

FACTORS PRECIPITATING AN EPISODE OF LYMPHATIC SWELLING

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Abstract

Background: People with lymphoedema may be advised to avoid or take caution with certain activities, such as airline flights and wearing tight clothing in order to reduce the risk of an episode of lymphatic swelling. However, the association between these activities and the occurrence of lymphoedema has infrequently been evaluated.

Aims: To document the patient-reported triggers of a new episode of lymphatic swelling in patients seen in a lymphoedema service. **Methods:** A chart review of 289 patients with an initial or recurring episode of lymphatic swelling. **Results:** Many patients (36%) could not recall a trigger to the episode of swelling. The most frequently recalled triggers were infection (25%), excessive activity (7%) and surgery to the at-risk limb (7%). **Conclusions:** Based upon frequency of self-report, the triggers that seem to be a priority for future research assessing the magnitude of increase in risk associated with exposure are: infection, excessive activity and surgery to the at-risk limb. The limitations of the study include a reliance upon self-report and the retrospective design. **Declaration of interest:** None.

Key words

Lymphoedema
Risk factors
Patient education

Lymphoedema is caused by a defect in the lymphatic system resulting in an accumulation of lymph in the interstitial spaces (Brennan, 1992). The accumulated lymph leads to limb swelling which is widely recognised as causing both cosmetic and functional concerns for patients. For example, patients with gross upper limb swelling may have difficulty obtaining clothes that fit and have reduced upper limb function. Recent research has revealed less apparent consequences of

lymphoedema. A comparison of breast cancer survivors with lymphoedema and survivors without lymphoedema (Ridner, 2005) revealed that those with lymphoedema had poorer quality of life, altered limb sensation, fatigue and psychological distress. Accordingly, there is now a greater appreciation of the importance of primary and secondary prevention of lymphoedema.

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After surgery, or procedures that remove or interrupt the lymph nodes, patients are often concerned about the chances of developing secondary lymphoedema. Patients are often advised to avoid, or be cautious with,

activities that are believed to trigger an initial or recurrent episode of lymphatic swelling (Casley-Smith and Casley-Smith, 1997; Browning et al, 1998). Hypothesised triggers include wearing tight clothing, airline flights, application of blood pressure cuffs to the at-risk limb and vigorous exercise. Although it is relatively easy to avoid triggers such as applying a blood pressure cuff to the at-risk limb, the avoidance of other triggers, such as lifting a heavy object, hot weather and air travel, is only possible if the person significantly restricts their lifestyle. It is, therefore, important to determine the true triggers for lymphoedema, so that patients can receive correct advice before making restricting lifestyle choices.

In 1998 the National Health and Medical Research Council (NHMRC) National Breast Cancer Center reviewed the evidence on risk factors for lymphoedema (Browning et al, 1998). The review found that although a large number of risk factors for lymphoedema have been proposed (Table 1), there was very

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little evidence to support these risk factors. The NHMRC report concluded that there was an urgent need for further research on risk factors for lymphoedema.

For people to make informed choices about the risks and benefits of altering their lifestyle to avoid triggers, research-based information on the association between triggers and the occurrence of lymphoedema is required. Risk is examined using observational studies such as case control studies, cohort studies and case cross-over studies (Fletcher et al, 1996). To generate a list of possible risk factors to be evaluated in such research studies a clinical review of risk factors reported by patients was undertaken. The review considered records of patients seen at a Sydney lymphoedema service to determine the trigger factors reported by patients seen for initial and recurrent limb swelling. The project began in 2000 and involved the review of files of 289 patients through a pilot review and two follow-up projects.

Aim

To review the triggers reported by patients with a new episode of lymphatic swelling (both recurrent episodes and initial episodes) who have been referred to a lymphoedema service.

