REFERENCES


EFFECTS OF TREATMENT WITH AN ELASTIC SLEEVE AND INTERMITTENT PNEUMATIC COMPRESSION IN POST-MASTECTOMY PATIENTS WITH LYMPHOEDEMA OF THE ARM

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ABSTRACT. In an attempt to reduce oedema of the arm after mastectomy, patients were provided with an elastic sleeve which was worn for a period of between 1 week and up to 6 months. A statistically significant mean relative decrease of 17% in the volume of oedema was achieved. Subsequent treatment by intermittent pneumatic compression for 10 days produced a further significant mean relative decrease of 18%. When the sleeve was worn for 6 months after the treatment there was no significant increase in arm volume—that is, no relapse.

Keywords: cancer, mastectomy, oedema, elastic sleeve, physiotherapy, intermittent pneumatic compression

The techniques of physiotherapy applied in the treatment of lymphoedema in post-mastectomy patients vary from hospital to hospital and from one country to another. The elastic sleeve is an important aid in helping fluid from accumulating again in the interstitial tissue and thus for preventing relapse. At most hospitals swelling of the arm is treated by intermittent pneumatic compression supplemented with use of an elastic sleeve (1, 5, 7, 8). This therapy can be combined with manual lymph drainage, medication and surgery (2, 3, 4).

Reported reductions in oedema obtained by intermittent pneumatic compression combined with the elastic sleeve therapy range from about 30 to 65% (5, 8). Among the factors probably accounting for this variability are differences in the patient series, the initial extent of the oedema, the duration of the treatment, the time at which the individual treatments were given and the competitive force used. It is interesting to learn, however, whether the elastic sleeve therapy alone may be regarded as sufficient to obtain an acceptable and lasting reduction in oedema or whether it is necessary to supplement it with other physiotherapeutic measures such as manual lymph drainage, intermittent pneumatic compression and active exercise. Long-term data observation on continued use of the elastic support in the control of the oedema is needed.

The purposes of the present study were (a) to determine the variability of the relative and the absolute volumes of the oedematous arm; (b) to measure any change in the relative and the absolute volumes after the following forms of treatment, given in turn: (1) elastic sleeve therapy ( obtus ) for 1 week and for 1, 3 and 6 months; (2) intermittent pneumatic compression (obtus) given for 2 weeks, and (3) elastic sleeve maintenance therapy for 1 week, and 1, 3 and 6 months, given to prevent relapse. The treatment schedule is shown in Fig. 1.

THE PATIENT SERIES

During the period from April 1980 to September 1982 a total of 249 post-mastectomy patients attended the Department of Physiotherapy and Medical Rehabilitation for consultation or for treatment of swelling of the arm, pain in the arm or chest, parasthesia, or impairment of arm function.

A selection of the patients was made according to the following criteria: (1) no known metastases; (2) no infection of the arm after the beginning of the study; (3) no functional impairment, swelling, or skin alterations of the other arm (the control arm); (4) a difference of at least 10% in the volumes of control and oedematous arm; (5) the patient must have complained of pain, a feeling of heaviness in the arm, or its unsatisfactory appearance; (6) no physiotherapy shall have been given during the 6 months preceding the present treatment.

The material for the study after the process of selection consisted of 54 patients. These were divided into two groups according to whether they had never received treatment for oedema of the arm (Group A, 32 patients) or had previously received treatment and/or used an elastic sleeve (Group B, 22 patients). The characteristics of the patients are presented in Table I.

From the calculations of the results relating to the control period and the period of treatment with the elastic compression sleeve, 22 patients were excluded who had not previously received treatment and/or had used an elastic compression sleeve (Group B). For 6 of the 32 patients comprising Group A, who had never received treatment, no measurements had been made during the control period. These 6 patients had been given priority for intermittent pneumatic compression or had not attended for the measurements. For 2 patients there were no measurements during the first week’s treatment with the elastic compression sleeve.

Moreover, not all the patients in Group A were able to complete the 6-month period of sleeve therapy, as owing to technical reasons it was necessary to advance the date for introducing the intermittent pneumatic compression therapy.

All 54 patients comprising Groups A and B had received intermittent pneumatic compression therapy.

