

## New apparatus for mechanical lymph drainage in association of therapies in the treatment of lymphoedema

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**Aim.** The principles of the concepts of hydraulics, anatomy and physiology allowed the creation of an apparatus which in turn gave origin to a new concept of mechanical lymph drainage. This apparatus reproduces the physiological movements of lymphovenous drainage, improving its return. The device has been used both for treatment in the clinical practice and in the residence of the patient.

**Methods.** Experience of at-home treatment consists of 10 patients who used the apparatus for 10 to 12 months, associated with bandages and self-applied lymph drainage. The patients were evaluated at the start of treatment and then at every two months by the team responsible for the treatment. As the patients come from a large region, a local physiotherapist, who was trained by the medical team and monitored initially weekly for two months then every other week, accompanied the patient.

**Results.** Adhesion to the treatment occurred with all the patients and the clinical results were better than without the device, both in terms of adhesion to treatment and in relation to the anthropometric reductions. At a clinical level the volumetric and anthropometric reduction is greater than in the isolated use of manual lymph drainage, when performed over a three-month period for three hours daily.

**Conclusion.** In conclusion mechanical lymph drainage is a facilitating tool in the treatment of lymphoedema, improving the clinical results and the adhesion of the patients to the treatment.

**KEY WORDS:** Apparatus - Mechanical lymph drainage - Anthropometric reduction.

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Pressure therapy is one of the few available techniques, which has been scientifically studied and used as mechanical lymph drainage.<sup>1,2</sup>

Recently a new apparatus was developed whose mechanism of action is based on the physiology of lymphovenous return. This electromechanical apparatus performs dorso-flexion movements of the feet thus stimulating the pumping system of the musculature. A reduction in the gravitational pressure associated with this mechanism constitutes an important device for lymphovenous drainage.<sup>3</sup> Evaluation by means of volume plestimography demonstrated this treatment to be efficient in the removal of fluids.<sup>4</sup> Another study demonstrated an improvement in the lymphoscintigraphic patterns in patients with lymphoedema.<sup>5</sup> Thus this can be considered as a new option for, or even a new concept in mechanical lymph drainage.

### Materials and method

Six female and four male patients with ages ranging from 11 to 44 years, all of whom suffered from clinical grade II lymphoedema with a maximum of six years of evolution were evaluated. All the diagnoses were confirmed by lymphoscintigraphy.

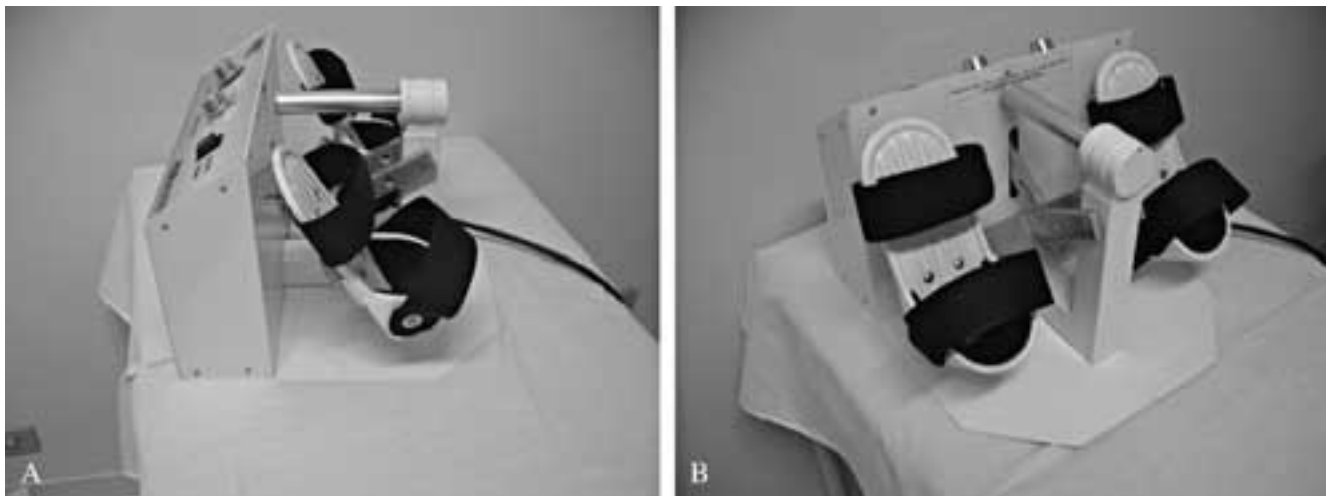


Figure 1.—The new apparatus of mechanical lymph drainage.

