

## Lower-Extremity Lymphedema in a Patient With Gynecologic Cancer

Kathleen Appollo, RN, BSN, OCN®

## Case Study

H.F. is a 56-year-old woman who presented to the gynecologic oncology department at a major comprehensive cancer center after an endometrial biopsy revealed an International Federation of Gynecology and Obstetrics grade III serous carcinoma of the endometrium. In addition to relevant endometrial cancer statistics, she received information about choices for treatment. The standard surgical treatment at the cancer center consists of a total abdominal hysterectomy with bilateral salpingo-oophorectomy, pelvic lymph node dissection, and para-aortic lymph node sampling. The acute and chronic side effects of surgery were discussed, including development of lower-extremity lymphedema. H.F. was informed that the lymphedema could occur anytime after surgery and she would need to monitor for lymphedema development for the rest of her life.

After preoperative testing, H.F. had an uneventful surgical procedure and routine postoperative course. The final pathology showed high-grade stage IIIC papillary serous carcinoma deeply invading the endometrium, with spread to a left para-aortic lymph node. As a result, her oncologist recommended both radiation and chemotherapy.

H.F. completed all therapy and was scheduled to return every three months for evaluation. She was cautioned to maintain skin integrity by applying moisturizers and sunscreen as needed and to avoid sources of trauma, injury, infection, and constriction to the lower extremities. In addition, she was encouraged to maintain her weight with a healthy diet and

nonstrenuous exercise. Because H.F. lived out of state, she was advised to ambulate and hydrate during air travel to the cancer center and consider the use of individually fitted compression stockings (see Figure 1).

H.F. knew that she had a serious cancer diagnosis, but after the treatment was completed, she expressed joy and hope for the future. She was determined to get back to her former lifestyle. She worked full-time as a high school music teacher, gave private piano lessons, and performed with a local theater group every month. H.F. was active in her church, playing the organ at Sunday services. In addition, she played the piano at a local nursing home each week. She said that she received so much more than she gave when she saw the positive effect that music had on others. H.F. maintained her weight with diet and by walking briskly with her dog and a group of dog owners. She now added the required three-month follow-up appointments to her busy schedule.

Approximately six months after completion of treatment, H.F. called the office to report that she had developed swelling in her left leg. She was not sure exactly when it had developed because the swelling decreased at night when she elevated her leg. Although the swelling returned during the day, she attributed it to "doing too much." She stopped walking her dog with the group, thinking that it may have caused the swelling. In the previous few days, H.F. noticed that the swelling did not automatically resolve after a night of sleep.

H.F. was seen for an office visit. Examination of her left leg revealed that she had pitting edema of the left foot, ankle, and calf with shiny tight skin. The leg was not red or

warm to touch, and no areas were open on the skin. Her toenails and the creases between her toes were intact. A Doppler ultrasound of the left lower extremity was negative for deep vein thrombosis. A computed tomography scan of the abdomen and pelvis revealed no evidence of recurrent cancer.

H.F. was referred to a lymphedema specialist for evaluation and complex decongestive therapy, a multimodality approach to lymphedema treatment consisting of manual lymphatic drainage, compression wrapping, exercises, and skin care recommendations. H.F. was taught various exercises and how to wrap the affected limb. She was fitted for a compression gradient stocking to wear when traveling by plane (see Figure 2).

A few months later, H.F. returned to the office for a routine follow-up examination and was not in her usual upbeat mood. She admitted to being lax about lymphedema home care, and now the swelling had returned. In addition, the swelling seemed more resistant to self-treatment and was affecting many areas of H.F.'s life. She noticed that when she sat at the piano for lessons or at the organ in church on Sundays, the swelling in her leg increased. H.F. now had to modify her clothing by wearing long skirts and dresses to cover her large, uneven leg. She began to take over-the-counter pain medication for the heavy, achy feeling in her leg. H.F. continued to teach because she needed a source of income, but she lost her desire to be in public. She stopped playing the organ in church and the piano for the seniors at the nursing home. She continued to walk her dog but noticed that her pace was slower.

H.F. was given a prescription for pain and sleep medication to use as needed. She was referred to a psychologist to evaluate any depression and bolster her coping mechanisms. She was encouraged to find a local support group through the American Cancer Society.