Methods

Subjects/study sample

Subjects were recruited from the Lymphoedema Service at Concord Repatriation General Hospital (Central Sydney Area Health Service at time of data collection, now Sydney South West Area Health Service). The pilot study was conducted in 2000, retrospectively reviewing the files of 124 subjects seen in the previous two years; these subjects included newly presenting lymphoedema patients and patients seen at the clinic for a previous episode. Study 1 was conducted in 2001 and reviewed 58 files of patients seen in the period 2000–2001. Study 2 was conducted in 2005 and reviewed 107 files of patients seen between 2002–2005. Patients were non-palliative and presenting to

Table 1

Risk factors for lymphoedema listed in the 1998 NHMRC document (Browning et al, 1998)

Do not allow anybody to take blood, check your blood pressure, put a drip or give an injection or vaccination in the affected arm

Do not carry anything heavy with the affected arm

Do not garden without gloves or long sleeves

Do not wash the dishes without gloves

Do not let your arm become sunburnt

Avoid cuts, burns and insect bites

Wear loose clothing and loose jewellery

Use skin cream to keep the skin of your arm moist

Keep cool during hot weather

If you cut your arm or develop an infection in the arm on the same side as your cancer, see your doctor immediately to get antibiotics

Avoid long aircraft flights

Avoid sports that cause pain

Avoid holding a cigarette in the affected arm

Avoid heavy massage to the affected limb

Keep weight under control

Do not pick cuticles

clinic with a new episode of swelling. Patients seen for compression garment review, or preventative education were not included.

In the pilot study, data were extracted from information provided in the clinical records. For studies 1 and 2 a specifically designed data collection form was designed for completion by therapists and used in both studies. The information collected included patient gender, age and type of lymphoedema (primary or secondary), whether the patient was aware of limb precautions, whether the patient could recall any specific trigger factors to their swelling and some medical background information.

Results

The pilot study comprised the records of 124 subjects (85% female), study 1 the records of 58 subjects (86% female), and study 2 the records of 107 subjects (80% female). In the pilot study, 114 of the 124 subjects (92%) had secondary lymphoedema, in the

first study 46 of the 58 subjects (79%), and in the second study 90 of the 107 subjects (84%) had secondary lymphoedema. The causes of the secondary lymphoedema are shown in *Table 2*.

Triggers to limb swelling

The triggers to lymphoedema reported by patients are shown in *Table 3*. In the pilot study, where the standardised data collection form was not used, a trigger was able to be identified in only 23% of patient records. In studies 1 and 2, where the standardised data collection form was used, a trigger was able to be identified in 64% of records. The most frequent triggers identified were infection (25%), excessive activity (7%) and surgery to the at-risk limb (7%).

Comorbidities

In study 1, 25% of patients reported a history of hypertension, 25% a history of venous problems and 25% had cardiac problems. In study 2, 33% reported hypertension, 21% vascular

Table 2

Causes of secondary lymphoedema

Cause	Pilot		Study 1		Study 2	
	N	(%)	N	(%)	N	(%)
Mastectomy for breast cancer	88	77	32	70	61	68
Other forms of cancer	23	20	10	22	22	25
Lumpectomy			1	2	0	0
Motor vehicle accident			0	0	2	3
Filariasis	3	3	2	4	1	2
Traumatic hand injury			0	0	1	2
Spider bite			1	2	0	0
Total	114	100	46	100	90	100

problems, 12% cardiac problems and 24% had more than one of these comorbidities.

Awareness of precautions

In both study 1 and 2 the therapists asked participants if they were aware of lymphoedema precaution guidelines, and recorded this information on the data collection form. Of the 165 participants, 57% reported that they were aware of the precautions.

Discussion

The files reviewed are typical of those patients seen in the lymphoedema clinic of a major university teaching hospital. The majority of patients were female and developed lymphoedema following breast cancer surgery. Most had comorbid medical conditions such as hypertension, vascular disease and/or cardiac disease and the most common trigger was infection. The most interesting finding of the study was the low prevalence of many hypothesised triggers to lymphoedema.

