts is the most natural way to reconstruct the lymphatic channels which are destructed within a limited area. In Europe, the postmastectomy oedema with lymphnode removal in the axilla is the most important example of the type of lymphatic destruction.

Lymphoedema due to lymphnode removal at other localisations, e.g. the groin, - mostly combined with radiotherapy-, and lymphoedema after trauma, - mostly with additional local infections-, are also caused by locally destructed lymphatic channels. In rare cases of primary lymphoedema, these are caused by local aetiases of lymphatics and are therefore also suited for a direct reconstruction by autogenous lymphatic transplantation.

The use of other material than autogenous lymphatic vessels for reconstructive purposes, such as autogenous veins, alllogenic lymphatics and PTFE prostheses have been proved in experimental studies.

But none of these materials could reach the excellent results of autogenous lymphatic transplantation. Some of these are of no value.

In the following, a short description of the method and the last results will be given followed by a more detailed discussion, on the use of different materials for lymphatic reconstruction.

MATERIAL AND METHODS

From June 1980, the first lymphatic transplantation in man, through December 1991, 111 patients were treated by autogenous lymphvessel transplantation.

68 patients suffered from oedema. Out of these, 63 were females and 5 males. 67 patients suffered from secondary and 1 of primary lymphoedema.

42 patients showed unilateral oedema of the lower extremities. Out of these, 29 were men and 14 females. 30 patients suffered from a secondary and 15 of a primary lymphoedema.

All patients were treated by conservative means for at least half a year prior to the microsurgical intervention. Also they were checked for a possible recurrence in the case of a history of a malignant disease and rejected in such a circumstance. Also patients were excluded with extensive remnants of radia
tions such as ulcerations and also patients with a high anachetical risk.

For evaluation of the results the affected and the contralateral extremity were measured with respect of the circumference.

The volumes were calculated by a computerprogram according to KUHARz (5). In the affected extremities and also at the donor side, lymphatic scintiscans were performed to estimate the lack of lymphatic outflow at the oedematous limbs and to ensure a normal lymphflow at the donor side.

Techniques such as photolysis were used for these purposes.

The scintigraphies were checked with respect to the lymphatic transporting kinetics (K), the distribution of the radiopharmacagon (D), the time to the appearance of the lymphnodes (t), the appearance of the lymphnodes (N) and the appearance of the lymphvessels (V).

Out of these dates, a lymphatic transport-index was calculated by the formula:

\[ TI = K \times D \times 0.04 \times T \times N \times V. \]

In some cases, especially in primary cases, an additional indirect lymphography using iofront was used to get some more informations about the peripheral lymphatic channels and the lymphatic influx into the main collectors.

The lymphatic grafts are harvested from the inner aspect of the thigh in between the groin and the kneeregion with a length up to 30 cm. Mostly 2 to 3 collectors are taken out of the about 16 collectors which are available at the ventro-medial bundle (KUHARz, 4).

In the case of an anteroedema ascending lymphatics are identified in the epifascial and often also in the deep compartment at the upper arm and also descending lymphatics at the neck next to the internal jugular vein.

The grafts are pulled through a plastic tube which is inserted in between the two incisions. After removal of this tube, the grafts, run in the subcutaneous tissue ventral to the shoulder. Under the microscope using a 40 fold magnification, the lymphatics are anastomosed - end to end - using the sublithium tension free anastomosing technique with absorbable suture material size 10.0 and 11.0.
After 6 months, he found all lymphatic autogenous graft patent, however all of the venous grafts were occluded.

Therefore together with the argument of the necessity of big calibers in the case of long venous segments, we suggest that lymphatic grafts are the material of choice for bridging lymphatic gaps.

REFERENCES


Thermotherapy and microsurgery: new trends in the management of lymphedema.

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INTRODUCTION

Our technique of hyperthermia is an alternative to microwave therapy, particularly where lymphangitis coexists in the same limb. In those patients with longstanding obstructive lymphedema worsened by obliterative lymphangitis, before using a microsurgical procedure, if any hyperthermic therapy is indicated.

Preoperative diagnostic evaluation including lymphatic and venous isotopic scintigraphy, Doppler venous flow maps and pressure manometry play an essential role in delineating the status of both the lymphatic and venous systems.

Arterial disease, tumors and pregnancy represent a genuine contraindication to hyperthermia. In this regard, it is essential firstly to assess together with the peripheral lymphatic and venous systems also the arterial circulation. In our registry, approximately 5% of patients with lymphedema have relapsing lymphangitis precluding straight feasibility of lymphatic shunting operations.

Although microwave hyperthermia has been used successfully in these situations, this procedure is contraindicated in patients with pacemaker or cemented prosthesis and may be associated with little skin burns caused by the warming of droplets of sweat. Alternatively, this group is amenable to our hyperthermia procedure.

This report describes our preliminary clinical experience with this approach used before lymphatic-venous-lymphatic shunt operation, in patients with postlymphangitis obliterans lymphedema (either arm or leg) to prevent appearance of any other lymphangitis post-operatively.

METHODS

Our apparatus for hyperthermic therapy consists of two parts joined by a tube covered with a non-conducting material in order to prevent the leakage of heat. The control panel includes the device to atomize water and the electric air heater and blower. Hot water is then atomized through the insulated tube inside the cylindrical chamber where the limb is placed and where a hygrometer and a thermometric measure humidity and temperature inside the chamber. Temperature of 41°C degrees and humidity of 80% are used generally. A thermostat regulates temperature and automatically controls the heating and setting of the sprinkler at a certain heat.

