

The adverse impact of strenuous exercise on breast cancer–related lymphoedema: a case report

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Key words

Breast cancer–related, exercise, individuality, lymphoedema, mastectomy, physiotherapy

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Abstract

Background: Exercise is an essential part of lymphoedema treatment; however, it's important to consider the level of exercise intensity in lymphoedema patients. **Aim:** To examine the effects of one session of strong exercise, which included extreme weight-bearing to the limb affected by lymphoedema. **Methods:** A 66-year-old female patient with breast cancer–related lymphoedema (BCRL) attended the oncological rehabilitation unit in May 2012. The patient was evaluated and trained about prevention and control methods for lymphoedema. She then entered a routine exercise programme that included range-of-motion, proprioceptive neuromuscular facilitation, posture and breathing exercises. In addition, she attempted to perform non-prescribed exercises that she saw on television; after this, she reported feeling that the exercises were difficult for her arm. After completing the exercises, she recorded by self-measurement that the lymphoedema increased. She then re-attended our unit for advice and was re-evaluated. **Results:** The summated difference of circumference measurements between the upper extremities increased from 9.3cm to 17.7cm. The increases were greater than 2cm at five of 11 locations. **Conclusions:** One session or inappropriate and unadvised exercise intervention can increase arm circumference and volume. Ideally, any exercise programme should be administered and overseen by a professional familiar with lymphoedema, who must consider the principle of the individuality of exercise. Further frequent checks of outcomes should be performed. Only a thorough assessment can guide the selection of the most suitable exercise programme, and educate about the dangers of difficult activities to reduce the risk of exacerbation of lymphoedema.

More than 255,000 new cases of invasive breast cancer and 63,410 new cases of non-invasive (*in situ*) breast cancer are expected to be diagnosed in women in the United States in 2017; the incidence of lymphoedema after mastectomy ranges from 6% to 70% (Breastcancer.org, 2017; Zuther, 2009). Breast cancer-related lymphoedema (BCRL) occurs as a result of damage to the lymphatic system caused by breast cancer treatment, such as tumour resection, axillary lymph node dissection and radiotherapy. The condition may occur suddenly or years after cancer treatment, although the majority of BCRL is diagnosed in the first 3 years (Hayes et al, 2008; Morrell et al, 2005; Ridner, 2013; Shah et al, 2012; DiSipio et al, 2013; Petrek et al, 2001).

Several risk factors for BCRL have been reported in the literature, including arm infection, inflammation, injury, being overweight or weight gain, ageing, surgery on the dominant arm, the level of hand use, a higher number of removed axillary lymph nodes, being married, having undergone a mastectomy, having undergone axillary lymph node dissection, having undergone radiation therapy or chemotherapy, the pathological status of the lymph nodes, and menopause (Mak et al, 2008; Petrek et al, 2001; Soran et al, 2006; Van der Veen et al, 2004; Paskett et al, 2007; Tsai et al, 2009). When the lymphatic system is damaged, fluid accumulates in the affected arm, leading to decrease in function and range of motion (ROM), an increase in swelling and changes in skin. If BCRL becomes chronic, infection and pain may develop (Morrell et

al, 2005; Ridner, 2013).

Patients with BCRL in our unit have identified physical problems such as limitation in joint ROM, diminishing muscle strength, and posture deficits. Exercise has a crucial role in lymphoedema treatment. The benefits of exercises in BCRL patients have been reported in many studies. Cardiovascular function, muscular strength, functional capacity and endurance are improved by exercise (Tretbar, 2008). Exercise also has the potential to facilitate the control of lymphoedema by resetting the sympathetic tone of the lymphatic vessels and activating the lymph flow (Roddie, 1990; Olszewski and Engeset, 1980). Additionally, physical activity affects the production, metabolism and excretion of hormones that may be linked to a lower risk of breast cancer and

its recurrence (Thune et al, 1997; Holmes et al, 2005). When developing an exercise programme for each patient, the benefits of exercise should be considered along with the patient's individual circumstances and priorities.

In a meta-analysis and systematic review, many exercise options for patients with lymphoedema were reported (Singh et al, 2016). Slowly progressing resistance exercises can safely be used without exacerbating lymphoedema (Kwan et al, 2011). However, exercise that is too intense, or that is taken up too quickly, may have adverse effects, as demonstrated in this case report.

Methods

A 66-year-old female patient with breast cancer (left-sided) underwent tumour excision in July 2009. Her treatment continued with a 25-session radiotherapy and supplement treatment. After contracting an upper-respiratory infection, lymphoedema developed in February 2012. She visited the oncological rehabilitation unit for physiotherapy suggestions in May 2012. At that time, she had a weight of 60 kg, height of 150 cm and a body-mass index of 26.6 kg/m². She had a history of renal stones.

Range of motion, muscle strength and circumference measurements were evaluated by a physiotherapist. Range of motion was measured with a universal goniometer (Baseline, FEI, White Plains, NY, USA). There was no limitation in shoulder movements. Muscle strength was evaluated by having the patient hold a 1 kg weight in 90-degree flexion or abduction position for 10 seconds; no strength reduction was observed. Upper-limb circumference measurements were taken at 4 cm intervals from the styloid process of ulna (Mortimer, 1990). Differences between the two extremities were less than 2 cm, with the highest difference being 1.8 cm.

As part of BCRL management, the patient followed a home-exercise programme that contained posture, ROM, proprioceptive neuromuscular facilitation and breathing exercises. The preventative physiotherapy intervention also included education about precautions for any cuts, scratches and burns; information on healthy eating; and advice to avoid sudden, extreme stress-loading. In addition, she was advised to undertake circumference

self-measurements, to monitor any arm-volume changes.

