

Otterbein University

Digital Commons @ Otterbein

Nursing Student Class Projects (Formerly MSN)

Student Research & Creative Work

Fall 2014

Lymphedema: Pathophysiology, Diagnosis & Management

Bernadine Cruz

Otterbein University, bernadine.cruz@otterbein.edu

Follow this and additional works at: https://digitalcommons.otterbein.edu/stu_msn



Part of the [Hemic and Lymphatic Diseases Commons](#), [Medical Pathology Commons](#), and the [Nursing Commons](#)

Recommended Citation

Cruz, Bernadine, "Lymphedema: Pathophysiology, Diagnosis & Management" (2014). *Nursing Student Class Projects (Formerly MSN)*. 9.

https://digitalcommons.otterbein.edu/stu_msn/9

This Project is brought to you for free and open access by the Student Research & Creative Work at Digital Commons @ Otterbein. It has been accepted for inclusion in Nursing Student Class Projects (Formerly MSN) by an authorized administrator of Digital Commons @ Otterbein. For more information, please contact digitalcommons07@otterbein.edu.

Lymphedema: Pathophysiology, Diagnosis & Management

Bernadine Cruz, RN, BSN

Otterbein University, Westerville, Ohio

Introduction

Lymphedema is a disfiguring condition whose hallmark is progressive, increasing swelling which occurs as a result of the accumulation of protein rich fluid in interstitial spaces. Those individuals who are affected suffer from either primary lymphedema or secondary lymphedema; the pathophysiology of both conditions is similar. Lymphedema can be a chronic, acute, or transient alteration, which can eventually lead to keratinization of the skin. An increase in the incidence of lymphedema has also been observed with increase in levels of obesity.

Lymphatic System Pathophysiology

The lymphatic system is a passive network of lymph nodes and lymphatic vessels which functions in concert with the immune and circulatory systems to relieve the body of excess amounts of interstitial fluid and other substances such as proteins and blood cells (National Lymphedema Network [NLN] 2011). Facilitated by valves, lymph travels in a unidirectional fashion towards the heart, along an intricate network comprising of lymph nodes and vessels to drain the capillary beds and interstitial tissue spaces. (Fu, Ridner, & Armer, 2009). Lymph return is facilitated in a fashion akin to milking, by contracting of skeletal muscle tissue around the network, by the effort of breathing which creates contractions, and by pulsations which occur within the arteries (Ridner, 2013). Capillary and osmotic pressures within the vasculature also serve to maintain the integrity of the lymphatic system. (Ridner, 2013). The spleen, tonsils, thymus and adenoids are also integral parts of the lymph system and are referred to as lymphatic organs. The importance of the lymphatic system is highlighted in the role it plays in helping to maintain the fluid balance in the body by returning fluid from the capillary beds and interstitial spaces back to the bloodstream by way of the thoracic and lymphatic ducts.

Lymphatic System Pathophysiology Cont'd

The thoracic duct drains lymph from the entire body except from the areas of the right upper arm, the right side of head, and the right side of the thorax which are drained by the right lymphatic duct; the lymph then makes its way into the venous circulation through the right and left subclavian veins. (Fu et al, 2009)

The lymphatic system is also instrumental in assisting in the transport of proteins and fats. By filtering lymph through lymph nodes, lymphatics play a pivotal role in the efficacy of the immune system and as such, in the immune response by actively engaging in the fight against infectious processes occurring in the body. When lymph travels through the nodes, macrophages and B and T cells which are housed within the nodes attack bacteria, viruses, and toxins. (Nazarko, 2009; Ridner, 2013; Fu et al, 2009)

