

Risk factors for the development of oedema and lymphoedema

Mary Woods

The development of oedema can be distressing for patients and affect their quality of life. The most frequent presentation of chronic oedema is in the lower limbs, which results in problems with mobility, clothing and footwear. If oedema of any kind remains untreated, stasis of fluid in the tissues of the body will place the patient at risk of complex skin conditions and cellulitis (Cox, 2006).

The causes of oedema can be cancer or non-cancer-related: these are illustrated in *Table 1*.

Defining risk factors

The appearance of oedema is a symptom of an underlying medical condition. The cause is therefore associated with the patient's medical diagnosis or, in the case of cancer-related lymphoedema, treatment that has already been completed to lymph node areas. The risk of oedema developing is usually a matter of chance and is not a certainty, but there are identifiable factors that can help reduce the risk of it developing. It may be possible to modify these factors, leading to a better outcome for the patient.

Risk factors for cancer-related lymphoedema

Patients with a cancer diagnosis who have undergone treatment to lymph node areas carry a lifelong risk of developing lymphoedema. The underlying cause is disruption to the lymph system due to the surgical removal of lymph nodes or to radiotherapy to lymph node areas. Some risk factors that may lead to an increase or decrease in the risk of a patient developing lymphoedema have been identified and these continue to be the subject of research studies.

Treatment-related risk factors

Surgery

Any surgical intervention in lymph node areas can cause lymphoedema, but the degree of disruption to these areas is considered relevant to the risk of developing it. The incidence of lymphoedema following treatment for breast cancer has been widely studied. DiSipio et al (2013), for example, found that women who underwent an axillary lymph node biopsy were four times more likely to develop lymphoedema than those who had a sentinel lymph node biopsy. This finding was supported by a study by Sackey et al (2014), in which women who had undergone sentinel lymph node biopsies reported significantly fewer symptoms of lymphoedema than those who had undergone an axillary lymph node biopsy.

ABSTRACT

An important symptom of ill health in clinical medicine is the development of oedema, which represents an imbalance in the amount of fluid entering and leaving the tissues of the body. Although medical treatment for the underlying cause of oedema is required, in both cancer and non-cancer settings risk factors that may increase or decrease the potential for oedema to develop or worsen can be identified. For the patient who has risk factors for the development of oedema, advice and education can enable the risk to be modified. Reducing the risk of oedema formation will help avoid long-term problematic oedema and complex skin conditions, as well as maintaining the patient's quality of life. This article discusses some of the risk factors for oedema and lymphoedema and concludes with an outline of how the risk can be managed.

Key words: Oedema ■ Lymphoedema ■ Risk factors ■ Cancer-related lymphoedema risk factors ■ Non-cancer-related oedema risk factors

Postoperative events

After surgery, there is the potential for an increased demand on a compromised lymph system, which can lead to the appearance of acute oedema and occasionally a pocket of serous fluid close to the wound site.

A retrospective cohort study by Toyserkani et al (2017) found that the development of a postoperative seroma increased the risk of patients having lymphoedema following breast cancer treatment.

Another side effect, axillary web syndrome (cording), typically occurs several days after surgery and is described as a rope-like structure extending along the arm (Tilley et al, 2009). A study by Wariss et al (2017), showed that axillary web syndrome was not a risk factor after 10 years of follow-up.

Radiotherapy

During radiotherapy treatment, patients may experience some acute swelling in the area being treated, which may also be associated with some skin excoriation. This can decrease the transport capacity of the initial lymphatics but should slowly improve once the treatment has been completed.

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Table 1. Causes of oedema

Cancer-related lymphoedema	Non-cancer related oedema
<ul style="list-style-type: none">■ Surgery to lymph node areas■ Radiotherapy to lymph node areas■ Tumour obstruction of lymph node areas	<ul style="list-style-type: none">■ Obesity■ Reduced mobility■ Venous disease■ Cardiac disease■ Renal failure■ Medication side effects■ Hypoproteinaemia■ Trauma

Adapted from Bianchi et al, 2012

The longer term effects of radiotherapy include scarring in the lymph node region and shrinkage of nodal tissue. Warren et al (2014) demonstrated that radiotherapy to regional lymph nodes led to an increased risk of developing lymphoedema and Gillespie et al (2018) suggested that all patients undergoing regional lymph node irradiation should be considered at high risk of developing lymphoedema.

Disease-related risk factors

Patients who have had a cancer diagnosis carry a risk of tumour invasion of lymph node areas, which can lead to the development of lymphoedema due to the reduced movement of lymph. In some cases, lymphoedema may be the presenting feature of the cancer.

Other disease-related factors that have been considered include:

- The site of the primary tumour and the incidence of lymphoedema (Shaitelman et al, 2015)
- The number of pathologically positive lymph nodes at the time of surgery and the incidence of lymphoedema (Purushotham et al, 2007).

