

# Rehabilitation protocol in upper limb lymphedema



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## Introduction

The physical treatment is the most appropriate technique for treating the secondary edema of the upper limb. Experience has shown<sup>(1, 2)</sup> that the methods we use not only relieve the symptoms of lymphedema but, in many ways, are the most hope curative treatment.

An accurate diagnosis is important. However, treatment is started based on clinical signs. These are many and include the colour and temperature of the skin, the nature of implantation of hair. These signs, together with an history of the development of the edema, provide sufficient information to allow us to treat the patient appropriately. This may involve changing treatments that have already been tried.

This article addresses the treatment most appropriate for an adequate limb drainage. Conservative (or physical) treatment does not exclude the possibility of later surgical treatment. It should always be used as the first step in treatment whereas surgery may be used if conservative treatment has been unsuccessful. A great advantage of conservative treatment is that it can be started as soon as edema becomes apparent and never has an irreversible character.

## Methods

The physical treatment of the limb edema is divided in 2 periods: in the first period (phase A), we use manual

## Riassunto

### PROTOCOLLO RIABILITATIVO PER IL LINFEDEMA DELL'ARTO SUPERIORE

*L'edema dell'arto superiore è spesso molto invalidante. Il trattamento fisico dell'edema dell'arto superiore consiste in una combinazione di terapie differenti: drenaggio linfatico manuale (MLD), pressoterapia sequenziale intermittente (IPP) a pressione molto bassa, bendaggi multistrato (MLB) e guaine elastiche.*

*I pazienti non vengono ricoverati in ospedale.*

*Nella prima fase del trattamento fisico, i pazienti sono trattati giornalmente per 2 o 3 settimane con differenti terapie (MLD, IPP e MLB).*

*Durante la seconda fase, non si usano più i bendaggi.*

*Dopo questo periodo di 2-3 settimane, vengono impiegate le guaine elastiche.*

*Il trattamento fisico, in questa fase, consiste in: drenaggio linfatico manuale e pressoterapia sequenziale intermittente (a bassa intensità).*

*La frequenza del trattamento fisico si riduce progressivamente.*

*Parole chiave: Linfedema secondario, trattamento fisico.*

## Abstract

*Edema of the upper limb is, frequently, very invalidating. The physical treatment for edema of the upper limb consists on a combination of different therapies: manual lymphatic drainage (MLD), intermittent sequential pressotherapy (IPP) with a very low intensity, multilayer bandages (MLB), and compression sleeves.*

*Patients are not hospitalized.*

*In the first step of physical treatment, the patients are treated daily during 2 or 3 weeks with different therapies (MLD, IPP and MLB).*

*During the second step, bandages are no more used.*

*The compression garments are applied after this 2 or 3 weeks period.*

*The physical treatment consist now in: manual lymphatic drainage and intermittent sequential pressotherapy (with low intensity).*

*The frequency of the physical treatment is progressively decreased.*

*Key words: Secondary lymphedema, physical treatment.*

lymphatic drainage, intermittent sequential pressotherapy and multilayers bandages.

### Manual drainage (MLD) of the limb

The patient is placed in the supine position with the head supported on a pillow and the limb raised in decline positioning. Half-sitting, half-lying is a compromise position which may be used if there is some difficulty in lying (eg pulmonary problems). We don't use any emollient or oil, nothing should come between the therapist's hand and the skin of the patient. The skin of the patient is mobilised by the moving hand of the therapist in order to facilitate the resorption of the fluid excess via lymphatic and venous vessels<sup>(1, 2)</sup>.

The main difference in the response of the lymphatic and venous draining networks is the fact that the increased lymphatic activity caused by the manual stimulation continues even after the manual drainage has stopped<sup>(1)</sup>. Every treatment by MLD has to be specific to the needs of the individual patient. The guidelines above are the foundations for proper treatment. The course of the treatment will depend on the specific reaction of the patient and the response of the oedema. There is one absolute rule which must not be broken – the movement and touch must always be very superficial and extremely soft<sup>(3)</sup>.

MLD alone can be sufficient to resolve oedema that has only recently begun. Thirty years experience has shown us that "in this condition" improvement can be maintained for years as long as the patient follows the usual advice given for the prevention of oedema.

More usually MLD will be just a part of the treatment given for oedema. Our research has demonstrated that MLD stimulates the resorption of macromolecules<sup>(1)</sup>. The next aspect of the complex therapeutic approach is the pressotherapy.

