Lymphoedema after mastectomy for breast cancer: Importance of supportive care

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Background. Lymphoedema resulting from axillary lymph node dissection remains a challenging complication after modified radical mastectomy. Objectives. To examine the effects of supportive therapy such as rehabilitation and medical and physical treatment on the development of lymphoedema, in an attempt to establish non-surgical ways to help prevent or reduce it.

Methods. Patients (N=5 064) who underwent breast cancer surgery in the Department of General Surgery, Ankara Oncology Research and Training Hospital, Turkey, between 1995 and 2010 were included. Data were collected by retrospectively examining all the patients’ files and the pre- and postoperative breast cancer follow-up forms.

Results. Of the patients in the study, 19.9% developed lymphoedema. It was significantly less common in patients who participated in physiotherapy than in those who did not, and it was more common in patients with a body mass index (BMI, kg/m²) between 30 and 34.9 than in those with lower BMIs. Postoperative axillary radiotherapy did not affect the occurrence of lymphoedema.

Conclusion. It is clear that the most successful method to reduce the impact of lymphoedema is to prevent it. We believe that educating patients about the risk factors for developing lymphoedema and referring them to postoperative physical therapy and rehabilitation clinics are the most important ways to avoid this distressing condition.

years, and then once a year. The minimum follow-up period was 13 months and the maximum 12 years, with a mean of 64 months (not all patients attended as regularly as they had been instructed to). Preoperative measurements of the circumference of each patient's arms, forearms and elbows were made, and a difference of >5% between the arms postoperatively was considered to indicate lymphoedema. No distinction was made between mild, moderate or severe lymphoedema.

In patients who received adjuvant radiotherapy, this included treatment of the axillary area. Cyclophosphamide, adriablastine, 5-fluourouracil and docetaxel were used for first-line adjuvant chemotherapy. None of the drugs used is reported to have isolated lymphoedema as a side-effect.

All patients were referred to physiotherapy and the rehabilitation clinic postoperatively. They were taught self-drainage massage techniques to use daily, and flexibility and strength exercises. Patients were also informed about the symptoms of lymphoedema, personal hygiene measures and general protective measures. This information was detailed and was reinforced in a booklet that was given to the patient to keep. Patients who continued to visit the physiotherapy department for therapy and did their exercises regularly were included in the 'physiotherapy' group, while those who lived in areas where there was no opportunity to receive physiotherapy and rehabilitation, or who did not do the exercises regularly, were included in the 'no physiotherapy' group.

The patients' age, employment status (employed/unemployed), baseline body mass index (BMI, kg/m²) (<17.9, 18 - 24.9, 25 - 25.9, or 30 - 34.9), and history of adjuvant chemotherapy, adjuvant radiotherapy and physiotherapy were evaluated, recorded and compared. Because of the synchronised level of axillary dissection (level I-II-III), the number of axillary lymph nodes (mean 16.8 v. 14.9) and positive lymph nodes (mean 8.3 v. 9.2) were similar between all groups, and this information was not included in the study criteria.

The following statistics were used to summarise the data: numbers and percentages for categorical data/averages, standard deviations, lowest and highest values for normally distributed numerical data/medians, interquartile ranges, and highest and lowest values for abnormally distributed numerical data. The χ² test or Mantel-Haenszel test was used for comparing categorical variance, and the Mann-Whitney U test for comparisons between subgroups. The effects of patient age, employment status, baseline BMI and history of adjuvant chemotherapy, adjuvant radiotherapy and physiotherapy were evaluated, with the significance level set as p<0.05. The analyses were done using NCSS 2007 version 07.1.14 software.

**Results**

Of the patients in the study, 19.9% developed lymphoedema (Table 1), after a mean of 29 months. The median ages of the patients with and without lymphoedema were 51 years (interquartile range (IQR) 34 - 75), and 50 years (IQR 71 - 31), respectively; the difference was statistically significant (p<0.001).

Lymphoedema was significantly more common in unemployed patients than in those who were employed (p<0.001). Patients who worked outside the home (n=1 023) accounted for only 20.2% of the total group, and most of them (63.7%) were in the physiotherapy group (Table 2).

Lymphoedema was also more common in patients with a BMI between 30 and 34.9 than in other patients. Multivariate analysis showed that a patient with a BMI of 25 - 29.9 was 1.445 times more likely to develop lymphoedema than a patient with a BMI of <17.9 (p<0.001), and a patient with a BMI of 30 - 34.9 was 6.643 times more likely to develop it than a patient with a BMI of <17.9 (p<0.001).

Lymphoedema was more likely to occur in patients who received postoperative chemotherapy than in those who did not (p<0.001). This finding was most striking at the 6-month follow-up visit. In most of these patients no difference was detected between the measurements of the two arms, so the lymphoedema was considered to be generalised. We did not find that postoperative axillary radiotherapy affected the occurrence of lymphoedema (p=0.217).

Lymphoedema was significantly less common in patients who participated in a physiotherapy programme than in those who did not (p<0.001) (Table 3).

**Discussion**

Breast cancer is the most common cancer in women today. Each year, 35 - 44 new cases are diagnosed per 100 000 women, and the rate is increasing. 13 Lymphoedema continues to be one of the main and most feared complications of breast cancer treatment, occurring in an estimated 25% of patients who undergo treatment, although rates varying from 6% to 70% have been reported. 14 In our study, 19.9% of the patients developed lymphoedema.