METHOD

Measures of arm and definition of volume

The volume of the arm was measured by an investigator using a precise volumetric method that has been designed and tested by the author (9, 10). It was found that the variability of the observation of volume varied about a mean of 0.5%. The modal variability was 0.2%. The basic quantity used for evaluating the effect of the treatment in this study was the relative volume of the oedematous arm. $V_{\text{arm,rel}}$ was expressed as the ratio of the volume of the oedematous arm ($V_{\text{arm,rel}}$) to that of the control arm ($V_{\text{arm}}$).

By thus expressing the volume of the oedematous arm as a ratio, any error incurred by the natural variability of the volume of the body with time was avoided. In an earlier study by the author this variability, measured over a fortnight in the arms of healthy subjects, was 5.3% (SD 3.2%).

The decrease in the relative volume of an oedematous arm, $V_{\text{arm,rel}}$, between times $t_1$ and $t_2$ is expressed as:

$$\Delta V_{\text{arm,rel}} = V_{\text{arm,rel}}(t_2) - V_{\text{arm,rel}}(t_1)$$

Another ratio that was applied in the relative volume of oedema, that is:

$$\frac{\Delta V_{\text{arm,rel}}}{V_{\text{arm,rel}}} = \frac{V_{\text{arm,rel}}(t_2) - V_{\text{arm,rel}}(t_1)}{V_{\text{arm,rel}}(t_1)}$$

The relative decrease in the relative volume of oedema ($\Delta V_{\text{arm,rel}}$) is expressed as the ratio:

$$\Delta V_{\text{arm,rel}} = \frac{V_{\text{arm,rel}}(t_2) - V_{\text{arm,rel}}(t_1)}{V_{\text{arm,rel}}(t_1)}$$

Table I. Characteristics of the patients

<table>
<thead>
<tr>
<th>Description</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>32</td>
<td>22</td>
</tr>
<tr>
<td>Mean age at beginning of study</td>
<td>63 years</td>
<td>62-79 years</td>
</tr>
<tr>
<td>Age range</td>
<td>1950-59, 6 patients</td>
<td>1960-69, 21 patients</td>
</tr>
<tr>
<td>Distribution of patient series by year of mastectomy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side of mastectomy</td>
<td>Left, 31 patients</td>
<td>Right, 25 patients</td>
</tr>
<tr>
<td>Leading hand</td>
<td>Left, 49 patients</td>
<td>Right, 53 patients</td>
</tr>
<tr>
<td>Initial volume of oedematous arm expressed as a percentage of that of the control arm ($V_{\text{arm,rel}}$)</td>
<td>Mean 147.7%</td>
<td>Mean 123.7%</td>
</tr>
<tr>
<td>Mean</td>
<td>111.7</td>
<td>111.7</td>
</tr>
<tr>
<td>Range</td>
<td>3 months-28 years</td>
<td>3 months-28 years</td>
</tr>
<tr>
<td>No previous treatment for swollen arm</td>
<td>32 patients (Group A)</td>
<td>22 patients (Group B)</td>
</tr>
<tr>
<td>Previous treatment received</td>
<td>22 patients</td>
<td>22 patients</td>
</tr>
</tbody>
</table>

Table II. The change in the relative volume of the oedematous arm $\Delta V_{\text{arm,rel}}$, the relative change of oedema $\Delta V_{\text{arm,rel}}$ and the change in the absolute volume of oedema $\Delta V_{\text{arm,rel}}$ over the control period of 4 weeks: Group A

<table>
<thead>
<tr>
<th>Description</th>
<th>Mean %</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta V_{\text{arm,rel}}$</td>
<td>0.38%</td>
<td>5.0</td>
</tr>
<tr>
<td>Level of statistical significance</td>
<td>P=0.003</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>0.0</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 1. The treatment schedule.

Substituting we have

$$\Delta V_{\text{arm,rel}} = \frac{V_{\text{arm,rel}}(t_2) - V_{\text{arm,rel}}(t_1)}{V_{\text{arm,rel}}(t_1)}$$

where $t_1$ and $t_2$ denote the times at which measurements were made at the beginning and the end of the various periods, namely the control period, and the periods of elastic sleeve therapy, intermittent pneumatic compression, and maintenance sleeve therapy.