### Intermittent pneumatic pressure (IPP)

We have proved that pressotherapy essentially influences the resorption of fluids. It only minimally influences transportation of proteins, if at all<sup>(2, 4, 5)</sup>. Lymphedema is characterised by the high concentration of proteins, caused by various physiopathological processes and especially by the lowering of the macromolecules resorption. As long as the macromolecules stagnate in the interstitial spaces, the oncotic pressure remains increased and the oedema continues. This is important because the protein concentration will favour fibrotic changes to the edema and so acts as a stimulus causing a chronic inflammatory process. For this reason, pressotherapy should never be used alone and should only be used in conjunction with MLD.

What is the pressure to be exerted?

It has been established that sequential intermittent pressotherapy (IPP) should not be used without MLD. The exerted pressure should never exceed 40 mmHg. Any higher pressure than this low figure causes collapse of the initial, superficial, lymphatics.

Both manual and mechanic pressures must be set in response to the physiological condition of the individual patient<sup>(3)</sup>. The raise in pressure as a result of IPP drives the fluids forward via all the existing possibilities of the venous circulatory system.

The absorption of the overflow fluid is very important along this venous system. IPP has therefore to be applied in a slow cycle increasing and decreasing pressure. When do we have to start IPP (intermittent pressotherapy)?

It is clear that IPP should not be used alone, nor should it be the first treatment used.

Examination of the proximal part of the limb by palpation allows to have a good idea of the tissue infiltration and compare the affected limb with the unaffected limb. The trunk should also be examined, with palpation of the skin. It must be clearly understood that if there is any truncal or proximal oedema then the first goal of treatment will be to evacuate this edema by manual stimulation of the lymphangiomotoric activity of this area. We know that gentle tactile stimuli in combination with a greater filling of the lymphatics will increase the number of pulsations in the lymph vessels<sup>(6)</sup>. IPP should therefore be preceded by MLD on the proximal part of the limb. We recommend that IPT should only be started after proximal edema has been partly resorbed.

### Bandages (multilayers = MLB) (Fig. 1 a, b, c)

Initially, MLD should be used with specific mobilisation movements during the onset period of the edema. If this does not lead to any improvement, when the edema is really existing according to the classification of the International Society of Lymphology (class 1 or more), then bandaging and the other technics are to be used in a so called "intensive" treatment. In this situation the treatment is divided into phase A and phase B.

Phase A = MLD	Phase B = MLD
IPP	IPP
MLB	compression garment
frequency 5 x/week	frequency 5 x/week
	progressively diminish

During phase A (intensive treatment) we add IPP and MLB to the MLD. Phase A continues for 2 to 3 weeks. During phase B we replace MLB by a garment.

From then on we will progressively diminish the frequency of the treatment.

Our research into the effects of the MLB has shown that<sup>(7, 8)</sup>:

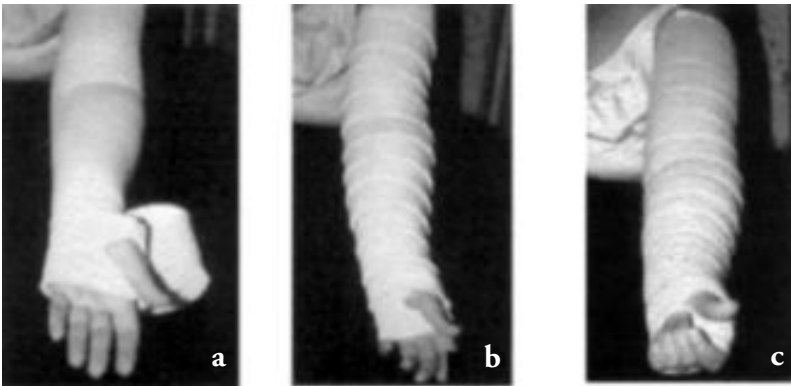


Fig. 1: The design of MLB: a) jersey and foam; b) foam; c) short elastic bandages.

– The bandages used in the treatment of the lymphedema behave as a non-elastic rigid casement.

Muscle contractions cause pressure in the limb, and the use of bandages increases the power of the contractions and the tissular pressure. A non-elastic (short-stretch bandage) which is resistant to stretching, results in higher pressure on movement than long-stretch bandages. This was tested on patients and on simulated limbs<sup>(7)</sup>.

– Using several layers of bandages, as in the case of MLB, results in lower pressures on the skin when at rest than if using normal long-stretch bandages.

– During movement, MLB with short-stretch bandages causes a higher pressure in the same area than long stretch bandages. Therefore the massage effect is better. The massage effect can be defined as the difference between maximum and minimum pressure values at the junction of skin and bandages caused by muscle activity.