**Table 1. Lymphoedema rates after modified radical mastectomy**

<table>
<thead>
<tr>
<th>Lymphoedema status</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No lymphoedema</td>
<td>4 056 (80.1)</td>
</tr>
<tr>
<td>Lymphoedema</td>
<td>1 008 (19.9)</td>
</tr>
<tr>
<td>Total</td>
<td>5 064 (100.0)</td>
</tr>
</tbody>
</table>

**Table 2. Relationship between lymphoedema and employment**

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>No Lymphoedema</th>
<th>Lymphoedema</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed, n (%)</td>
<td>852 (83.3)</td>
<td>171 (16.7)</td>
<td>1 023 (100.0)</td>
</tr>
<tr>
<td>Unemployed, n (%)</td>
<td>3 204 (79.3)</td>
<td>837 (20.7)</td>
<td>4 041 (100.0)</td>
</tr>
<tr>
<td>Total, n (%)</td>
<td>4 056 (80.1)</td>
<td>1 008 (19.9)</td>
<td>5 064 (100.0)</td>
</tr>
</tbody>
</table>

Employment v. lymphoedema p=0.004 (χ² test).
Lymphoedema can be defined as the accumulation of lymph in the interstitial spaces, principally in the subcutaneous fatty tissues. It is caused by a defect in the lymphatic system and is marked by an abnormal increase in tissue proteins, oedema, chronic inflammation and fibrosis. Three stages have been described. Stage I presents with pitting and is considered reversible; some women have had no increased arm girth or heaviness at this stage and no signs of pitting oedema. As the oedema progresses, it becomes brawny, fibrotic, non-pitting and irreversible (stage II). In advanced lymphoedema (stage III), which rarely occurs after treatment of breast cancer, cartilaginous hardening occurs, with papillomatous outgrowths and hyperkeratosis of the skin.

Some of the main problems associated with lymphoedema are pain, inability to recognize the location of tactile sensations, a heavy sensation in the limbs, decreased mobility, psychosocial stress, isolation and repeated tissue infections. The effect on the patient's quality of life should be taken seriously. Lymphoedema causes considerable psychosocial stress, and patients lose confidence when in a social environment because they are concerned about how their affected arm is perceived. Major current problems with regard to lymphoedema are lack of a standard guideline, standard reporting system or realistic estimate of incidence, and even lack of a clear aetiological definition. Some studies classify axillary dissection and radiotherapy as risk factors for lymphoedema. Clark and Sitzia reported that axillary dissection and radiotherapy have no effect on lymphoedema formation; however, they found that 80% of their patients who developed lymphoedema within 3 years had developed it within the first year. Purushotham et al. found no association between adjuvant treatment and lymphoedema in patients who had undergone the same treatment. Moreover, they found that collateral vessels form earlier and more effectively in patients with axillary node positivity, suggesting that lymphoedema is likely to occur in these patients. In our study, only 19.9% of patients who underwent modified radical mastectomy and full axillary dissection developed lymphoedema, and axillary radiotherapy was not found to be a significant risk factor. We believe that these findings help clarify the relationship between adjuvant radiotherapy and lymphoedema.

We wish to emphasize the importance of postoperative physical treatment and rehabilitation in the prevention of lymphoedema. Mak et al. found that just walking and being active are effective in preventing postoperative lymphoedema, while Binkley et al. recently reported that few patients are currently referred for physical therapy after cancer treatment, and of those who are referred, few continue therapy. However, several studies have reported that educating patients about lymphoedema and physical treatment and rehabilitation after surgery are very important. Demonstrating and practising weight-lifting exercises and informing patients about manual drainage with hand techniques are also effective in reducing the risk of developing lymphoedema. Our patients in the physiotherapy group had a significantly lower incidence of lymphoedema than those in the no physiotherapy group; in addition, patients who were employed had a lower incidence of lymphoedema than those who were unemployed, suggesting that walking, an active

<table>
<thead>
<tr>
<th>Physical therapy and rehabilitation</th>
<th>No lymphoedema</th>
<th>Lymphoedema</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, n (%)</td>
<td>1 704 (89.6)</td>
<td>198 (10.4)</td>
<td>1 902 (100.0)</td>
</tr>
<tr>
<td>No, n (%)</td>
<td>2 352 (74.4)</td>
<td>810 (25.6)</td>
<td>3 162 (100.0)</td>
</tr>
<tr>
<td>Total, n (%)</td>
<td>4 056 (80.1)</td>
<td>1 008 (19.9)</td>
<td>5 064 (100.0)</td>
</tr>
</tbody>
</table>

Table 3. Effect of physical therapy and rehabilitation on development of lymphoedema

Physical therapy and rehabilitation v. lymphoedema p<0.001 (χ² test).
lifestyle and regular participation in physical therapy reduce the risk. At Ankara Oncology Research and Training Hospital, one of the largest oncology hospitals in Turkey, we routinely refer every patient who undergoes mastectomy to the physical therapy and rehabilitation department. We consider this to be the most important step for preventing postoperative lymphoedema, and the findings of the current study support this approach.

Finally, if lymphoedema does develop, it is difficult to treat. Treatment options include liposuction and drugs that stimulate proteolysis, such as 5,6-benzo-[α]pyrone. However, it is clear that the best way to reduce the impact of lymphoedema is to prevent it. Our findings support our belief that educating patients about the risk factors for developing lymphoedema, and referring them to postoperative physical therapy and rehabilitation clinics, are the most important ways to avoid this distressing condition.

REFERENCES