Fig. 2. Upper: Taking measurements. Lower: Various models of the Jobst elastic compression sleeve.
Table I. Characteristics of the patients

- Number of patients: Group A + Group B
  - 32 + 23 = 55 patients
- Mean age at beginning of study
  - Group A: 61 years
  - Group B: 62.7 years
- Age range
  - Group A: 70-90 years
  - Group B: 70-90 years
- Distribution of patient series by year of mastectomy
  - Group A: 1960-69, 21 patients
  - Group B: 1970-79, 26 patients
- Side of mastectomy
  - Right: 45 patients
  - Left: 37 patients
- Leading hand
  - Left: 31 patients
  - Right: 33 patients
- Initial volume of oedematous arm expressed as a percentage of the normal arm
  - Mean: 147.7%
  - S.D.: 27.3
- Radiotherapy
  - Duration of oedema prior to treatment
    - Group A: 146 days
    - Group B: 146 days
- No previous treatment for swollen arm
  - Group A: 37 patients
  - Group B: 22 patients
- Previous treatment received
  - Infection of the arm
    - Group A: 32 patients
    - Group B: 23 patients

The material for the study after the process of selection consisted of 54 patients. These were divided into two groups according to whether they had never received treatment for oedema of the arm (Group A, 32 patients) or had previously received treatment and/or used an elastic sleeve (Group B, 22 patients). The characteristics of the patients are presented in Table I. From the calculations of the results relating to the control period and the period of treatment with the elastic compression sleeve, 22 patients were excluded who had not previously received treatment and/or who had used an elastic compression sleeve (Group B). For 6 of the 32 patients comprising Group A, who had never received treatment, no measurements had been made during the control period. These 6 patients had been given prior consent for intermittent pneumatic compression or had not attended for the measurements. For 2 patients there were no measurements during the first week's treatment with the elastic compression sleeve.

Moreover, not all the patients in Group A were able to complete the 6-month period of sleeve therapy, as owing to technical reasons it was necessary to advance the date for introducing the intermittent pneumatic compression therapy. All 54 patients comprising Groups A and B had received intermittent pneumatic compression therapy.

**METHOD**

**Measures of arm and definition of volume**

The volume of the arm was measured by an investigator using a precise volumetric method that has been designed and tested by the author (9, 10). It was found that the variability of the observation of volume varied about a mean of 0.5%. The modulated variance was 0.2%. The basic quantity used for evaluating the effect of the treatment in this study was the relative volume of the oedematous arm. This was expressed as the ratio of the volume of the oedematous arm (V_{oedematous}) to that of the control arm (V_{control}):

\[
\text{Relative volume} = \frac{V_{oedematous}}{V_{control}}
\]

By thus expressing the volume of the oedematous arm as a ratio, any error incurred by the natural variability of the volume of the body with time was avoided. In an earlier study by the author this variability, measured over a fortnight in the arms of healthy subjects, was 5.3% (SD 3.2%).

The decrease in the relative volume of an oedematous arm, V_{oedematous}, between times t1 and t2 is expressed as:

\[
\text{Relative decrease in volume} = \frac{V_{oedematous}(t2) - V_{oedematous}(t1)}{V_{oedematous}(t1)}
\]

Another ratio that was applied in the relative volume of oedemas, that is:

\[
\text{Ratio} = \frac{V_{oedematous}}{V_{control}} - 1
\]

The relative decrease in the relative volume of oedema (ΔV_{oedematous}) is defined as the ratio of the relative decrease in oedemas to the ratio of the relative decrease in control:

\[
\Delta V_{oedematous} = \frac{V_{oedematous}(t2) - V_{oedematous}(t1)}{V_{oedematous}(t1)}
\]

**Substituting we have**

\[
\Delta V_{oedematous} = \frac{V_{oedematous}(t2)}{V_{oedematous}(t1)} - 1
\]

where t1 and t2 denote the times at which measurements were made. At the beginning and the end of the various periods, namely the control period, and the periods of elastic sleeve therapy, intermittent pneumatic compression, and maintenance sleeve therapy.