Hyperthermia was performed in 32 patients (Table 1), with postlymphangitis chronic lymphedemas who underwent our operation of lymphatic-venous-lymphatic anastomosis, 3 months - 6 months after the end of chemotherapy. The reason for such an interval between the end of chemotherapy and operation lays in the fact that, based on our clinical experience, the predisposition for the recurrence of infection, following also a single episode of clinically manifest lymphangitis, can be left from the anatomico-pathological point of view as occurs in most patients undergoing only medical therapy.

Two patients had primary arm lymphedema and 9 primary leg lymphedema, with recurrent lymphangitis. Three patients had secondary arm lymphedema and 18 secondary leg lymphedema, with recurrent lymphangitis.

The average age of these patients was 36 years (range 18 - 55 years) with females predominating (about 5 : 1) (Fig. 1, a - b). Our treatment schedule for patients with postlymphangitis lymphedema undergo 10 - 12 daily applications, every month, for 6 months.

Clinical criteria to evaluate the patients included measuring limb circumference before hyperthermia treatment and after operation, volumetry measurements with a water volume meter, assessment of complete recovery from lymphangitis and any recurrence of the disease, functional change.

Lymphangio-scintigraphy and echo-scan were used to assess reduction of limb edema and improvement of lymph flow, and particularly echo-scan proved remarkable reduction of thickness and fibrosis of subcutaneous tissue.
Figure 1. a - b
Primary lymphedema of right arm at the 3-4 stage treated by hyperthermia and L.V.L. shunt operation,
before (a) and after one year (b) from operation.
La microchirurgie lymphatique en Roumanie.

Lymphatic microsurgery in Romania.

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SUMMARY

In Romania activities dealing with lymphatic pathology have a long tradition (GEROTA, 1896). A second period is marked by the issue of the first lymphography (KAUFMANN, 1962).

Afterwards, methods, techniques and introduced in the clinical practice of the lymphopathies / phlebolymphtygraphy, lymphangioplasty with human hair, lymphangiectomy of the leg. Between 1970-1980, in the lymphoedema therapy, were privileged exercices techniques. The first experimental (ab. of microsurgery dates from 1981, and in 1984 the first microsurgical lymphode- vein anastomoses are performed in Cluj (KAUFMANN).

Experimental researches were carried out in terms of microsurgical lymphode-/vein and lympho-capsulo-venous anastomoses. The results showed the superiority of the lympho-capsulo-venous anastomosis.

In clinical practice were practical method of microsurgical collector-vein drainage (DEGNI-FOX) and lymphode-vein drainage.

The results were:
- at the collector-vein / inguinal (Cluj):
  - immediate = very good
  - late = good
- at the leg (Timişoara):
  - immediate = satisfactory
  - late = unsatisfactory.

Techniques of lymphatic reconstruction are used only experimentally.

Les préoccupations pour la pathologie lymphatique en Rouma- nie ont de vieilles traditions. Il faut rappeler les études du Dr GEROTA (1896) qui, il y a 100 années, imaginait l'une des meilleures méthodes d'injectiof des lymphatiques au caudex. Elle continue d'être utilisée aujourd'hui dans la recherche expé- rimentale.


On introduit des méthodes, des classifications, des techniques dans la pratique clinique des lymphopathies:
- la phlebolymphtygraphie, méthode combinée pour l'explora- tion simultanée du système veineux et lymphatique périphéri- que ;
- la classification clinique des lymphédèmes (KAUFMANN), utile pour le médecin praticien non-spécialiste ;
- la lymphangioplastie, avec des fils du cheveu humain, comme méthode du drainage des lymphédèmes post-traumatis- ques (KAUFMANN) ;
- la lymphangiectomie totale du pied (KAUFMANN), comme complémentation de la technique de SERVILLE.

Comment la pratique et la recherche lymphologique ont-elles évolué en Roumanie ?


En 1997, on pratique les premières lymphangiectomies (Kondo- lom).
FINAL REMARKS

C. CAMPISI

(Genoa, Italy)

I had no doubt, considering the high qualities of speakers, as our Honorary President Prof. M. CASACCIA said at the beginning, that we could have arrived at the end of this Symposium so satisfied.

I believe that today we put another important little stone in the building that all together we are going to build, trying to succeed in giving to the patients, affected from lymphedema, a clear way to follow with a precise diagnostic and therapeutic programme.

Nevertheless there are yet a lot of different points of view between the experts of this particular field, but certainly we could say we have tried to take the right way.

First of all, the patients affected by lymphedema has to be studied in a complete way without neglecting the relationship between venous and arterial circulation.

We have to find the cause of lymphostatic pathology and in the case of an idiopathic etiology to establish preliminarily the existence or not of lymphatic vessels or lymphnodes anatomically and functionally utilisable for our therapeutical procedures.

The direct lymphography not always van be refused a priori to our patients.

The lymphoscintigraphy is very useful for the depistage of patients and for the follow-up, very useful too are the imaging diagnostic procedures and above all the ecotomography.

But direct lymphography if well done, can result reliable in a patient designed to surgical therapy. Microsurgery has almost overcome old demolitive and antiesthetic techniques, giving a defined space only for the reductive plastic operations for the serious and invertebrate cases.

Microsurgery can be today considered an aesthetic, functional and conservativ'e surgical therapy to use precociously in the selected lymphedema in IIo and IIIo stage.

What kind of techniques we can use? The derivative techniques or the reconstructive ones? And, among the derivative techniques which of these? Certainly the end-to-side lymphatic-venous anastomoses have got over a lot of proves and the experience is great (Figs. 1 - 2 - 3, a - b - c - d).

Among the reconstructive techniques, which one we can adopt?