– The use of MLB increases the lymphflow<sup>(8)</sup>.

We have demonstrated by mean of lymphoscintigraphic investigations that the superficial lymphflow is considerably increased during muscle activity. This phenomenon is still maintained more than half an hour after ending with muscle contraction.

– Isodynamic muscle contraction under MLB results in a significant increase of the resorption of the edema. These experiments were done on the upper limbs<sup>(9)</sup>.

A cotton tube stretch embraces the limb. This way the skin is protected against full contact with the latex bandage (thickness 5 mm, length 2m; type Komplex Binde®, Lohmann -Rauscher).

The latex bandage is placed in a way that is half covering, and without any tension.

The non-elastic bandages (Durelast® or Rosidal K® Lohmann-Rauscher) are likewise applied on the limb from the distal toward the proximal region.

Note that we use several bandages, so that we can apply them criss-crossing to provide axial rotation of the whole limb.

### The compression garments (Fig. 2)

In the second period of the physical treatment (phase B), after 2 or 3 weeks of “intensive” treatment we replace MLB by a compression garment.

The compression garment is an external physical aid, embracing the limb. These sleeves must be made to measure. It is important that they fit well as they are an important part of the total treatment of the swollen limb. As the compression garment is perfectly fitted to the limb it provides external support and strength to the skin and subcutaneous tissues. In this way it prevents an increase in tissue swelling, or the development of new swelling. Garments should be put on before the patient gets up, after which gravity (arm hanging) would cause an increase in pressure and leads to increased filtration. Garments should be used as soon as MLB has been completed. The skin will gradually retract.

The compression garment is, in many cases, an essential and indispensable help to maintain the volume decrease obtained during the intensive therapy.

In a previous publication we explained how the compression garment works<sup>(10, 11)</sup>.

By increasing the tissue pressure it decreases the filtra-



Fig. 2: The design of a garment.

tion. Although the permanent compression garment is necessary in many cases, it is also true that the patient very often does not tolerate the garment very well.

To be efficient the garment must embrace the whole limb, and by doing so the garment causes many technical problems.

It must embrace the hand and ascend up to the shoulder causing pressure on the tissues, i.e. the garment must tighten.

Hence the patient can have some difficulties to put it on. The pressure exerted by the garment has to be higher hand level than more proximal at upper-arm level in other words the garment must adapt the form of the limb, i.e. the edema, and as we know that the distribution of an edema rarely or never is equal, the garment must be based on very exact measurements.

Wearing the garment the elbow has to move freely. Many times patients suffer from irritation in the pit of the elbow. If we take a good look at it, we will see that the skin is slightly injured, provoking an inflammatory focus that can aggravate the edema.

We mentioned the garment should ascend up to the shoulder, but how do we manage to maintain it there without pinching and thus hindering the circulation of return?

One can imagine how many measurements are to be taken to reach the ideal solution, well tolerated by the patient.

The patient may find it difficult to tolerate wearing compression hosiery during hot weather.

The patient needs to understand that it is at these times that the garment will be most useful, because of the increased swelling that may be experienced in the summer. Ideally they should get used to the hosiery during cooler weather.

We suggest that the patient should be measured for the garment after the first ten treatments (phase A) as the oedema will already have reduced.

Initially we ask the patient to wear the garment night and day. If a good result has been obtained and the size of the limb remains stable then the patient is asked to leave the garment off for progressively longer periods of time. During this time the therapist will continue to monitor the outcome.

At its most successful the result of this approach to treatment will mean that the patient will not have to continue to wear compression hosiery.

Treatment should progress steadily in the correct order. The stimulation of the lymph flow by the use of MLD may be sufficient to maintain the volume decrease in many cases. It is important to understand that treating lymphoedema is a very slow and gradual process. It can only be achieved with the full co-operation of the patient.

The patient should not have unrealistic expectations and it is absolutely essential to explain the likely outcome of treatment avoid any misunderstanding.

## Course of the physical treatment

### Phase A

Phase of daily treatment. The first time we put some reference marks on the skin of the limb in order to be able to follow up the evolution of the contours.

The execution of MLD is followed by IPP and MLB. We generally start with soft IPP because on the fact that the MLD is easier on a limb already softened by IPP. With regard to the result we find no difference whether we start the therapy with MLD or with IPP. The duration of MLD is about half an hour to three quarters of an hour. The duration of the IPP is about an hour.

The MLB remains until the next treatment session, i.e. night and day.