**Treatment schedule**

The treatment was given in four stages (Fig. 1). 1. **Control period**. In order to obtain an impression of the variability of the volume of the oedematous arm in relation to that of the unaffected arm, control measurements were made of the volume of the oedematous arm and the centre arm on at least two occasions before the treatment was introduced. 2. **Elastic sleeve therapy**. The patients began by using a very carefully measured and fitted elastic sleeve (Jobst, Figure 2). This enclosed the whole of the lower and upper arm, and the hand, too, if this was swollen. The compressive force exerted by the support at its distal end is 30-40 mmHg and this value decreases in the direction of the wrist. The sleeve was replaced if it became worn, or too large or tight. The patient was informed about infection prophylaxis, the importance of dynamic work, the suitability of static work, etc., and also as to the advisability of resting the arm in a raised position. The patient otherwise carried out normal tasks with no restrictions.

After the sleeve had been used for 1 week and 1, 3, and 6 months, measurements were taken on the oedematous and the control arms were performed. 3. **Intermittent pneumatic compression therapy**. The next stage in the treatment schedule was massage of the arm with intermittent pneumatic compression (IPC), performed with a Jobst pulser, hospital model (Fig. 3). The

**Fig. 1. The treatment schedule.**

**Fig. 2. Upper: Taking measurements. Lower: Various models of the Jobst elastic compression sleeve.**

**Table II. The change in the relative volume of the oedematous arm ΔV_{oedematous} and the change in the absolute volume of oedema ΔV_{oedema} over the control period of 4 weeks: Group A**

<table>
<thead>
<tr>
<th>ΔV_{oedematous}</th>
<th>Mean (SD)</th>
<th>Level of statistical significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔV_{oedematous}</td>
<td>0.38% (5.6)</td>
<td>P=0.703</td>
</tr>
</tbody>
</table>

*Dependent tailed t-test.
Treatment consisted of 10 sessions, given daily from Monday to Friday for 6 hours a day. The initial compressive force ranged from 35 to 45 mmHg, and this value was gradually increased to 60 mmHg after a daily check of the arm volume.

The IPC treatment was started after varying periods of the sleeve treatment (see point 2). Six patients were given priority for IPC treatment without having first passed through the 'control period' or been given sleeve treatment. The reason was either that the patient belonged to another administrative district, or that the patient was asked for advice by the surgeon. During the IPC treatment the elastic compression sleeve was worn.

4. Maintenance sleeve therapy. To prevent relapse, the sleeve was worn for 6 months after the intermitted pneumatic compression therapy had been terminated. The directions for use were carefully compiled with. Measurements of volume were performed after 1 week and 1, 3 and 6 months.

RESULTS AND DISCUSSION

During the control period of, on average, 4 weeks (range 1.5–10.3 weeks) during which no treatment was given, the volume of the oedematous arm decreased by about 0.4% in relation to that of the control arm. This corresponds to a reduction of the oedema of 1.5%, or about 9 cm³. The differences are not statistically significant (Table II). During the control period the results were derived only for the patients that had not earlier had any physiotherapy (Group A). The patients that had had such treatment (Group B), and that had already used the elastic sleeve were not included in the analysis of the results for the control period.

After the sleeve therapy for 1 week, and 1, 3 and 6 months there was a decrease in the relative volume of the oedematous arm by 4, 5, 6 and 8%, respectively. The values for the reduction in volume are significant (Table III, Fig. 4). As seen from the table, the number of patients gradually decreased with the duration of the treatment (for an explanation, see under 'The patient series'). Most of the reduction in volume occurred during the first week of the therapy; this has also been found earlier in the case of combined treatment, with manual massage, raised position of the arm, isometric exercises, and use of the elastic sleeve (II).

During the intermittent pneumatic compression therapy there was a further reduction of 9% in the volume of the oedematous arm in relation to that of the control. This corresponds to a mean reduction in oedema of 18%, or 213 cm³. The decreases are significant (Table III). The results of the IPC therapy relate to the 54 patients that had either had sleeve therapy (Group A) or that had received treatment on a previous occasion (Group B). It is conceivable that the results yielded by the IPC therapy when this was the first measure, were better than those reported here. However, even after the sleeve therapy the results were further improved by the IPC treatment.