Here, we believe that the problem is seen yet. However, according to our experience we can deserve that the use of venous graft makes easier and shorter the operation, and, if a technique is simple like this, you can perform it more frequently and the success of this method is almost always obtained (Figs. 5 - 6, a - b - c - d - e).
FIGURE 1
End-to-side multiple lymphatic-venous anastomoses.
Near blue-dyed lymphatic collectors introduced end-to-side into the vein and the latter stitch of anchorage of lymphatics to the venous wall.

FIGURE 2
End-to-end multiple lymphatic-venous anastomoses.
The blue-dyed lymphatic collectors are introduced (with a simple 3/0 stitch inside a valved secondary branch of the great saphenous vein, after having previously controlled that there is no blood back flow. This particular technique was personally conceived and performed because of the great distance between the "saphena magna" and lymphatic collectors.

FIGURE 4
Schematic drawing of the personal technique of lymphatic-venous-lymphatic anastomoses, used in these patients in whom there exists also a venous disorder at the same lymphedematous limb, and where, therefore, lymphatic-venous shunts are contraindicated.
Clinical observation of a patient (a) affected from secondary chronic leg lymphedema, appeared after an operation of inguinal-blue-lumbar-aortic lymphadenectomy for a seminoma of left dialyzis and the association of radiotherapy. Since the veins at the thigh were completely sclerotic and no lympho-venous derivative shunt was, therefore, performable, the only possible microsurgical solution was that of creating a new lymphatic pathway, using an autolo-
gous venous graft, harvested from the volar 
surface of the right forearm (b), between lymphatic collectors found at the supra-
pubic site (c) and the lymphatics found at the 
upper third of the thigh (d). Note the remarka-
ble decrease of edema just at only one week 
after operation (e).
MORPHOLOGY

STUDY OF THE LYMPH DRAINAGE OF THE THYROID GLAND
ETUDE DU DRAINAGE LYMPHATIQUE DE LA THYROÏDE

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Do the infragastrique ganglions constitute the principal ganglionic relay of the thyroid gland? If so, wouldn't it not be possible to do a systematic excision of a ganglion at this level for an anatomopathological study, of which the results would allow to identify an absolute or an extended curage (N +) or an extended curage (N +). Thus, we have been able to undertake an anatomical study of the lymph drainage of the thyroid gland that we will compare to the N + topography (ganglionic metastasis) in non-metastatic thyroid cancer.

This anatomical work has permitted us to study the lymphatic anastomoses between the lobes and with contiguous organs (i.e., trachea).

Lés ganglions sous-diaphragmatiques constituent-ils le principal relais ganglionnaire de la thyroïde? Si oui, ne pourrait-on pas faire systématiquement un prélèvement ganglionnaire à ce niveau pour une étude anatomopathologique des nodes décrits lors d’un curage limité (N−) ou d’un curage étendu (N+) ? Ceci nous a amené à faire une étude anatomique sur le drainage lymphatique du corps thyroïde que nous comparerons à la topographie de N+ (métastases ganglionnaires) dans les cancers thyroïdiens en dehors des mediaténes.

Ce travail anatomique nous a permis d’étudier les anastomoses lymphatiques entre les lobes et avec les organes contigus (trachée par exemple).

EMBRYONIC APPEARANCE AND GROWTH
OF THE HUMAN LUNG LYMPHATICS
APPARITION ET CROISSANCE EMBRYONNAIRE
DES LYMPHATIQUES DU POUMON CHEZ L’HÖMMME

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According to LIMBORG, paratracheal lymphatic pleurales appear in an embryo of 12 mm and a unique primordium under the tracheal bifurcation of 22 mm.

In order to study in more detail the development of the lung lymphatics, we studied histological sections of 71 human embryos and foetuses from the collection of the Laboratory of Anatomy of the biomedical UFR des Sciences des Tissus. Their size, calculated from the vertex to the sacrum, was between 16 and 30 mm; 49 of them were cut transversally in sections, 15 sagittally. 7 in frontal sections. We have observed lymphatic vessels from 21 mm lungfield tissue between 33 and 42 mm and lymph nodes from 69 mm. These elements appear at the same period whatever the observed anatomical region: intertrachéo-bronchial, suprabronchial left, bronchial right and triangular ligaments. The lymph vessels established connections with the vessels at the base of the neck and with the thoracic duct in the mediastinum just after the first lymphoid elements appear.

The lung lymphatics are therefore constituted and at their definitive position before the end of the embryonic growth as defined by PINEAU.

Selon LIMBORG, des pleuves lymphatiques paratrachéaux apparaissent chez l’embryon de 12 mm et un primordium unique sous la bifurcation trachéale à 22 mm. De façon à étudier plus avant le développement des lymphatiques du poumon, nous avons revu des coupes histologiques de 71 embryons et foetus humains de la collection du Laboratoire d’Anatome de l’UFR Biomédecine des Saints-Pères. Leur taille exceptionnelle entre 16 et 22 mm a été coupée en série transversalement, 15 sagittalement. 7 frontallements. Nous avons observé des vaisseaux lymphatiques dès 22 mm, du tissu

Dermal electric resistance was registered in 21 patients with hand and finger edema caused by arm hemorrhage. This parameter was measured in 7 patients at rest (controls), and in 14 patients before, during, and after manual lymph drainage (MLD). 7 patients treated had a motor arm hemorrhage and 7 patients treated had spastic arm hemorrhage. All patients were treated for 50 minutes per day and over a period of 7 days. Results: dermal electrical resistance remained unchanged, regardless of whether it was measured during MLD treatment or at rest over an observation-time period of 9 days. But spontaneously, spastic fingers extended fully, although temporarily, in 5 of 7 patients during MLD sessions beginning with the 4th MLD treatment. This development was accompanied by a significant paral- lel increase in dermal electrical resistance (p< 0.1%). According to G.T. WERNER & al. (1991), there is dynamic insufficiency of the lymph vessel system in patients with arm hemorrhage. Our exper will discuss why this kind of hand and finger edema may not cause by inactive muscle and joint pump. These hand and finger edema are caused by neurogenic factors. Therefore, they should be treated with physiotherapy, compression therapy, ergotherapy and with MLD, which are listed here in order of therapeutic importance.