After a thorough medical examination determined that H.F. did not have recurrent disease,

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*Kathleen Appollo, RN, BSN, OCN®, is a clinical research nurse at Memorial Sloan-Kettering Cancer Center in New York, NY.*

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she was advised to return to the lymphedema specialist for lymphedema control.

She understands that she must be diligent in her care to maintain control. H.F. knows that she should be joyous that she is free from cancer but often wonders about the sacrifices that she has made in the quality of her per-

Few evidence-based recommendations have been published for risk reduction of lower-extremity lymphedema. The following education points are meant to be used as guidelines to reduce the risk of increased volume of fluid or decreased flow in the extremities, which may contribute to the development of lymphedema.

#### **Mobility**

Ambulation is very important.

Change position as often as possible.

Perform stretching and range-of-motion exercises when stationary.

Avoid crossing the legs or sitting with legs at a 90° angle.

Elevate extremities whenever sitting for long periods of time.

#### **Minimize the Risk of Infection**

Examine extremities daily for swelling, inflammation, redness, or warmth.

Observe for blisters, rash, change in texture, or weeping of skin.

Use insect repellent.

Keep extremities clean using mild soaps.

Pat skin dry, rather than briskly rub, especially between toes and skin creases.

Keep the skin soft using a nonalcohol, nonadditive moisturizer after bathing or swimming and under compression garments.

#### **Avoid Trauma or Constriction**

Wear loose-fitting clothing and jewelry.

Wear properly fitted shoes with no open toes.

Avoid extreme temperature changes such as saunas and ice packs.

Consider the use of an electric razor.

Use sunscreen.

Cut nails straight across and use a file; do not cut cuticles.

#### **Exercise**

Remain hydrated.

Slowly progress exercise.

Stop activity if a limb aches or tires and elevate it.

Use deep-breathing exercises to encourage the flow of lymph.

#### **Air Travel**

Consider using a personally fitted compression stocking.

Hydrate during flight.

Ambulate as often as possible during flight.

Request a seat with adequate leg room.

### **Figure 1. Patient Education for Lymphedema Risk Reduction**

*Note.* Based on information from National Lymphedema Network, 2005.

sonal life. She did not feel the need to seek professional psychiatric help but did join a support group. Although the members of the group all have cancer, none has lymphedema. Even so, H.F. has found that sharing difficulties with others has helped her to cope, and she feels good when she has helped another deal with a difficult issue. Although she has not returned to her former music activities, she has found that helping others in the support group has given her the same satisfaction that she felt when her music brought happiness to others.

### **Lymphatic System and Lymphedema**

Lymph is extracellular fluid composed of water, fats, proteins, bacteria, and waste products. The lymphatic system is an interconnected network of organs, lymph vessels, and lymph nodes that transports lymph from body tissues to the bloodstream, helping to maintain body fluid balance. It also is a major component of the body's immune system. The superficial lymphatic capillaries are made up of endothelial cells that overlap but do not form a continuous connection. Each cell is anchored to surrounding tissue by filaments that pull on the cells in response to changes in tissue pressure. As the cell is pulled by the filament, fluid drains into the vessel. Pressure changes occur during muscle contraction, respiration, and arterial pulsation and when the skin is stretched. Lymph flows into progressively larger deep vessels that have one-way valves to ensure that the fluid moves away from tissues in a slow, steady, low-pressure system. Afferent vessels carry lymph into lymph nodes, where the lymph is filtered of cellular waste products, pathogens, and cancer cells and where lymphocytes are added.

Efferent vessels carry lymph out of the lymph nodes to return to circulation. Lymph drains from the lower limbs into the lumbar lymphatic trunk, joining the intestinal lymphatic trunk and cisterna chyli to form the thoracic duct that empties lymph into the left subclavian vein (Casely-Smith & Casely-Smith, 1997; Mortimer, 1998).

Lymphedema occurs when lymph remains in the tissues because the lymphatic system is unable to transport interstitial filtrate (Foldi, 1998; International Society of Lymphology, 2003). Primary lymphedema is a result of an absence of or abnormalities in lymphatic tissue. Secondary lymphedema, which is the focus of this discussion, results when the flow of lymph is interrupted because of malignancies, surgery, infection, trauma, or postradiation fibrosis and the lymph remains in the tissue.