During the maintenance treatment with the elastic compression sleeve the volume of the arm increased slightly, by 1–1.5%, though not to the level of statistical significance. Nor did the increase exceed the reduction in volume achieved with the IPC treatment (Table III, Fig. 5). It has been noted that...
treatment consisted of 10 sessions, given daily from Monday to Friday for 6 hours a day. The initial compressive force ranged from 35 to 45 mmHg, and this value was gradually increased to 60 mmHg after a daily check of the arm volume.

The IPC treatment was started after varying periods of the sleeve treatment (see point 2). Six patients were given priority for IPC treatment without having first passed through the "control period" or been given sleeve treatment. The reason was either that the patient belonged to another administrative district, or that she was much troubled by the vestibular arm. During the IPC treatment the elastic compression sleeve was worn.

4. Maintenance sleeve therapy. To prevent relapse, the sleeve was worn for 6 months after the intermittent pneumatic compression therapy had been terminated. The directions for use were carefully compiled with. Measurements of volume were performed after 1 week and 1, 3 and 6 months.

RESULTS AND DISCUSSION

During the control period of, on average, 4 weeks (range 1.5–10.3 weeks) during which no treatment was given, the volume of the oedematous arm decreased by about 0.4% in relation to that of the control arm. This corresponded to a reduction of the oedema of 1.5%, or about 9 cm³. The differences are not statistically significant (Table I). During the control period the results were derived only for the patients that had not earlier had any physiotherapy (Group A). The patients that had had such treatment (Group B), and that had already used the elastic sleeve were not included in the analysis of the results for the control period.

After the sleeve therapy for 1 week, and 1, 3 and 6 months there was a decrease in the relative volume of the oedematous arm by 4, 5, 6 and 8%, respectively. The values for the reduction in volume are significant (Table III, Fig. 4). As seen from the table, the number of patients gradually decreased with the duration of the treatment (for an explanation, see under "The patient series"). Most of the reduction in volume occurred during the first week of the therapy; this has also been found earlier in the case of combined treatment, with manual massage, raised position of the arm, isometric exercises, and use of the elastic sleeve (10).

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Table III. The change in the relative volume of the oedematous arm (ΔV\textsubscript{relative}) and the relative change in the absolute volume of oedema (ΔV\textsubscript{absolute}) over the period of elastic sleeve therapy, intermittent pneumatic compression therapy and maintenance sleeve therapy

<table>
<thead>
<tr>
<th>Duration of treatment</th>
<th>Elastic sleeve therapy</th>
<th>Intermittent pneumatic compression therapy</th>
<th>Maintenance sleeve therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 week</td>
<td>3.7</td>
<td>2.2</td>
<td>-0.7</td>
</tr>
<tr>
<td>1 month</td>
<td>5.3</td>
<td>15</td>
<td>-1.2</td>
</tr>
<tr>
<td>3 months</td>
<td>6.2</td>
<td>11</td>
<td>-0.5</td>
</tr>
<tr>
<td>6 months</td>
<td>8.1</td>
<td>11</td>
<td>-1.5</td>
</tr>
<tr>
<td>2 weeks</td>
<td>7.0</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Mean, %</td>
<td>4.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First measurement, mean %</td>
<td>144.0</td>
<td>174</td>
<td>139.4</td>
</tr>
<tr>
<td>Last measurement, mean %</td>
<td>148.3</td>
<td>173</td>
<td>139.1</td>
</tr>
<tr>
<td>Level of significance, P</td>
<td>0.001</td>
<td>0.003</td>
<td>0.004</td>
</tr>
<tr>
<td>Number of patients</td>
<td>24</td>
<td>22</td>
<td>41</td>
</tr>
<tr>
<td>ΔV\textsubscript{relative} \times 100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean, %</td>
<td>8.8</td>
<td>13.4</td>
<td>139.4</td>
</tr>
<tr>
<td>SD</td>
<td>13.2</td>
<td>16.8</td>
<td>139.1</td>
</tr>
<tr>
<td>Range</td>
<td>7.1</td>
<td>11.9</td>
<td>139.1</td>
</tr>
<tr>
<td>Number of patients</td>
<td>24</td>
<td>22</td>
<td>41</td>
</tr>
<tr>
<td>ΔV\textsubscript{absolute}, cm(^3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean, %</td>
<td>50</td>
<td>90.6</td>
<td>139.4</td>
</tr>
<tr>
<td>SD</td>
<td>100.8</td>
<td>172.8</td>
<td>139.1</td>
</tr>
<tr>
<td>Range</td>
<td>200</td>
<td>265</td>
<td>139.1</td>
</tr>
<tr>
<td>Number of patients</td>
<td>24</td>
<td>22</td>
<td>41</td>
</tr>
</tbody>
</table>