LYMPHOSCINTIGRAPHIC VALIDATION OF MANUAL LYMPH DRAINAGE IN A SECONDARY LYMPHODEMA OF THE UPPER LIMB (50 cases)

VALIDATION LYMHPHOSCINTIGRAPHIQUE DU DRAINAGE LYMPHATIQUE MANUEL DANS LE LYMPHODEMA SECONDAIRE DU MEMBRE SUPERIEUR (A propos de 50 cas)

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50 patients with an average age of 61.5 years (32 to 80 y) underwent a radiosurgical breast cancer treatment (6 tumorectomies, 34 mas- tectomies). They all presented an oedema in the upper limb which was neither due to neurogenic relapse, nor to a diagnosed thrombophlebitis. Their oedema was manifest as a mean perimetric increase of 6.1 cm for the forearm (1 to 30 cm) and 5.3 cm for the upperarm (1 to 18 cm), mean history of 3 years (0 to 21 years). The dominant limb was affected in 24 cases and 24 patients underwent a direct radiotherapy of the axilla. They underwent a static lymphoscintigraphic exploration where we compared:

- cliche L1 obtained 30 min after injection of 99m-Tc labelled anti- mony sulfide colloids.
- cliche L2 obtained after a 30 min session of manual lymph drainage.

The comparison between cliche L2 and cliche L1 demonstrates the different action modalities of the manual lymph drainage in the lymphodema of the upper limb. Notably, the different heights of progression obtained (fore arm, upper arm, ganglions) and the pathways transporting the colloids (lymph collectors, interstitial space, perivascular and extravascular space) are analysed.

Finally, in 40 cases, the lymphoscintigraphic images were correlated with the results of perimetric decrease of the oedema obtained by identical physiotherapy. We try to answer the next question: "Does the lymphoscintigraphic image give a prognosis of the lymphodema reduction?"

50 patients aigues en moyenne de 61.5 ans (bornes de 32 à 80 ans) ont bénéficié d'un traitement chirurgical d'un cancer du sein (16 tumorectomies, 34 mastectomies). Elles présentent toutes un édème du membre supérieur qui n'est pas lié à une récurrence nœblopétique, ni à une thrombophlébite diagnostiquée. Leur édème se traduit par une augmentation péri- métique moyenne de 6.1 cm à l'avant-bras (1 cm à 30 cm) et 5.3 cm à la jambe (1 cm à 18 cm), d'ancienneté moyenne de 3 ans (3 à 21 ans), atteignant 24 fois le membre dominant ; 24 des patients ont eu une radiothérapie directe du creux axillaire.

Elles bénéficient d'une exploration lymphoscintigraphique statique ou l'on compare : - le cliché L1 obtenu 30 min après injection d'une solution colloïdale de suture d'antimoine marquée au Technétium 99m ; - le cliché L2 obtenu après une séance de drainage lymphatique manuel de 30 min.

La comparaison des clichés L2 par rapport à L1 a permis d'évaluer les différentes modalités d'action du drainage lymphatique manuel dans le lymphodème du membre supérieur. Notamment, sont analysées les différentes hauteurs de progression observées (avant-bras, bras, ganglions), et les voies de cheminement du colloïde lymphatique, e space interstitiel, space péri- et extra-vasculaire.

Enfin, chez 40 d'entre elles, les images lymphoscintigraphiques sont corrigées aux résultats de diminution perméatique de leur édème obtenu par une physiothérapie identique. Nous essayons de répondre à la question suivante : "L'image lymphoscintigraphique donne-t-elle le pronostic de réduction de l'lymphodème?"

INTERRELATIONSHIP BETWEEN EPID- AND SUBFASCIAL PRESSURE CHANGES INDUCED BY MLD

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The mode of action of Manual Lymph Drainage (MLD) has not yet been fully elucidated.

The authors measured pressure changes induced by MLD epi- and subfascially (ent. 1b. compartment) in 15 patients with unilateral chronic swelling of the leg. In 8 patients the swelling was of lymphatic, in 5 of venous origin and two presented with lipodermatosclerosis of many years duration.

The tissue pressure changes were monitored by modified slit-catheter techique and correlated with various flow alterations in the common femoral vein as displayed by colour coded duplex sonography.

MLD changed the resting continuous tissue pressure in an intermittent and both, epi- and subfascially and resulted after 30 min. of massage in its considerable decrease.

The dynamic pressure reduction was more significant in the epi- fascial than in the subfascial tissue.

The results suggested that:

- the interstitial fluid is the main target organ of MLD ;
- the mode of action of this treatment modality is the normalisation of the pathologically increased tissue pressure.

MANUAL LYMPH MASSAGE PERFORMED BY HIGH PRESSURE MORPHOLOGY OF LYMPHATICS

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For many years the manual lymph massage (drainage) has been
In 2 cases of ULE with residual inguinal lymph nodes pre-op the post-operative lymphoscintigraphy suggested a functional improve-
ment with visualization of additional lymph nodes in 1 case.

In 2 cases of ULE with residual inguinal lymph nodes pre-op, a first axillary graft was characterized by the post-operative lympho-
sцинтиграфия как функциональное улучшение отсутствия в лимфатическом гребне грыжи, но в одном случае, с более лучшим про-
gression of the tumor and in the other an individualisation of lymphatic vascular pathways. The subsequently grafted breast lymph nodes showed a "collique-festive" activity. In 1 case of ULE with remaining axillary lymph nodes pre-op and with a braided lymph node graft, the post-operative lymphoscintigraphy suggested a functional improvement with appearance-individualisation of lymphatic vascular pathways towards the graft site but without visualization of lymph nodes at this level.