The study results concur with the results of the few studies that have been done in this area. These studies have reported that infection to a limb (Segerstrom et al, 1992), a background of hypertension (Kissin et al, 1986), or a limb with a venous flow abnormality (Rockson, 1998) place the patient at risk of lymphoedema. These factors

seem associated with the onset of lymphoedema based upon the data in this study, and there is also a physiological basis for how they would initiate an episode of lymphoedema. Therefore, it makes good sense to continue to inform patients about these factors.

The most interesting finding of the study was the low prevalence of many hypothesised triggers to lymphoedema.

This study found that some of the precautions/risk factors advocated by Casley-Smith and Casley-Smith (1997) and collated in the NHMRC report (Browning et al, 1998) are infrequently self-reported to be associated with the development of lymphoedema. Examples include airline flights (2%), blood pressure cuffs (1%), tight clothing (1%), and lifting heavy weights or objects (1%). The low frequency of self-reported risk factors may be explained in a number of ways. It is possible that these triggers do not increase the risk of a new episode of lymphoedema and that is why they were infrequently or never reported. Another possibility is that the triggers do increase the risk of lymphoedema but healthcare professionals have been

successful in educating patients to avoid the triggers. Patients may also not make a connection between the incident and the occurrence of lymphoedema, or may forget the incident so it is not subsequently recalled. The only way to resolve this uncertainty is to conduct a prospective risk study, with close and regular monitoring of participants, in order to evaluate these risk factors (Clark et al, 2005).

One reported risk/precaution is excessive activity (Casley-Smith and Casley-Smith, 1994), however, there is some evidence that global statements about avoiding physical activity may be counterproductive in some cases. There is evidence that exercise has health benefits for women being treated for early stage breast cancer (Mutrie et al, 2007), and that exercise is useful in helping women maintain a healthy weight and body composition among breast cancer survivors (Ingram et al, 2006). More importantly, it has been demonstrated that when patients at risk of lymphoedema participate in a supervised upper limb weight training programme, they are not more likely to develop lymphoedema or have an exacerbation (Ahmed et al, 2006).

Considering this evidence, it would seem more reasonable to encourage women who have undergone breast cancer surgery to exercise appropriately rather than to avoid exercise. Additionally, exercise may assist with weight control, which is important given that Clark et al (2005) found that being overweight was a risk factor for developing lymphoedema following breast cancer surgery. As some of the subjects in this review were found to have cardiovascular histories, a medical review before commencing any exercise may be needed.

The National Lymphedema Network (NLN) in the USA has changed the way they present information on risk factors. Where previously they advocated the need to educate patients about 18 specific risk factors, the current education has been reorganised, with the risk

Table 3

Triggers to lymphoedema reported by patients*

Trigger for new episode	Pilot		Study 1		Study 2		Study 1 and 2 combined	
	N	(%)	N	(%)	N	(%)	N	(%)
Unknown	95	77	22	38	37	35	59	36
Infection (cellulitis)	16	13	13	22	28	26	41	25
Excessive activity	1	1	8	14	4	4	12	7
Surgery to at-risk limb	3	2	1	2	10	9	11	7
Hot weather	0	0	0	0	6	6	6	4
Bite/scratch	1	1	2	3	3	3	5	3
Trauma to at-risk limb	2	2	1	2	4	4	5	3
Falls affecting at-risk limb	0	0	0	0	4	4	4	2
After radiation therapy		0	0	0	4	4	4	2
Immediately post surgery	5	4	4	7	0	0	4	2
Airline flight	1	1	0	0	2	2	2	1
Cannula in at-risk limb	0	0	0	0	1	1	1	1
Shaved armpit	0	0	0	0	1	1	1	1
Waxed armpit	0	0	0	0	1	1	1	1
Weight gain	0	0	0	0	2	2	2	1
Cessation of pressure	0	0	2	3	0	0	2	1
Blood pressure cuff	0	0	1	2	0	0	1	1
Wearing tight clothing	0	0	1	2	0	0	1	1
Lifting heavy weights	0	0	1	2	0	0	1	1
Incorrect fit of pressure garment	0	0	1	2	0	0	1	1
Needle prick to finger for BSL	0	0	1	2	0	0	1	1
Travel (other than flight)	0	0	0	0	0	0	0	0
Total	124	100	58	100	107	100	165	100