We apply the MLB in such a way that the distal pressure exceeds the proximal pressure.

The superposition of the layers permits the patient to diminish the pressure of the bandages in case of pain.

The MLB must be well tolerated.

If necessary the patient is allowed to remove the last applied bandage (i.e. most proximal) until the pain disappears.

If the bandages were uncomfortable they have to be applied in a different way. Each day the bandages are removed and the skin washed and emollient applied. Excellent care of the skin, and prevention of injuries, is integral to the treatment of lymphoedema and an important area for patient education. Measurements of the limb are taken before starting treatment (MLD or IPP). Daily treatment is continued until the measurements don't change any more, i.e. when the condition has been stabilised. At this stage phase B is started.

### Phase B

Compression hosiery must be worn as soon as bandaging has been stopped. If there is a time delay before a made-to-measure garment is ready than a ready made garment should be used in the interim. As soon as the garment is ready the therapist ensures that it is perfect fit.

The frequency of treatments is then gradually reduced, from three times a week to twice a week and finally once a week.

During all this time the garment is worn day and night. If the results are maintained when the treatment has been reduced to once a week, and the skin has regained its normal tension, then the patient can start to wear the garment just during the day. If the results are still maintained then the patient may progressively reduce the amount of time that they wear the hosiery. For example, initially leaving it off once a week, then twice, then three times.

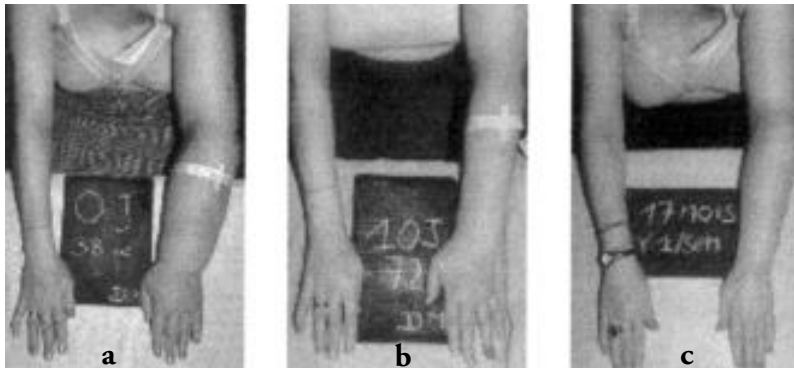


Fig. 3: a) edema post-mastectomy; b) same patient after 2 weeks of treatment; c) same patient after 17 months: still treated once a week.

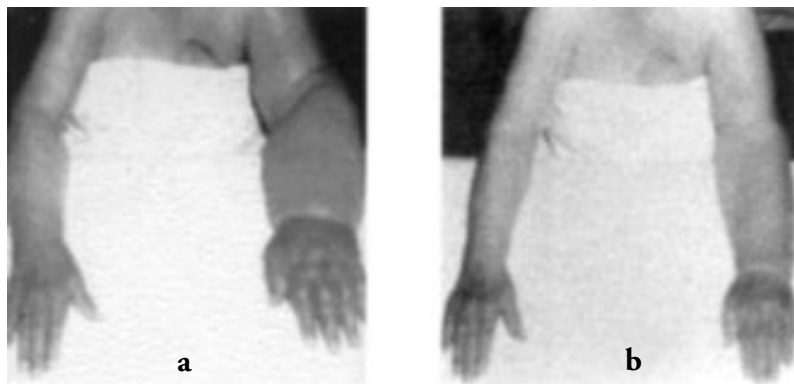


Fig. 4: a) edema post-mastectomy; b) same patient after 2 weeks of treatment. The patient wears a compression garment during the day.

The phase of decreasing the use of the garment can last for several months. The progressive course of this phase is very important to the long term maintenance of good results.

### Results (Figg. 3a, b, c; 4 a, b)

The photographs were taken during a course of treatment, as previously described, which was carried out in a private treatment centre (out-patients).

The photographs were taken at the start and at the end of the treatment sessions. Each daily treatment last for two hours for a period of two or three weeks.

The treatments were carried out by therapist trained in our techniques (Leduc method).

We always try to achieve long term follow up by seeing the patient again one or two years after finishing the treatment.

### Conclusion

We have described the physical treatment of edema which we have developed at our clinic. It is a gentle therapy which is usually effective in achieving a considerable reduction in limb volume. The therapy is safe and can be adapted to suit individual needs.

It is our conclusion that the physical treatment should be the initial treatment of choice for treating the secondary edema of the upper limbs.

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