In the last ULE case without residual axillary lymph nodes pre-op, but where a lymph vessel ends in the arm, the axillary graft resulted in the appearance of several axillary lymph nodes. These observations suggested:

- a lymphoscintigraphic functional improvement in 7 cases of 10;
- a collique uptake in only 4 lymph node grafts of 12;
- a "lymphangiogenic" effect of these grafts with appearance-individualisation of lymphatic vascular pathways towards the graft site (and this usually within a pre-existing network of superficial dermal collateralisation). These results and observations will be correlated with the clinical results of the Operation. They should of course be confirmed on larger series, but they underline how-ever the necessity of detailed protocols in investigatory lympho-
sцинтиграфия показала улучшение функции и появление дополнительных лимфатических узлов в одном случае.

Les lames libres ganglionnaires représentent une approche chirurgicale du traitement des ordonnements des ganglions (OMS). Dans ces cas, on a porté sur 5 patients et 1 patient (lieux moyens: 61 ans, 60 CM supérieurs et 4 CM inférieurs d’origine (urogénitale, 4 greffes inguinales – l\’incision, 5 sattelares, – Ax et 3 triangulaires, – Br. greffes à deux niveaux du membre dans 2 cas), les modifications morphologiques et fonctionnelles de l’axe lymphatique ont été évaluées comparant les résultats de lymphoscintigi-

Production of pathogenic factors by these grafts can further extend the lymphatic system to the arm and possibly contribute to the development of lymph nodes in the arm.

The changes of scintigraphic images pre-versus post-surgery are in general not pronounced, only the quantitative parameters of lymph transport demonstrate adequately the effect of microsurgical reconstructive surgery. Contrary to our expectations, we found the mean number of lymph nodes in the arm with the grafts to be similar to that in the normal arm, and the effect of the grafts on lymph transport is not significant.

The use of microsurgical reconstructive surgery was considered as positive if an arm circumference decrease (Rémes 40 mm) was observed in the case in 11 out of 20 cases. In this patient group there was only liver uptake in 6 cases, which was the result of migration in the arm. The result of increased lymphatic flow 8 cases. In the patient group without benefit of reconstructive surgery the changes of the migration parameters are few and related to circumscribed lower arm anastomosis.

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THE PATHOGENETICALLY MOST RELEVANT STRUCTURAL CHANGES IN LYMPHOMA.

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So far lymphoedema was believed to affect exclusively the epifascial tissues. However, the preoperative findings have consistently shown that from all layers of the soft tissue the fascia of the muscular compartments displayed the most severe pathological changes. A more detailed analysis of these findings suggested that:

- the thickening and fibrosis of the fascia preceded the fibrotic alterations of the skin and subcutaneous tissue and
- the degree of fibrous thickening correlated very well with the severity of lymphoedema.

The validity of this observation was confirmed by subfascial tissue pressure measurements on the one hand, and by excellent therapeutic results after releasing fasciotomy on the other. The most important clinical implication of these structural changes should be an upgrading of surgical treatment in all forms of lymphoedema.

FREE PAPERS

TOWARDS A NEW MICROCIRCULATORY MODEL FOR THE PATHOGENESIS OF LYMPH DRAINAGE.

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Manual lymph drainage, according to the method LEDUC, appears clinically efficient in the orthopedic idiopathic oedema (OKO), although it has no basic action of the lymphatic system in this condition.

We have studied with the capillary permeability test to 99m-Tc labeled albumin, the effect of manual lymph drainage of the upper limb in 10 patients suffering from verified OOK and this without any drug treatment.

The average retention of 99m-Tc labeled albumin prior to drainage is of 13.2 % ± 5 % (norm inferior to 8 %) and after drainage 3.6 ± 2.4 %.

The lymphatic occlusion average is, prior to drainage: 1.68 % ± 0.08 % (norm inferior to 1 %) and after drainage: 0.66 % ± 0.41 %.

The study was significant at p < 0.001.

Furthermore, in the same patients, the fluorescent uptake in microcapillariscopy shows after drainage of the lower limbs a clear reduction of the stagnation of the product in the interstitial space and the acceleration or the clearance by the initial lymphatics.

All these results are in favour of a model where DLM, in case of normal lymphatics, acts directly on the desaturation of the lymphatic pone, thanks to the back flow stimulation. This confirms the Taylor's hypothesis on the "peripheral lymph heart" : the hyperfiltration of albumin through little pores in the capillaries can temporarily be compensated by the activation of the lymphatic resorption.

The drainage lymphatico manual selon le méthodes LEDUC appa- rait cliniquement efficace dans l'œdème idiopathique orthopédique (OKO) bien qu'il n'y ait aucune attente tronculaire du système lymphatique dans cette affection.

Nous avons étudié à l'aide du test de perméabilité capillaire à l'al- bumine technetium, l'effet du drainage lymphatique manuel (DLM)


POST-THERAPEUTIC OEDEMA AFTER BREAST CANCER SURGERY AND / OR RADIO-

THERAPEUTIC (WHO IS RESPONSIBLE ?) - LYMPHOSCINTIGRAPHIC DATA.