Pathophysiology of Lymphedema

When blood circulates from the heart out to the body, plasma containing proteins, water and waste products or cell debris makes its way into the interstitial spaces from where the lymphatic system filters the fluid and returns it to the circulation (Nazarko, 2009). An intact lymphatic system can effectively return the lymph fluid to the bloodstream via the mechanisms described earlier; however, any loss of integrity in any part of the system can cause lymph fluid to accumulate in interstitial spaces resulting in edema (Fu et al, 2009; King, 2006; Ridner, 2013). (Figure 1) Several factors can contribute to the development of lymphedema including changes in capillary pressure, changes in osmotic pressures, changes in the integrity of the skeletal muscle (fibrosis or lack of muscle tone), and changes in the condition of the lymph nodes themselves, either from fibrosis from chemotherapy or radiation treatments or from complete removal (Ridner, 2013). Congenital abnormalities of the lymphatic system can also result in lymphedema as well as any severe skin trauma resulting from burns or other skin infections (NLN, 2011). With failure of any of the processes which accommodates the forward propulsion of lymph fluid through the network, the fluid builds up in the tissue and resultant swelling occurs because the proteins and other matter from the cells is unable to be effectively returned to the bloodstream (NLN, 2011). Lymphedema can occur anywhere in the body at any point where the drainage of lymph is compromised by any of the above referenced contributing factors.

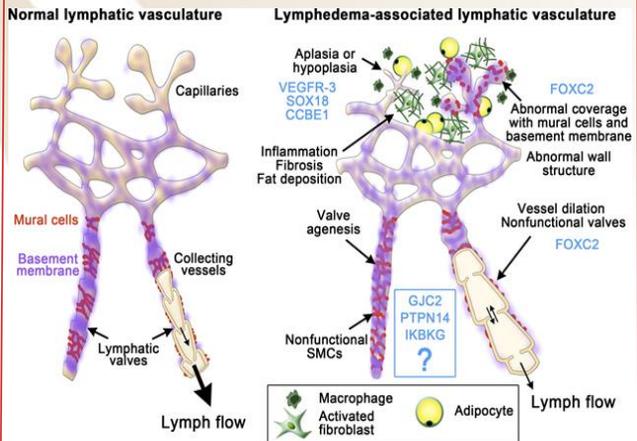


Figure 1. Normal vs. Lymphedema-associated vasculature. Retrieved from <http://jcb.rupress.org/content/193/4/607/F3.expansion.html>

Clinical Presentation

In its early stages, lymphedema cannot easily be distinguished from edema. A patient's initial presentation is usually dismissed as simple swelling or edema until elevation of the extremity, or diuretic therapy prove to be inadequate measures, and don't resolve the swelling. During the beginning stages, pitting is apparent, the skin is soft, and limb elevation assists in resolving the edema but as the disease progresses, pitting is no longer evident, the skin becomes hard, and elevation does not relieve the swelling. (King, 2006). Lymphedema can be a stigmatizing condition which can result in the patient developing open, weeping blisters, usually on the affected lower extremities. (Figure 2)

The following prominent clinical features have been identified (King, 2006, Narzarko 2009):

- Positive Stemmers sign:** Inability to pinch a fold of skin at the root of the second toe
- Edema:** Edema of greater than 3 month's duration which does not resolve completely with elevation of the affected limb
- Fibrosis:** The skin becomes hard and tight; it no longer pits because of fibrous tissue formation in the interstitial spaces.
- Papillomatosis:** Affected skin resembles cobblestones as a result of dilation of the lymphatic system and formation of fibrous tissue.
- Hyperkeratosis:** Skin becomes scaly and thickens.
- Lymphangio:** Development of small blisters and bumps on the skin.
- Lymphorrhoea:** Leakage of lymph fluid from the skin



Figure 2. Lymphedema with hyperkeratosis [digital image]. Retrieved from <http://www.vascularconsultancy.com/blog/2010/nov/the-swollen-leg>

Diagnosis

As with any health alteration, a thorough history and physical examination is a critical first step to diagnosis of any patient presenting with complaints of chronic swelling - duration, onset, aggravating and relieving factors, medications, and injuries are factors which should all be assessed. (Bernas, 2013; NLN 2011).

