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Lymphoedema

Lymphoedema is a chronic debilitating condition that may lead to significant physical and psychological morbidity. Swelling results in discomfort, reduced mobility and a risk of recurrent infections. Early intervention will minimise these complications. The incidence of lymphoedema will rise with our ageing population and there is a need for a greater understanding of the condition and its management within the medical community.

The Lymphatic system

The lymphatic system forms part of the circulatory and immune systems. It is comprised of a network of lymphatic vessels (that possess an innate pumping mechanism) and lymph nodes. The system's primary function is to maintain fluid balance and drain materials from tissues that cannot directly return to the bloodstream e.g. capillary filtrate/ interstitial fluid, proteins and malignant cells. Contrary to popular belief, the lymphatic system is responsible for draining all capillary filtrate and interstitial fluid, and the venous system does not contribute to this process.[1]

The lymphatic system also plays a key role in maintaining the body's immune function by transporting antigens and leucocytes from tissues to the draining lymph nodes. This transport system allows for infections to be recognised and an immune response to be generated. Local infections (e.g. cellulitis, human papilloma virus [HPV], or interdigital tinea) are a frequent concern for patients with lymphoedema. Lymphoedema conveys a relative risk of 70 times more than the normal population for development of cellulitis, due to the impaired immune surveillance within the swollen region.[2]

Lymphoedema

Lymphoedema is the swelling of any part of the body due to an accumulation of lymphatic fluid within tissues caused by inadequate lymph drainage. Limited data exist on the prevalence of lymphoedema but chronic lymphoedema (of primary and secondary causes) is estimated to affect 4 per 1000 population in the UK. Lymphoedema occurs when the blood vessel filtration rate exceeds the capacity of the lymphatic drainage system.
This can occur as a result of 2 scenarios:

1. the microvascular filtration rate has increased *(e.g. heart failure, varicose veins)*
2. the rate of lymphatic flow has decreased *(e.g. primary lymphoedema, or damage as a result of cancer treatment)*, or a combination of the two.

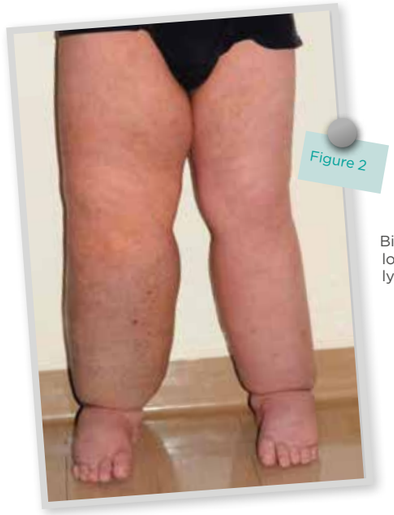
The clinical signs of lymphoedema range from mild swelling to grotesque enlargement in chronic cases that have not received adequate treatment. Protein-rich materials and debris accumulate in addition to water. This results in “solid” and “fluid” components to the swelling, giving rise to the “brawny” nature of chronic oedema that resists pitting.[3]

Skin changes may be present, including brawny fibrotic skin and the presence of the Kaposi-Stemmer sign (the failure to pinch/pick up a fold of skin at the base of the second toe as a result of its thickness) that is pathognomonic of lymphoedema. Papillomatosis (small flesh-coloured papules) occurs as a result of dilatation within the dermal lymphatics and a subsequent reactive fibrosis of the dermis. Lymphangiectasia appear as small blisters on the skin surface as a result of engorgement of lymphatic vessels (Figures 1 & 2). Lymph fluid frequently leaks as a result of minimal trauma and is termed lymphorrhoea.

Chronic lymphoedema of the foot: positive Stemmer’s sign, papillomatosis and lymphangiectasia.

Primary Lymphoedema

Primary lymphoedema occurs as a result of a genetically determined abnormality of the lymphatic system. The lymphatic system fails to develop normally, or to be maintained adequately, causing impaired drainage of lymph resulting in swelling of the affected region. Primary lymphoedema may occur as an isolated condition, or less commonly as part of a complex syndromic disorder.[4]



Bilateral lower limb lymphoedema.

A number of gene tests are available for patients with primary lymphoedema and a molecular diagnosis allows the clinician to confidently predict the clinical prognosis (for example, one rare form of primary lymphoedema (Emberger syndrome) is associated with leukaemia, and other types with congenital cardiac defects) and offer screening for family members.

Secondary Lymphoedema

Secondary lymphoedema results from lymphatic damage due to extrinsic factors such as surgical lymphadenectomy, radiotherapy or chronic venous disease. Recurrent lower limb cellulitis can also lead to lymphoedema.

> “Most patients will develop a secondary lymphoedema in time.

> “Lipoedema is a condition that is frequently misdiagnosed as lymphoedema.

Interestingly, a significant number of the latter group will have an intrinsic lymphatic abnormality predisposing them to cellulitis indicating that this can be both a cause of lymphoedema and occur secondary to a primary lymphoedema.[5] Table 1 lists a number of conditions that are known to cause lymphoedema. Secondary lymphoedema may improve, but rarely resolve, if the underlying cause is treated and the burden upon the lymphatic system is relieved e.g. varicose vein surgery may improve lymphovenous oedema; management of acne or rosacea may improve facial lymphoedema etc.