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Upper limb oedema ULE remains a frequent complication after breast cancer surgery and / or radiotherapy. Amongst the incrimina-
ting factor in their pathogenesis, the so-called "quality " of lymphatic drainage (axillary nodes resection) and its consequences on lymphatic drainage of the upper limb appears to be the most difficult to demon-
strate objectively. 1073 patients who underwent a complete axillary surgery between end of 1978 and 1989 for breast cancer, have systematically been investigated postoperatively by lymphoscintigraphy of the upper limb. After injection of the 99m-Tc labelled colloids in the first interdigital space of each hand, one or several residual axillary nodes were visualised in 799 patients (73 % of this population). The frequency of oedema of the upper limb sub-
sequently arising (average follow up = 5 years) has appeared very significantly superior in patients where the lymphoscintigraphy had not showed any axillary nodes (KAPLAN - MEIER method, LOGRANK test). According to COX (multivariate analysis) in a modellisation where the radiotherapy (or no) of axillary and supra-cla-
viculae regions is also introduced, the therapy (which in univariate analysis is prognostically responsible for upper limb oedema), does not appear to have any statistical significance, nor does it modify the impact on the lymphoscintigraphic results.

The conclusion is therefore:

- surgery remains the principal causal factor in the genesis of the upper limb oedema;

- post-operative lymphoscintigraphy permits to characterize a group of patients at risk and its systematic apply is therefore recom-

mended.

L'œdème du membre supérieur (OMS) reste une complication fré-

quente après chirurgie et / ou radiothérapie du cancer du sein. Parmi les facteurs incriminés dans leur pathogénose, la technique chirur-
gicale, sa "qualité" (du curage axillaire) et ses conséquences sur le drainage lymphatique du MS apparaissent comme les "dificil-
lement " objectivables. 1073 patients ayant bénéficié d'un curage axillaire (ax) et de "complet " ont été systématiquement investigués postopératoires par la lymphoscintigraphie (LSIC) des MS. Après injection de colloi-
des technétium dans le premier ES de chaque main et du côté côté, un ou plusieurs ganglions (gg) ax é "suidés" ont été ainsi visualisés chez 799 patients (73 % de cette population). La fréquence d'OMS survenant ultérieurement (follow-up moyen = 5 ans) est apparemment très significativement (p < 0.001/1) supérieure chez les patients où la LYS n'avait pas démontré de ganglions gg (méthode actuelle de KAPLAN MEIER, test de LOGRANK).

Dans une méotisation selon COX (analyse multivariée) o la radiothérapie (ou non) des régions axillaires et sus-claviculaires est également introduite, la thérapie (qui en analyse univariée est pronostiquement responsable de OMS) n'apparaît plus avoir de significa-
tion statistique, ni modifier l'impact du résultat de la LYSIC. Il est donc conclu que:

- la chirurgie reste le facteur causal principal dans la génése des OMS;

- la LSIC des MS pratique post-op permet de caractériser un groupe de patients à risque et sa réalisation systématique est donc recommandée.

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appreciate their practical interest for treatment orientation. Twenty-two children (12 boys, 10 girls, average age of 10 years, extremes = 0.5 and 16 years) presenting lymphoedema of the limbs (lower limbs = 17; lower and upper limbs = 4; upper limbs = 1) were explored. 20. to 11 Millig of 99m-Tc labelled Rhenium sulfa colloid were subcutaneously injected in the first interdigital space of the extremities. After a dynamic recording of the limb activities (40 x 1 min) following the injection, static images were obtained at 40 min and at 4 h. In considering the anamnesis, various doppler exploration and sonographic data, the physiopathological models observed were as follows:

a) hypoplasia or pure aplasia (N = 12): vessels and / or lymphatic ganglia hypoplastic or absent; 

b) lymphoedematous oedema or hypoplasia revealed by an infection or traumatic minor factor (N = 7): same abnormities as mentioned above, but with visualization of greater dermal hyperactivity and of popliteal nodes; 

c) anoviscous biliary disease (N = 1): intense interstitial hyperactivity above the striction; 

d) lymphangiectasia: tortuous and dilated lymph vessels. The visualization of lymph vessels has constituted a decisive factor for lymphovenous anastomosis (3 cases), and the interstitial hyperactivity has provided guidance to manual lymph drainages (7 cases). 

A malformation of the thoracic canal was suspected by the lymphoscintigraphy and confirmed by the radiological lymphography (1 case).

Finally, a contralateral latent lymphoedema was detected in 9 children. The lymphoscintigraphy can therefore contribute to lymphoedema classification in children and to therapeutic strategy.

Lymphoscintigraphic evaluation of the upper limbs in volley-ball players: Preliminary results on 8 subjects

Evaluation lymphoscintigraphique des membres superieurs de joueurs de volley-ball: Resultats preliminaires sur 8 sujets

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Functional anomalies of the lymphatic system have been demonstrated using lymphoscintigraphic techniques in the lower limbs of football players. One of the causes put forward to explain these abnormalities and their lateralisation was that of repeated shocks. In the same way, this present study was undertaken in order to try to demonstrate that these anomalies could exist in the upper limbs of volley-ball players too.

Eight male volunteers (average age of 22 years, ranging from 19 to 33) were included in this study. Their practices (P) varied from 2 to 14 years (resp. 2, 3, 4, 5, 7, 8, 9 and 14 years) and their training rhythm of 3 to 5 sessions per week. All were right handed except one and all had a right hand superior to their left (except 7). Three subjects (P = 7, 8 and 14) had presented different traumatic osteoarthritic events in both of the upper limbs (group A). The axillary nodes activity has been measured by scintigraphic techniques (expressed with reference to the injected activity) after a standardized exercise protocol and subcutaneous injection of 0.2 mg × 0.2 mL ≤ 5.0×10^6 (99m-Tc) labelled nanocolloids in the first interdigital space of each hand.

The 3 subjects of group A presented a superior axillary nodes activity (ANA) in both upper limbs compared to that of the other volley-ball players (and to that of a control group of subjects of the same age not practising any sport traumatising the upper limbs).