Other diagnostic methodologies include (NLN, 2011):

- Soft tissue imaging via MRI, CT, and ultrasound to determine whether there is extra fluid in the tissues.
- Lymph vessel imaging - lymphoscintigraphy to detect any abnormalities of the lymphatic system.
- Measuring limb volume to detect enlargement of any limb. Measurement is performed using a tape measure, perometry (infrared scan), or water displacement.
- Bioimpedance Spectroscopy - to measure interstitial fluid volume.
- Physical examination to investigate any progressive changes in skin texture and changes in skin folds.
- Genetic testing for those diagnosed with primary lymphedema

Treatment

Lymphedema does not resolve spontaneously and management of the condition requires continuous, treatment. The following treatment modalities have been found to be effective in the treatment of lymphedema (Bernas, 2013, NLN, 2011; Narzarko, 2009):

- Complete Decongestive Therapy - the gold standard of treatment for lymphedema utilizing a combination of exercise, manual lymph drainage, meticulous skin care, and compression bandaging.
- Use of compression garments such as sleeves, stockings, or shorts which provide a certain amount of pressure measured in millimeters of mercury. These garments can be customized or ready-made.
- Weight loss - since the risk of lymphedema increases with obesity, weight loss is an integral part of therapy for obese persons with lymphedema.
- Intermittent Pneumatic Compression Therapy - sequential pressure systems with multiple chambers should be used.
- Surgical procedures - used for debulking, liposuction, and tissue transfers but they are no curative.
- Pharmacological therapies should be considered on a case by case basis based on co-morbidities.

Nursing Implications

After a valid diagnosis of lymphedema has been established, patient education and teaching play a pivotal role in the success of any treatment modality. Patients must be taught the importance of skin care and good hygiene, but teaching about consistency and frequency of therapy must also be provided. In addition, patients who are able must be educated to perform manual lymphatic drainage, and application of compression bandages. For those who are unable to perform such interventions, adequate arrangements must be made for either in-home service or out patient service.

Conclusion

Lymphedema can have detrimental effects on the physical and emotional states of its sufferers. In addition, lymphedema has a significant negative impact on a patient's functional ability and quality of life. Meticulous attention must be given to self-care in an attempt to compensate for the sometimes disfiguring effects of the disease. Although lymphedema is characterized as an incurable health alteration, with effective management, existing treatment modalities usually provide relief in varying degrees and most patients who suffer from lymphedema experience acceptable outcomes.

References Cited

- Bernas, M. (2013). Assessment and risk reduction in lymphedema. Seminars in Oncology Nursing, 29(1), 12-19
- Fu, M.R., Ridner, S.H., & Armer, J. (2009). The pathophysiology of lymphedema. American Journal of Nursing, 109(7), 48 - 54
- King, B. (2006). Diagnosis and management of lymphedema. Nursing Times, 102(13), 47-51
- National Lymphedema Network. (2011). The diagnosis and treatment of lymphedema: position statement of the national lymphedema network. 1-19
- Narzarko L. (2009). Lymphoedema: diagnosis and treatment. British Journal of Healthcare Assistants, 3(1), 11-15
- Ridner, S.H. (2013). Pathophysiology of lymphedema. Seminars in Nursing Oncology, 29(1), 4-11

Additional Sources

- Cho, H.S., Dais, G.C., Paek, J.E., Rao, R., Zhao, H., Xie, X., Yousef, M.G., Fedric, T., Euhus, D. H., & Leitch, M. (2012). A randomized trial of nursing interventions supporting recovery of the postmastectomy patient. Journal of Clinical Nursing, 22, 919-929
- Greene, R., & Fowler, R. (2010). Physical therapy management of primary lymphedema in the lower extremities: a case report. Physiotherapy Theory and Practice, 26(1), 62-68
- Hardy, D. (2012). Reducing the risk of lower limb lymphedema. Primary Health Care, 22(6), 16-21
- International Society of Lymphedema. (2013). The diagnosis and treatment of peripheral lymphedema: 2013 consensus document of the international society of lymphology. Lymphology, 46, 1-11
- Poage, E., Singer, M., Armer, J., Poundall, M., & Shellabarger, M. (2008). Demystifying lymphedema: development of the lymphedema PUTTING EVIDENCE INTO PRACTICE card. Clinical Journal of Oncology Nursing, 12(6), 951-964



OTTERBEIN
UNIVERSITY