

Lympha-Press

A new pneumatic device for the treatment of Lymphedema of the limbs

A. Zelikovski, M. Manoach, Sh. Giler and I. Urca

Department of Surgery "B" and Bio-Engineering Institute Beilinson Medical Center, Petach Tikva, and Tel Aviv University Sackler School of Medicine, Israel

Summary

As no adequate surgical nor conservative therapy exists for the treatment of lymphedema, therapists should aim at efforts to improve quality of life for those patients. Most surgeons agree that surgical treatment of such cases leaves much to be desired (4).

The use of microsurgery lymph-vein anastomosis may be the current best solution to this problem, but to date not enough experience has been accumulated (5). Of all the conservative treatments known, intermittent compression is the only one which so far has shown any effectiveness.

The "Lympha-Press", a pneumatic compression instrument, based on physiological principles, has been developed in our department and is currently being manufactured. It has proven to be very effective for the efficient reduction of lymphedema.

It is designed so that the fluid is pushed from the limb in a proximal direction only. The short cycle of the pressure allows the therapist to use high pressures in order to overcome long standing lymphedema without discomfort to the patient. The use of the "Lympha-Press" together with the correct elastic stocking promises restoration of a good quality of life for the patients.

In this series of 20 patients we had remarkable results in a very short time and succeeded in maintaining this success with the exception of a few patients who needed a few additional sessions, of one hour each.

The "Lympha-Press" is a new intermittent pneumatic machine which according to our experience, has been more effective than the conventional machines, and the results presented in this paper would seem to justify its wide use in the treatment of lymphedema of the limbs.

Introduction

Despite recent advances in the treatment of lymphedema, a satisfactory and effective treatment has not yet been developed as

evidenced by the long list of surgical procedures proving the lack of a single good surgical solution. Conservative therapy, based on elastic stockings and diuretics is helpful in non-severe cases, good results having been reported by *van der Molen* (1), using his elastic tourniquettes. A further advance in the field of conservative treatment for lymphedema is the use of intermittent pneumatic compression, but the results leave much to be desired. Since this latter treatment seems to be based on a very logical approach, the surprisingly inadequate relief it affords led us to examine the pneumatic devices available. Two factors were repeatedly evident:

- a) by compressing air into a single compartment sleeve, the pressure is distributed in all directions (LaPlace's Law) so that only part of the desired pressure reaches the lymph proximally via the remaining lymph vessels, with resultant diminished effectiveness.
- b) the long duration of the pressure cycle in existing pneumatic devices precludes the use of high pressures which would cause great discomfort to the patient.

With these two aspects in mind, we have developed the "Lympha-Press", a new pneumatic instrument described below.

Technical Details

The instrument itself consists of a carpet adapted to form a tight sleeve, containing from 9-12 cells, which is fitted to the limb according to its length.

lymph press, pressure system

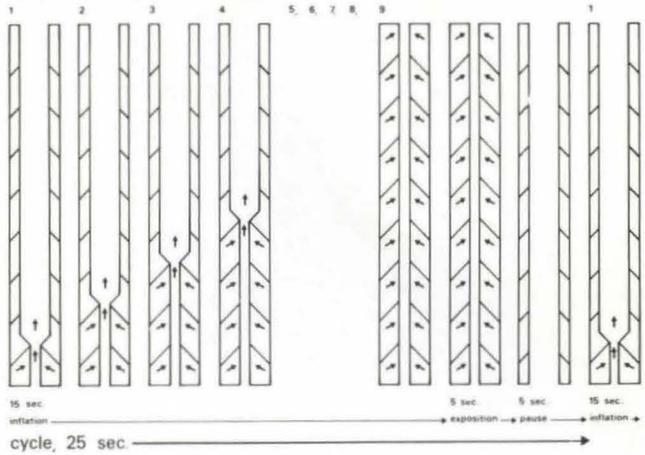


Fig. 1 The graphic cycle of the "Lympha-Press". Note the overlapping of the cells and the short cycle.



Fig. 2 Patient during treatment with the "Lympha-Press".

A special boot consisting of one cell has been designed for the foot. In order to avoid any interstices between the cells we constructed the cells in an overlapping manner, thus providing a smooth outflow.

The cells are inflated progressively, starting from the first distal cell then the second, the third and so on. The pressure is derived from a compressor leading to a distributor which feeds each cell separately. In this way successive inflation creates a sort of milking mechanism. When the entire sleeve is filled

with air, all the cells empty themselves automatically and simultaneously. The duration of the cycle, including an intermission, is 25 seconds of which the compression period is 20 seconds on the first cell and only 2 seconds on the last cell (see Fig. 1). The short cycle allows the use of high pressure on the limb (120–160 mmHg) without causing discomfort to the patient, due to the fact that the pressure is of such brief duration.