The other subjects, if they had normal ANA values of their non-hitting arm, also showed an inversion in the ratio of right to left which was even more pronounced in accordance with the number of years of practice.

These results, even though preliminary and based on a limited number of cases, also suggest the possibility of lymph abnormalities in upper limbs as consequence of sport practice.

Des anomalies fonctionnelles du systeme lymphatique ont ete demontrées à l'aide de techniques lymphoscintigraphiques au niveau des membres inferieurs de joueurs de football. Une des causes avancées pour expliquer celles-ci et leur lateralisation reposait sur les chocs repetitifs. La pratique a ete étudiée par l'essai de démontrer si, au niveau des membres superieurs (MS), de telles anomalies pouvaient etre trouvées comme suite à la pratique du volleyball.

Volunteers de sexe masculin (age moyen 22 ans, range: 19-33) ont ete inclus dans cette etude. Leur ancienneté de pratiques etait comprise entre 2 et 14 ans (2, 3, 4, 5, 7, 8, 9 et 14 ans respectivement) et leur rythme d'entraînement (RE) de 3 à 5 séances/semaine. Tous étaient droitiers sauf un et frappage également de la main droite sauf un. Trois sujets (P = 7, 8 et 14) avaient présenté des accidents traumatiques ou arthritiques traumatiques au niveau des deux MS (Groupe A). L'activité ganglionnaire axillaire (AXA) a été mesurée par techniques scintigraphiques (et rapportée à l'activité injectée) aprés un protocole d'exercices standardisés et injection Sc de 0.2 mg × 0.2 mL ≤ 5.0×10^6 de nanocolloïdes technétium dans le 1er espace interdigital de chaque main.

Les trois sujets du Groupe A présentaient des AXA au niveau des deux MS superieurs à celles des autres joueurs (et à celles d'un groupe témoins de même age ne pratiquant pas de sport "traumatisant" 16 MS). Les autres sujets, s'ils avaient au niveau du membre non frappant des valeurs d'AXA normales, montraient également une inversion du rapport D / G d'autant plus marquée que leur pratique (AP × RE) etait plus grande.

Ces résultats, bien que preliminaires et portant sur un nombre limite de cas, suggerent donc également au niveau des MS la possibilité d'anomalies lymphatiques comme suite à la pratique d'un sport.
SEMIRIGID BANDAGES: LYMPHOSCINTIGRAPHIC APPROACH TO THEIR ACTION ON SECONDARY LymphEdema of the Upper Limb

Bandages SEMIRIGID: APPROCH LYMPHOSCINTIGRAH-IQUE DE LEUR Action SUR le Lymphedème SECOND- DAIRE DU MEMBRE SUPÉRIEUR

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Contamination application after manual lymph drainage is recognized as necessary to obtain the best result in lymphoedema reduction.

18 patients treated for breast cancer by radiotherapy treatment were selected for this study. Each patient was examined twice, once before the treatment and once after the treatment. The results are expressed as a percentage of the initial volume.

Leir age moyenn is de 50.8 years (30 to 80 years).

Leir surgery types were : 6 tumorectomies, 12 mastectomies. At least 7 auxiliary lymph nodes were curaged. X-ray treatment was of 45 Gray in post-operative.

They underwent a static lymphoscintigraphy realised in 3 clitches:

Clitch-1: performed 30 min after the injection.

Clitch-2: performed 30 min after manual lymph drainage (MLD).

Clitch-3: performed after 30 min of physical activity under condition consisting of a multiple semi-rigid bandage (Mousse Thasane NN" and Flexide" brandage).

The comparison between clitch L3 and L0 allows to demonstrate the effect of the contractions on the return of lymph previously submitted to the MLD.

The results are expressed as a percentage of the initial volume.

Leir results are expressed as a percentage of the initial volume.

PRIMARY LEG LymphEdema in ADULTS

TREATED WITH MANUAL Lymph DRAINAGE and COMPRESSION THERAPY

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In a retrospective study, leg volume reductions (LVR) were analysed in 35 patients with bilateral primary lymphedema and in 17 patients with unilateral primary lymphedema. All patients had 2nd and 3rd degree leg lymphedema and were treated twice daily for one hour with manual lymph drainage (MLD), 5 days per week, for a 3 weeks period. Bandage compressions (BC) were used between each MLD sessions. Before MLD and BC treatments began, and at the end of the therapy, leg volume were calculated by KLINKE'S method (1976). Results : the leg volume decreased from 11.665 ml 2.886 ml to 10.351 ml 2.845 ml in affected legs, and from 9.145 ml 1.625 ml to 8.808 ml 1.507 ml in healthy legs in patients with unilateral primary lymphedema during the 3 weeks treatment.

Leg volume decreased from 10.762 ml 2.608 ml to 9.727 ml 2.359 ml in the right affected leg, and decreased from 10.116 ml 3.290 ml to 9.268 ml 2.507 ml in the left affected leg in patients with bilateral lymphedema. All these LVRs were in both groups high significant with a probability of < 1% as shown by the WILCOXON matched pairs test. LVRs caused by MLD and by BC effects and will be discussed in this paper.