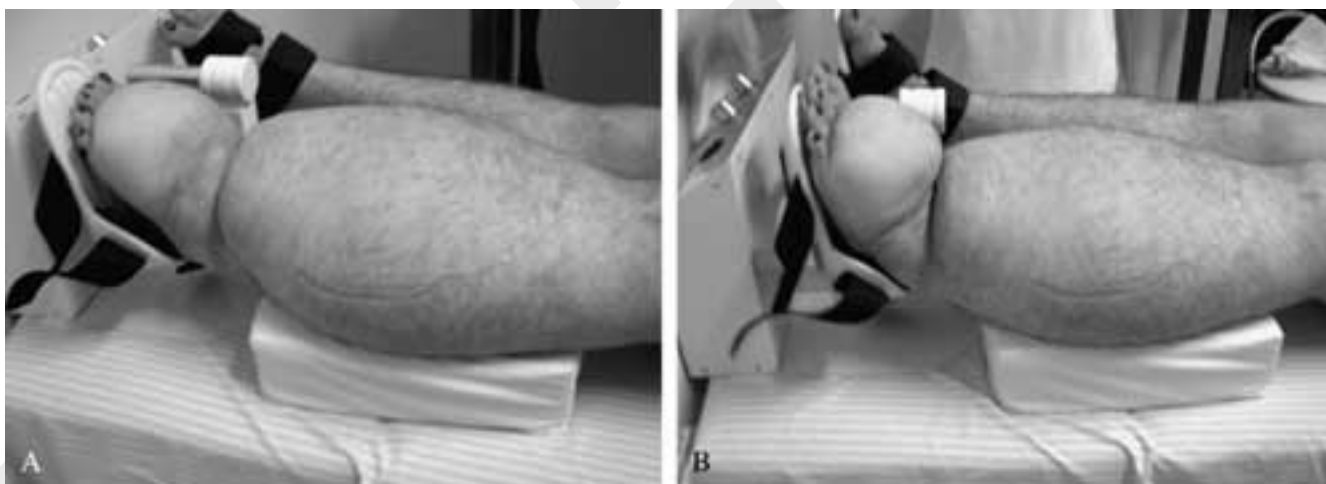


Figure 2.—Demonstrates the dorso-flexion movements of the feet.

During a period of two months the patients received training in the self-applied manual lymph drainage technique, the use of non-elastic socks, myolymphokinetic exercises. Mechanical lymph drainage utilising a new apparatus was also added, Figure 1 and 2. A local physiotherapist was trained to work with the patient within the community. The patients were evaluated at the beginning of treatment and every two months thereafter by the team responsible for the treatment using anthropometric and volume plestimography. After two months they no longer were required to visit the treatment centre for therapy but were supervised at home by the phys-

iotherapist with supervision by the multidisciplinary medical team every two months. The acceptance of the mechanical lymph drainage and the frequency of use of this apparatus were also evaluated.

### Results

All the patients who were submitted to treatment with the apparatus maintained or reduced their anthropometric and volumetric measurements when compared with the initial measurements.

The mechanical lymph drainage apparatus was well accepted by the patients and utilised frequently and thus constituted another therapeutic option to assist treatment.