* No patient explicitly reported that gardening or dishwashing without gloves, sunburn, tight clothing or jewellery, sports participation, holding a cigarette, heavy massage or cuticle picking triggered their lymphoedema

factors summarised within six key risk messages: (1) skin care; (2) healthy activity/lifestyle; (3) avoid limb constriction; (4) correct use of compression garments; (5) avoidance of extremes of temperature and (6) advice for lower limb lymphoedema (National Lymphedema Network, 2005). The International Consensus Guidelines provide similar advice for patients (Moffatt, 2006).

Airline flights are commonly discussed by healthcare professionals and patients. It has previously been reported as a trigger in 5% of episodes of lymphatic swelling (Casley-Smith and Casley-Smith, 1996). Some have suggested it may be due to poorly fitting garments, rather than the flight itself (Graham, 2002). In the current study the prevalence was low; only 1% of people with lymphoedema reported that an airline flight triggered the episode. This may be because education has been effective, as many patients fearing the chance of developing lymphoedema request to be fitted with an appropriate compression garment. It could also be argued that these patients may experience a combination of events, such as arriving at a hot or tropical destination, carrying a heavy suitcase, or lifting luggage into overhead lockers. These issues are considered at some length in the Air Travel position statement of the NLN (National Lymphedema Network, 2004). Resolution of the uncertainty related to air travel requires more formal study.

The main limitation of the current study is that it did not prospectively measure risk factors related to the original surgical and medical management, for example, type and extent of breast surgery and/or amount of radiotherapy. The study also only considered at-risk patients who developed swelling and reported exposure to a trigger; a similar group of at-risk patients who did not develop swelling has not been followed to establish whether they were also exposed to the same triggers. If there had been funding available to

allow prospective monitoring of both groups, it would have been possible to estimate the size of risk associated with each trigger. For example, Clark et al (2005) followed 188 women following breast cancer surgery for a period of three years and, of these, 39 developed lymphoedema. Hospital skin puncture (e.g. finger-prick glucose testing) on the ipsilateral upper limb was reported by 18 of the 188 women. The incidence of lymphoedema in those who did not have a hospital skin puncture was 18% (31 of 170 women), whereas in those who had received a hospital skin puncture the incidence was 44% (8 of 18 women). In other words, a hospital skin puncture doubled the risk of lymphoedema in women who had received surgical treatment for breast cancer. However, the value of the current study is that it identifies the triggers that should be investigated in greater detail with a study design similar to that of Clark et al (2005), as well as providing information to help design the future study.

Another limitation of the study is that about one-third of patients had difficulty recalling precipitating factors. Commonly, many patients have a gradual onset of lymphoedema (initial or recurrent episode), and it is not until they have functional problems that they present to a clinic. This may explain why they have difficulty recalling triggers. To avoid this limitation it would be necessary to regularly monitor at-risk subjects for lymphoedema using a sensitive tool, such as bioimpedance. There are also those patients who have been successfully taught home or self-management techniques to deal with episodes of swelling, such as bandaging, massage and exercises. These re-occurrences of swelling often resolve and patients do not present to clinic, with their cases going unrecorded. Thus, patients who are affected by certain triggers are being missed, as are those who have an episode of swelling but successfully self-manage it.