* Dependent two-tailed t-test.

if the follow-up sleeve therapy is not given, a rapid relapse to the original arm volume may occur (10). The net benefit of the intermittent pneumatic compression therapy and the maintenance sleeve treatment given for 1 week, 1, 3 and 6 months was a reduction in the relative volume of the oedematous arm by 8.3, 7.8, 8.5 and 7.5%, respectively.

CONCLUSIONS

The study has shown that a marked reduction of the arm oedema can be obtained solely with the elastic compression sleeve, when worn for a fairly long time. Subsequent intermittent pneumatic compression therapy can produce a further considerable decrease in volume within a short time. For patients who are much troubled by the oedema it would seem best to begin with the IPC therapy. For those who are less affected, the sleeve therapy alone may suffice, since this form of treatment, too, is beneficial in the long run.

In order to maintain the beneficial effect of the IPC therapy it is essential to follow it up by applying the elastic compression sleeve.

ACKNOWLEDGEMENTS

Support for this research has been provided by a grant from the King Gustav V Foundation. The statistical analysis was performed by B. Nilsén. The practical work was done by D. Fredhössen, B. Romerjö, S.Wikström and C. Honeth.

REFERENCES

Table III. The change in the relative volume of the oedematous arm (ΔVrelative) and the relative change of oedema (rel ΔVrelative) and the change in the absolute volume of oedema (ΔVabsolute) over the period of elastic sleeve therapy, intermittent pneumatic compression therapy and maintenance sleeve therapy

<table>
<thead>
<tr>
<th>Duration of treatment</th>
<th>Elastic sleeve therapy</th>
<th>IPC Groups A + B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 week</td>
<td>1 month</td>
</tr>
<tr>
<td>ΔVrelative × 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean, %</td>
<td>3.7</td>
<td>5.3</td>
</tr>
<tr>
<td>SD</td>
<td>4.7</td>
<td>4.7</td>
</tr>
<tr>
<td>First measurement, mean %</td>
<td>144.0</td>
<td>147.0</td>
</tr>
<tr>
<td>Last measurement, mean %</td>
<td>140.3</td>
<td>141.7</td>
</tr>
<tr>
<td>Level of significance, P</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Number of patients</td>
<td>24</td>
<td>22</td>
</tr>
<tr>
<td>ΔVabsolute, cm²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean, %</td>
<td>8.8</td>
<td>13.4</td>
</tr>
<tr>
<td>SD</td>
<td>59.2</td>
<td>12.2</td>
</tr>
<tr>
<td>Range</td>
<td>-8.9</td>
<td>-26</td>
</tr>
<tr>
<td></td>
<td>7.1</td>
<td>42</td>
</tr>
<tr>
<td>Number of patients</td>
<td>24</td>
<td>22</td>
</tr>
</tbody>
</table>

* Dependent two-tailed t-test
* Difference in number of patients due to one missing value for the control arm.

if the follow-up sleeve therapy is not given, a rapid relapse to the original arm volume can occur (10).

The net benefit of the intermittent pneumatic compression therapy and the maintenance sleeve treatment given for 1 week, 1, 3 and 6 months was a reduction in the relative volume of the oedematous arm by 8.3, 7.8, 8.5 and 7.5%, respectively.

CONCLUSIONS
The study has shown that a marked reduction of the arm oedema can be obtained solely with the elastic compression sleeve, when worn for a fairly long time. Subsequent intermittent pneumatic compression therapy can produce a further considerable decrease in volume within a short time. For patients who are much troubled by the oedema it would seem best to begin with the IPC therapy. For those who are less affected, the sleeve therapy alone may suffice, since this form of treatment, too, is beneficial in the long run.

In order to maintain the beneficial effect of the IPC therapy it is essential to follow it up by applying the elastic compression sleeve.

ACKNOWLEDGEMENTS
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