In this communication we report our experience with the reduction of lymphedema of the

Table 1

Patient No.	Sex	Age	Etiology of Lymphedema	Hours of Treatment	Reduction of Lymphedema in cm	Remarks
1	F	14	congenital	3	3	
2	M	8	congenital	3	2	
3	F	22	congenital	20	8	
4	M	18	congenital	5	20	
5	F	22	congenital	6	4	
6	F	17	congenital	8	4	
7	M	60	rec. erysipely	24	30	see Fig. 3, 4
8	M	30	rec. erysipely	40	70	see Fig. 5, 6, 7, 8
9	M	36	rec. erysipely	24	10	
10	F	28	rec. erysipely	12	10	
11	F	46	groin dissect.	24	20	
12	F	49	groin dissect.	17	8	
13	F	66	groin dissect.	36	32	see Fig. 9, 10
14	F	38	groin dissect.	24	12	
15	F	42	irradiation	24	14	
16	M	52	irradiation	12	18	
17	M	32	irradiation	12	6	
18	M	47	post traumatic	12	8	
19	F	16	post traumatic	2	4	
20	F	60	post traumatic	6	8	

lower limbs. The use of the „Lympha-Press” in the reduction of lymphedema of the upper limb and its use for the treatment of crural ulcer in gait-limited patients has been reported elsewhere (2, 3).

Material, Methods and Results

Twenty patients with lymphedema of the lower limbs (11 women, 9 men) were treated. The patients were admitted to our department for an almost continuous treatment with the Lymphy-Press (range of pressures which were used 120–140 mmHg). Only one case required surgery which was carried out four days after treatment began; all the others were discharged with tight elastic bandages which were later changed for very tight elastic stockings. Fig. 2 demonstrates a patient during treatment.

Table 1 summarizes the age of the patients, the cause of lymphedema, hours of treatment and the reduction of lymphedema as measured in cm in the middle of the calf.

As shown, five groups of patients were treated: 6 patients with congenital lymphedema, 4 with lymphedema due to recurrent erysipelas, 4 after groin dissection, 3 after irradiation of the groin region, and 3 post severe trauma of the legs.

The mean age of the patients is 35.1 years, ranging from 8 to 66 years of age. Patients were treated for an average of 15.7 hours, the shortest treatment being of two hours duration and the longest treatment 70 hours. The mean reduction of edema as measured in the middle of the calf was 14.5 cm, the smallest reduction achieved was 2 cm and the largest 70 cm. Our results show that the reduction of the edema was rapid and very effective in all patients. In order to maintain this achievement, an elastic stocking was fitted to each patient's leg, and walking exercises were recommended.

The criterion for good stockings was when no reaccumulation of the edema appeared. We checked all patients three days after the intensive treatment; in cases where



Fig. 3 Lymphedema due to recurrent erysipelas in a 60 year old man before treatment.



Fig. 4 The same patient after 24 hours.



Fig. 5 Elephantiasis in a 30 year old man due to recurrent erysipelas of 14 years duration before treatment.



Fig. 6 The same patient after 40 hours of treatment with the "Lympha-Press".



Fig. 7 The same patient, 10 days after simple excision of skin and subcutaneous tissue.



Fig. 8 The same patient one year after operation (patient wears two elastic stockings).



Fig. 9 Lymphedema in a 66 year old women (after hysterectomy and bilateral groin dissection), before treatment.



Fig. 10 The same patient after 36 hours of treatment with the "Lympha-Press".

enlargement of the leg was noted, the patient received another hour of treatment with the "Lympha-Press" and a tighter stocking was fitted to the limb. In several cases two elastic stockings were needed in order to maintain the results.

Six of the patient were treated on ambulatory basis every month or two for a few hours, and each time tighter elastic stockings were needed, until there was no recurrence of the edema.

Side Effects

Pains during treatment: Seven patients complained about pains during treatment which disappeared when pressure was reduced to 120 mmHg. Three of those patients were from the "post traumatic lymphedema".

Polyuria: In all the patients a remarkable polyuria was noted in the first hours of the treatment amounting up to eight litres of urine in the first eight hours.

Augmentation of C.P.K. and Aldolase: was noted in the serum of all the patients amounting up to 200 % of the normal values. The values returned to normal three days after treatment was stopped.

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A. Zelikowski, M.D., Surgery B Beilinson Hospital Petah-Tikva, Israel