Table 1: Possible causes of secondary lymphoedema

Classification	Examples
Infection	Cellulitis Filariasis (commonest cause of lymphoedema, affecting 40 million people)
Inflammation	Acne / Rosacea (causing facial lymphoedema) Psoriasis Rheumatoid arthritis Sarcoidosis
Trauma	Lymphadenectomy Radiotherapy Burns Scarring
Venous Disease	Chronic venous insufficiency Vein harvesting Post-thrombotic syndrome
Malignancy	Infiltrative cancer Relapsed cancer Lymphoma
Other	Right heart failure Hypoalbuminaemia Immobility / Dependency oedema Obesity Lipoedema

Lipoedema: symmetrical abnormal adipose deposition of the lower limbs with sparing of the feet (braceleting) unlike in lymphoedema where the feet are affected.

It should be noted that calcium channel blockers (especially amlodipine and diltiazem) exacerbate lower limb lymphoedema (of any cause), as they paralyse the lymphatic vessels from pumping. This class of drug should be avoided in patients with lymphoedema.

Lipoedema is a condition that is frequently misdiagnosed as lymphoedema. Lipoedema is a disorder of adipose tissue that occurs almost exclusively in women (Figure 3). It is thought to be an inherited condition that is unmasked during times of hormonal change e.g. puberty or pregnancy. Contrary to what the name suggests oedema is not a key feature and the “swelling” is caused by abnormal adipose tissue. Patients complain of progressive fatty swelling of the lower limbs, with associated easy bruising, skin tenderness and pain of the lower limbs. The feet are spared and create a “bracelet” effect at the ankles. Most patients will develop a secondary lymphoedema in time, which presents with pitting oedema of the feet that will extend up the lower limbs. Traditional lymphoedema treatment will be of limited benefit to patients until they develop a secondary lymphatic impairment.

Management

Lymphoedema represents end-stage lymphatic failure. Unfortunately, a number of misguided clinicians will inform patients with lymphoedema that they “need to learn to live with it” and that treatment is unavailable. Although lymphoedema remains incurable, treatment is possible and can significantly improve symptoms and quality of life. The principle of treatment is to improve, through stimulating interventions, lymph flow within existing or collateral drainage routes. Significant volume reduction can be achieved with the combination of manual lymph drainage massage (MLD), daily application of multi-layered short-stretch bandages, exercise and skin care (Figure 4).

Multilayer bandaging of the lower limb.

The long-term results will be maintained with the daily use of low stretch elastic compression hosiery garments (Figure 5). The severity of lymphoedema will determine the grade/class of compression required from the garment. To encourage compliance, the elastic compression garments must fit correctly.

Specialist lymphoedema centres offer regular appointments for limb measuring and supply appropriately sized hosiery. Patients with a limb of significantly abnormal shape or size will benefit from these expert centres. Full length or below-knee hosiery can be supplied, depending on the patient’s needs. Additional treatment options include the use of Velcro-style garments, kinesio-tape and intermittent pneumatic compression machines.

> “Liposuction has been shown to significantly reduce limb volumes.

Lymphoedema treatment reduces the size of the lymphoedematous region/limb with subsequent improved functionality, reduced risk of infection, and significantly improved quality of life.[6] Complications of chronic lymphoedema include recurrent cellulitis. Each episode of infection causes further lymphatic vessel damage and worsening lymphoedema. Therefore, patients with regular episodes of infection (e.g. 2 or more per year) benefit from prophylactic antibiotics. Prophylactic penicillin V 500mg OD (BD if >75kg) has been used with success. Additional antibiotic guidelines are available at ***www.thebls.org***

Surgical treatments should be considered when decongestive physical treatments fail. Excisional debulking procedures are best avoided as they cause worsening lymphoedema due to iatrogenic removal of collateral lymphatic pathways. Lymph node transfer surgery is potentially useful, but lymphaticovenular anastomosis (LVA) surgery is showing more promise in cancer-related cases of lymphoedema. However, even successful surgery is unlikely to eliminate the need for long-term use of compression garments.

Liposuction has been shown to significantly reduce limb volumes in a subgroup of patients whose lymphoedema has turned “fatty” and therefore will not respond to MLD and bandaging efforts. Patients need to be carefully selected and the procedure should be undertaken by experienced surgeons in order to reduce postoperative complications e.g. worsening lymphoedema.

Bilateral below knee compression garments.

Summary

- Lymphoedema results from a primary or secondary failure of the lymphatic system
- Genetic defects have been identified in several forms of primary lymphoedema
- Major complications of lymphoedema include swelling and recurrent infection
- Lymphoedema is a debilitating condition characterised by swelling, usually of one or more limbs, but may also affect the trunk, genitalia or face
- Although lymphoedema remains incurable, treatment is possible and can significantly improve symptoms and quality of life

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