### Discussion

The association of therapies in the treatment of lymphoedema has been recommended, however compliance to the proposed treatment at home is not always satisfactory.<sup>6-9</sup>

One of the bases in the treatment of lymphoedema is lymph drainage, and the self-applied technique has allowed a greater independence for the patient.<sup>10-13</sup>

Non-elastic bandages or those with little elasticity constitute one of the most important forms of reducing the size of the limb in patients, as long as they perform physical activities such as walking as the results depend on the intensity of the activity.<sup>14</sup> The adaptation of a low-cost non-elastic sock that can be made by the patient or someone within the community has helped in the independence of these patients both because of the cost and the simplicity of its modification.<sup>15, 16</sup>

Nevertheless, compliance to treatment at home when using the self-applied treatment and bandages alone is still not adequate. The addition of a form of passive mechanical lymph drainage has given an improvement in adherence of these patients, at least over the short term as evidenced in this study. This apparatus opens the perspective to perform treatment at alternative times in accordance to the patient's availability as, for example, during leisure time when watching television.

The constant improvement in the clinical symptoms is a result of the association of treatments, specifically the non-elastic socks and the constant utilisation of the apparatus.

Compliance of the patients at home is important and for this we try to make use of all the available resources, such as training of local professionals and the participation of the local community and members of the family who give support to the patient.

Additionally, the maintenance of the results of treatment for lymphoedema and the reduction of the time the patients spend in the treatment centres has been a challenge, specifically when there are difficulties in travelling to these centres. The difficulties that have appeared suggest that the continuity of treatment can be performed at home as long as there is support from

the medical team. The involvement of the local community as an instrument of support and supervision has been one of our objectives and is a strategy to improve adherence to the treatment. The treatment based on the participation of the local community requires understanding about the disease and the possibility of treatment, as well as the importance of this treatment for the patient. Guidance of the people involved by means of health programs at a local level, the participation of neighbours and friends in support groups to explain about the disease have given satisfactory results. The development of a self-applied manual lymph drainage technique and a new apparatus for mechanical lymph drainage associated with this strategy have facilitated the treatment and allowed us to reach our objectives. Satisfaction due to these results helps the patients maintain the necessary care of their injured limbs. A passive form of treatment such as mechanical lymph drainage associated with conventional therapies has been proposed for better compliance to the treatment and improved results.

### Conclusion

The association of therapies in the treatment of lymphoedema is fundamental for a good result. Mechanical lymph drainage gives us a new therapeutic option both at the treatment centre and at home. This association facilitates the treatment and improves both the compliance and the results.

The simplicity of use of the new apparatus and the tolerance for several hours have enabled an intensive program reducing the treatment time required. New forms of treatment should be investigated, as a specific treatment consensus has still not been reached.

### Riassunto

*Nuovi apparati per il drenaggio linfatico meccanico in associazione alle terapie per il trattamento del linfedema.*

*Obiettivo.* I principi concettuali dell'idraulica, dell'anatomia e della fisiologia hanno consentito la creazione di un apparato che a sua volta origina da un nuovo concetto di linfodrenaggio meccanico. Questo apparato riproduce i movimenti fisiologici del drenaggio linfo-venoso, migliorando il suo ritorno. Il dispositivo è stato utilizzato sia per il trattamento nella pratica clinica sia per quello a domicilio.

*Metodi.* Il trattamento a domicilio ha riguardato 10 pazien-

ti che hanno utilizzato lo strumento per 10-12 mesi, assieme a bendaggi e all'autoapplicazione di massaggi linfodrenanti. I pazienti sono stati valutati all'inizio del trattamento e quindi ogni due mesi dal gruppo responsabile dello studio. Dal momento che i pazienti erano sparsi su un ampio territorio, un fisioterapista locale, che era stato addestrato dal team medico, ha seguito i pazienti settimanalmente per i primi due mesi e quindi ogni due settimane.

**Risultati.** Tutti i pazienti hanno aderito al trattamento e i risultati clinici sono stati migliori con l'utilizzo del dispositivo, sia in termini di aderenza al trattamento che in relazione alle riduzioni antropometriche. Dal punto di vista clinico la riduzione volumetrica e antropometrica è stata maggiore rispetto a quella ottenuta con il solo linfodrenaggio manuale, quando eseguito per 3 mesi per 3 ore al giorno.

**Conclusioni.** In conclusione, il linfodrenaggio meccanico è uno strumento che facilita il trattamento del linfedema, migliorando i risultati clinici e l'adesione del paziente al trattamento.

**PAROLE CHIAVE:** Vasi linfatici - drenaggio linfatico - Linfedema.

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