However, there is no firm evidence to date that appears to support the influence of these factors in the development of lymphoedema.

Patient-related risk factors for cancer and non-cancer-related oedema

Patients with and without cancer can experience a range of medical conditions that can cause an increase in extracellular fluid and lead to oedema. While the cause of these conditions requires medical intervention, there are identifiable patient-related risk factors that may be modifiable in order to reduce the degree of oedema that subsequently develops.

Obesity

An increased body mass index is widely acknowledged as a risk factor involved in the development of oedema. Piller (2016) argued that, as the obesity epidemic grows, the burden on our patients' health and wellbeing will worsen. Obesity has an impact on the venous system, the lymphatic system and the tissues of the body, which undergo changes due to the stasis of tissue fluid. An individual's increasing obesity will also lead to reduced muscle action due to movement restriction, further compounding the problem.

Patients with known risk factors for developing oedema and lymphoedema should receive sensitive, timely advice about

their weight management goals, with the aim of keeping their weight within normal limits.

Reduced mobility

The relationship between oedema in the lower limbs and physical function was explored by O'Malley et al (2015). The study found that patients with oedema in their lower limbs had worse physical function than those without and that this was independent of body mass index.

Muscular action is essential for the transport of interstitial fluid and for maintaining an equilibrium between tissue fluid formation and reabsorption. Patients with oedema describe their legs as being heavy, making mobility challenging. In addition, patients can find it difficult to find comfortable, well-fitting footwear to wear when they are mobile. Patients with, or at risk of, developing oedema should be encouraged to remain as active as possible to reduce the risk of any oedema worsening and becoming problematic.

Venous disease

In venous insufficiency, the flow of blood through the veins is impaired, and blood leaks back through the valves to pool in the veins. Raised pressure in the veins can further weaken the valves, and the increased interstitial fluid volume leads to the development of oedema in the limbs.

Risk factors for venous disease have been the subject of studies by Carpentier et al (2004), Criqui et al (2007), Lohr et al (2013) and others. Although it is considered that a range of risk factors is involved, those shown to be most influential in the development of venous disease are listed in *Box 1*.

Inactivity slows the movement of blood through the veins and a sedentary lifestyle can contribute to chronic health problems, in addition to the development and progression of venous disease. Patients at risk of venous disease should receive advice about remaining active in order to keep the blood flowing in their legs. Even if they find mobility challenging, simple leg exercises completed while sitting can activate the calf muscle and encourage venous return.

Managing the risk of oedema

The identification of individual risk factors for the development of oedema should be the first step in managing the risk. Patients should understand why they are at risk, how to minimise it and what to do if they notice the development of any oedema.

Three approaches to the management of risk can be incorporated in daily life:

Box 1. Risk factors for venous disease

- Age over 50 years
- Female
- Increased body mass index
- Family history
- Reduced mobility
- Prolonged standing or sitting due to lifestyle and occupation
- Pregnancy
- Smoking

Adapted from Criqui, 2007

KEY POINTS

- Oedema is a sign of ill health in clinical medicine
- The two main risk factors for developing non-cancer-related oedema are obesity and a lack of mobility
- Where the lymph system has undergone damage or disruption due to cancer-related treatment, there will be a risk of the patient developing lymphoedema
- Some factors for lymphoedema and oedema can be modified to reduce the risk of patients developing the condition and its consequent problems

- Skin hygiene and moisturising: this will promote skin integrity and minimise the risk of infection. The skin should be cleansed, carefully dried, and moisturised with an emollient each day. Any trauma to the skin should be treated antiseptically to reduce the risk of infection
- Exercise: this will promote venous return and lymphatic drainage. A sedentary lifestyle should be avoided, and patients should be encouraged to incorporate some physical activity in their daily routine
- Compression: this will promote venous return and lymphatic drainage. Compression garments are medical devices and should always be selected carefully for individual patients by a trained health professional, who can select the correct compression class, size and style of garment. During the 'at risk' stage of oedema formation a low level of compression may be appropriate for some patients to promote venous return and lymphatic drainage.

Conclusion

The development of oedema can have an impact on many areas of a patient's life. While its appearance can be unexpected, there are also times when it can be anticipated as a potential problem; for example, it may be related to a medical condition.

By identifying the risk factors for a patient developing oedema and providing early education and advice to the patient, the health professional can facilitate self-care to avoid associated skin complications, help reduce the risk of infection and the potential impact that oedema can have on the patient's quality of life. **BJN**

CPD reflective questions

- What are two main risk factors for developing oedema?
- What advice would you give a patient who has a risk of venous disease to minimise the risk of developing oedema?
- What risk factors can you identify for a person who has undergone cancer treatment to lymph node areas?

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