The patient reported that she adhered to a regular schedule for her home-exercise programme. However, the patient also performed non-prescribed exercises that she saw on television. Upon presentation to the oncological rehabilitation unit, she reported that, during one of the exercises, she transferred part of her bodyweight to one arm, in a 'crawling' position. She further reported that, after this, she felt the exercises were difficult for her arm, and there was pain in her shoulder. After completing the exercises, she recorded by self-measurement that the lymphoedema increased by more than 2 cm. Further, she experienced difficulties in the shoulder movement of the arm on the side of the mastectomy.

She then re-visited the oncological rehabilitation unit for a second time with these complaints. She was re-evaluated by the same physiotherapist, who referred the patient to the department of orthopaedics. Magnetic resonance imaging of the left shoulder in December 2014 detected tendinosis, surface irregularity and focal partial ruptures on supraspinatus and subscapularis tendons, subacromial and subcoracoid bursitis, and labral degeneration. No surgery was planned, because the patient did not want the surgery as she was afraid of increasing lymphoedema.

She was re-referred to the oncological rehabilitation unit for physiotherapy follow-up and interventions. In her third visit, resting and positioning were suggested to control the pain and acute oedema. Three days later, the pain reduced. She was advised to perform an exercise programme that included posture and stretching exercises. Careful and sensitive transverse friction massage to supraspinatus, infraspinatus and biceps brachii tendons, along with self-manual lymph drainage were also recommended.

The patient was also re-educated regarding preventative approaches that needed to be considered when undertaking further exercise. She was advised to continue to perform the self-measurements of arm circumference and monitor her shoulder ROM. She was instructed to re-visit the physiotherapist if lymphoedema increased or if she experienced any shoulder problem.

Results

The difference between the total score of circumference measurements of the two upper extremities increased from 9.3 cm to 17.7 cm in supine position. The differences were above 2 cm at 5 of 11 locations. Even after one session of forceful exercise, the limb volume increased (*Table 1*).

Discussion

In this case study, increased arm swelling after only one session of inappropriate exercise may indicate that performing difficult exercise might have triggered a worsening of the BCRL. However, the reason for lymphoedema development in a short time may also be associated with other factors, such as radiotherapy history, age, weight and menopause.

Exercise is a key and important part of lymphoedema management (Buchan et al, 2016). The challenge with exercise recommendations for women with, and at risk for, BCRL is avoiding the potential adverse effects of either over-exercising or lack of exercising (American Cancer Society, 2017). In previous studies, it has been demonstrated that strengthening exercises, aerobic exercises, proprioceptive neuromuscular facilitation exercises and breathing exercises are safe and effective methods for lymphoedema management (Kwan et al, 2011; Hwang et al, 2015). Slowly progressing the level of exercises has been shown to not pose a risk for development or exacerbation of BCRL and can be safely performed with proper supervision (Kwan et al, 2011). However, there is no consensus regarding which type or intensity of exercises is inappropriate for these patients.

In this case, sudden stress-loading exercises and long, tiring exercises without any rest were seen to cause some injuries and increase arm volume. Trained health professionals such as physiotherapists may provide training regarding safe exercising (American Cancer Society, 2017). Before any exercise, activity or return-to-work programme, a trained healthcare professional should assess the patient with BCRL, because each patient will have a different response to exercise and activity (Johansson and Piller, 2007).

Exercise programmes promoted in the public media should bear warning messages for possible adverse effects of the exercises depicted, so that spectators can make

Table 1. Circumference measurements of the upper limbs in centimetres.

Date	18 May 2012			20 November 2014		
Circumference measurement intervals	Right	Left	Difference	Right	Left	Difference
Wrist	15.7	16	0.3	15.5	16.4	0.9
4 cm	17.1	18.8	1.7	16.9	19.4	2.5
8 cm	20.3	21.8	1.5	19.4	22.2	2.8
12 cm	22.6	24.4	1.8	22.5	24.7	2.2
16 cm	22.6	24.2	1.6	22.5	25.1	2.6
20 cm	22.4	23.9	1.5	22.6	24.8	2.2
24 cm	24	25.6	1.6	23.6	25.6	2.0
28 cm	26.7	27.1	0.4	26	27.6	1.6
32 cm	28.3	28.8	0.5	28.5	29.4	0.9
36 cm	30.7	30	-0.7	30.6	30.8	0.2
40 cm	32.8	31.9	-0.9	32.8	32.6	-0.2
Total			9.3			17.7

better-informed decisions about their own practice of the exercise. Exercise is an essential part of lymphoedema treatment; however, the principle of exercise individuality should be considered (Singh et al, 2016). Moreover, this study recommends that changes in patients' health conditions should be monitored frequently, and their exercise programmes adapted accordingly. The selection of exercise should account for difficulty level in combination with the management needs and goals of the patient, in order to prevent further issues with lymphoedema in the arm.

Conclusions

Although there are many factors that contribute to lymphoedema, this case report demonstrated that just one session of inappropriate and un-recommended exercise intervention may affect arm volume and increase the lymphoedema. Exercise remains an essential part of lymphoedema treatment; however, the principle of exercise individuality should be considered as part of a multifactorial assessment carried out by a healthcare professional such as a physiotherapist. Patients should be educated about the exercises they are asked to undertake, and be warned about the serious dangers of undertaking general exercise programmes not prescribed by their physiotherapist.

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