Conclusion

This review identified a number of patient-reported triggers to a new

episode of lymphatic swelling in lymphoedema patients. The study provides important information to plan a future risk study to more formally evaluate the change in risk associated with exposure to these factors. JL

References

- Ahmed RL, Thomas W, Yee D, Schmitz KH (2006) Randomized controlled trial of weight training and lymphedema in breast cancer survivors. *J Clin Oncol* 24(18): 2765–72
- Brennan MJ (1992) Lymphedema following the surgical treatment of breast cancer: a review of pathophysiology and treatment. *J Pain Symptom Manage* 7(2): 110–6
- Browning CJ, Redman S, National Breast Cancer Centre (Australia) (1998) *Lymphoedema: prevalence and risk factors: a review of research*. NHMRC National Breast Council Centre, Kings Cross, New South Wales, Australia
- Casley-Smith JR, Casley-Smith JR (1994) *Modern treatment for lymphoedema*. Lymphoedema Association of Australia, Adelaide
- Casley-Smith JR, Casley-Smith JR (1996) Lymphedema initiated by aircraft flights. *Aviat Space Environ Med* 67(1): 52–6
- Casley-Smith JR, Casley-Smith JR (1997) *Modern treatment for lymphoedema*. 5th revised edn. Lymphoedema Association of Australia, Malvern, South Australia
- Clark B, Sitzia J, Harlow W (2005) Incidence and risk of arm oedema following treatment for breast cancer: a three-year follow-up study. *QJ Med* 98(5): 343–8
- Fletcher R, Fletcher S, Wagner E (1996) *Clinical Epidemiology. The Essentials*. 3rd edn. Williams and Wilkins, Baltimore
- Graham PH (2002) Compression prophylaxis may increase the potential for flight-associated lymphoedema after breast cancer treatment. *Breast* 11(1): 66–71
- Ingram C, Courneya KS, Kingston D (2006) The effects of exercise on body weight and composition in breast cancer survivors: an integrative systematic review. *Oncol Nurs Forum* 33(5): 937–47
- Kissin MW, Querci della Rovere G, Easton D, Westbury G (1986) Risk of lymphoedema following the treatment of breast cancer. *Br J Surg* 73(7): 580–4
- Moffatt C (Ed) (2006) *Lymphoedema Framework. Best practice for the management of lymphoedema*. International consensus. Medical Education Partnership Ltd, London

Key points

- ▶▶ There has been little formal investigation of triggers to a new episode of lymphatic swelling.
- ▶▶ This audit found that many patients could not recall a trigger to an episode of swelling.
- ▶▶ Some of the commonly cited triggers were not reported by patients.
- ▶▶ The most commonly reported triggers were infection, excessive activity and surgery to the at-risk limb.
- ▶▶ Large prospective studies of women at risk of lymphoedema need to be conducted in order to provide better information on triggers to new episodes of lymphatic swelling.

Mutrie N, Campbell AM, Whyte F, McConnachie A, Emslie C, Lee L, Kearney N, Walker A, Ritchie D (2007) Benefits of supervised group exercise programme for women being treated for early stage breast cancer: pragmatic randomised controlled trial. *BMJ* 334(7592): 517

National Lymphedema Network (2004) *Position statement of the National Lymphedema Network. Topic: Air Travel*. Available online at: www.lymphnet.org/pdfDocs/nlnairtravel.pdf (accessed 26/12/2007)

National Lymphedema Network (2005) *Position statement of the National Lymphedema Network. Topic: Lymphedema risk reduction practices*. Available online at: www.lymphnet.org/pdfDocs/nlnriskreduction.pdf (accessed 26/12/2007)

Ridner SH (2005) Quality of life and a symptom cluster associated with breast cancer treatment-related lymphedema. *Support Care Cancer* 13(11): 904–11

Rockson SG (1998) Precipitating factors in lymphedema: myths and realities. *Cancer* 83 (12 Suppl American): 2814–16

Segerström K, Bjerle P, Graffman S, Nyström A (1992) Factors that influence the incidence of brachial oedema after treatment of breast cancer. *Scand J Plast Reconstr Surg Hand Surg* 26(2): 223–7