RELIABILITY OF A VOLUME MEASURING DEVICE (Volometer) in HUMAN LIMBS

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EXPERIMENTAL DESIGN

1. Comparison with a well-defined volume.

2. Comparison with the volume of a human autopsy specimen (forearm).

3. Influence of the rotation on the measurement of the autopsy specimen.

4. Influence of the rotation on the measurements in vivo.

5. Influence of the elbow flexion on the measurements in vivo.

RESULTS

A well defined homogeneous cylinder (2011 ml) was used. The measured volume with the "Volometer" was 1987 ml ± 4.3 ml. The error was thus 1.2%.

thermia represents an alternative to micro wave therapy. Whereas microwave hyperthermia has been used successfully in these situations, certain limitations exist. Our method of treatment consists of producing hot and humid ambient inside the chamber where the limb is situated. Hyperthermia was performed in 64 patients, with postlymphangitic chronic lymphedema, who underwent microsurgical lym pho-venous or lymphatic-venous-lymphatic shunt operations, 3 - 6 months after the end of hyperthermic treatment. All patients were followed up to 3 years. A remarkable improvement of lymph flow was assessed using isotope lymphography and edema improved in all patients.

LYMPHATIC TRANSPLANT TRANSFERTS LYMPHATIQUES

BECKER C., HIDDEN G., BOURGEOIS P.

The authors have performed 120 lymphatic transfers for lymphoedema resistant to physical treatment. The intervention consists of a free transfer of a couple of lymph nodes contained in fat with arterial and venous anastomosis. A lymphatic neovascularisation appears within 24 hours and the arterio-venous anastomosis allows the vascularisation of the lymphatics and plaxial circulation of the lymph nodes. We shall show you a few different cases of lymphoedema resistant to all physical treatment in the upper and lower limbs, the obtained results, the complementary results of physical treatment applied post-operatively and the reasons of failed cases.

The discussion concentrates on the eventualising of complementary treatments, either surgical or physical, in order to improve the state of these patients.

Les auteurs ont d'accord 120 transferts lymphatiques pour lymphoedèmes résistant au traitement physique.

L'intervention consiste en un transfert libre de quelques ganglions contenus dans la graisse avec anastomose artério-veineuse. Une néovascularisation lymphatique se fait dans les 24 heures et les anastomoses artério-veineuses permettent la vascularisation des lymphatiques et la circulation plaxiale au niveau des nodules lymphatiques. Nous vous montrons quelques cas différents de lymphoedème résistant à tout traitement physique au niveau des membres supérieur et membre inférieur, les résultats que nous avons obtenus, les compléments des résultats physiques qui fonctionnent en post-opératoire, et les raisons des cas d'échec.

La discussion s'ouvre sur l'éventualisation de traitements complémentaires, soit chirurgicaux, soit physiques, de manière à améliorer ces patients.

PRESENT ROLE OF MICROSURGERY IN LYMPHEDEMA TREATMENT

C. CAMPISI, F. BOCCARDO, M. TACCHELLA, C.M. CAMPISI

The authors report their experience in managing 709 patients with chronic peripheral lymphedema undergoing microsurgical operative techniques. An accurate preparative diagnostic evaluation is indispensable to select the patients according to indications of the various surgical methods. The lymphoedema was mostly performed under general anesthesia. Operative microscope was always used both to isolate lymphatic collectors and to perform anastomoses. The authors point out indications to derivative operations of lympho-venous shunts and those to reconstructive techniques with particular reference to the personal method of lymphatic-venous-lymphatic interpositioned shunt (LILVA). The follow-up at over 5 years after operation showed positive results in over 60 % of patients.

RATIONAL APPROACH OF PERIPHERAL LYMPHOSTATIC DISEASES: 20 YEAR CLINICAL EXPERIENCE

C. CAMPISI, F. BOCCARDO, M. TACCHELLA, C.M. CAMPISI

University of Genova - Dep. of General and Emergency Surgery Microsurgical Center - Osp. San Martino - Italy

The authors report their clinical experience (1973-1993) in the diagnostic evaluation and management plan of patients with peripheral lymphostatic disorders, underlining the complexity and variable clinical presentations of these diseases.

Based on their lengthy experience with an ongoing registry they have tried to outline a protocol for studying, staging and managing lymphedema, including the role of microsurgical lympho-lymphatic shunts.

The preoccuption of microsurgical operation, if indicated, is indispensable to obtain permanent remarkable edema regression.

A PROTOCOL FOR STUDYING AND MANAGING LYMPHEDEMA

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The authors report their experience in managing patients with chronic arm or leg persistent lymphedema. The initial approach to these patients includes appropriate drugs, manual lymph drainage, pneumatic compression, external compression stockings. In patients, however, with longstanding obstructive lymphedema unresponsive to "conservative" methods and in whom there are demonstrable patent regional lymphatics and suitable lymph nodes, microsurgical shunts and plastic reconstruction in the management of peripheral lymphedema are feasible. These operations, however, can yield successful results only thanks to a careful diagnostic preoperative evaluation, which is indispensable, as the authors point out, to establish the precise indications to the various microsurgical operations used in different clinical situations.

VARIATIONS OF MICROSURGICAL LYMPHVESSEL TRANSPLANTATION

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Lymphvessel transplantation originally was designed to bridge blocked lymphatic pathways at the roots of the extremities.

In the meantime there have been performed several variations with the aid of lymphatic grafts or with transposed lymphatic vessels in order to treat localized lymphoedemas.

Local peripheral blockade: they are bridged by short lymphatic grafts.

Selected blockade of the superficial inguinal lymphnodes:

transposition of the superficial lymphatics to the deep system with lympho-lymphatic anastomoses.

Edemas of penis and scrotum:

Transposition of lymphatics of the thigh to the scrotal area with lympho-lymphatic anastomosis.

The technical variations are presented in detail.

WOBENZYM THERAPY OF ONCOLOGICAL PATIENTS WITH LYMPHEDEMAS

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After surgical treatment of the cancer patients no - and chemotherapy frequency of secondary lymphedema very uncertain. The patient's claim cannot be ignored if changes are not clinically detectable by measurement. Post-mastectomy patients, without apparent lymphedema decreased lymphatic and transport capacity in lymph and transport capacity in lymphoscintigraphic study. The patients