### **Incidence and Risk Factors**

Although much has been written about upper-extremity lymphedema after breast surgery, information about lower-extremity lymphedema is lacking. The literature varies

#### **Manual Lymphatic Drainage**

This slow, gentle massage starts at the body center and moves to the extremities.

Central emptying allows room for the lymph to flow from the extremity.

Other forms of massage may shut down the lymph flow.

#### **Compression Wrapping**

The affected extremity is wrapped in bandaging after manual lymphatic drainage to prevent lymph reaccumulation.

Padding is followed by short stretch wraps that support without binding.

The wrapping is applied with decreasing pressure from distal to proximal sides.

The patient learns self-application to remove and reapply as needed.

#### **Exercises**

Patients should be instructed to exercise to promote flexibility.

Deep-breathing exercises increase the drainage of lymph.

#### **Skin Care**

The importance of hygiene should be reviewed.

Patients should use additive-free lotion after bathing or swimming and should be encouraged to use it before and after compression garments are worn.

#### **Compression Hosiery**

These are fitted individually to cover without constriction.

They aid in preventing lymphedema accumulation or reaccumulation after massage.

Compression hosiery acts as a counterforce to muscular contractions and generates greater interstitial pressure.

They provide support during air travel when atmospheric pressure changes.

#### **Pneumatic Compression Pumps**

Their use is controversial.

### **Figure 2. Lymphedema Treatment**

*Note.* Based on information from Brewer et al., 2000; Cheville et al., 2003; Foldi, 1998; International Society of Lymphology, 2003; Lerner, 1998; Mortimer, 1998; National Lymphedema Network, 2005.

widely about the number of patients affected. In one study, the incidence of lymphedema in patients after a hysterectomy with lymph node removal was 20% (Ryan, Stainton, Slaytor, et al., 2003). Another study reported a 3.4% incidence rate in patients following endometrial staging surgery, including hysterectomy, bilateral salpingo-oophorectomy, and lymph node dissection (Abu-Rustum et al., 2006). A retrospective series of staging surgery for endometrial cancer followed by radiation therapy reported an incidence of 4.6% (Nunns, Williamson, Swaney, & Davy, 2000).

H.F. was at risk to develop lymphedema after her surgery for endometrial cancer because of the disruption of lymphatics and lymph nodes during staging surgery. She was at additional risk because of the postoperative radiation. Other risk factors are believed to include injury, trauma, heat changes, infection to the extremity, and weight gain and decreased mobility (Brewer, Hahn, Rohrbach, Bell, & Baddour, 2000; Mortimer, 1998).

## Treatment

Although research is lacking to support many recommendations for the prevention of lymphedema (Ridner, 2002), education regarding measures that are believed to reduce risk include protecting the skin from trauma and infection. Those measures were discussed with H.F. postoperatively and at each office visit. The plan is based on the concept that any action or condition that predisposes a patient to or increases swelling may disrupt the fine balance of drainage after surgery (Mortimer, 1998). In addition, open skin may lead to infection, which can occur more easily in stagnant, protein-rich lymph fluid, a perfect medium for bacteria growth (Brewer et al., 2000). Because deep vein thrombosis and cancer recurrence can cause swelling, they were ruled out before H.F. was referred for complex decongestive therapy. Her treatment began with manual lymphatic drainage, a gentle massage that starts proximally to encourage the flow of lymph from the distal extremity. More lymph is encouraged to move into the normally functioning lymphatics (Cheville et al., 2003; Foldi, 1998; Lerner, 1998). Massage was followed by padding of the extremity and application of short stretch compression bandages with gradual pressure changes distally to proximally. That type of bandaging helps the flow of lymph to the nodal basins (Cheville et al.; International Society of Lymphology, 2003).

H.F. was taught the techniques so that she could continue maintenance therapy at home. She was encouraged to practice manual lymphatic drainage, use compression bandages at night, wear a fitted compression garment, follow meticulous skin care guidelines, protect the leg from trauma and injury, and perform muscle-building exercises. H.F. also was taught to wear the compression garment especially during air travel because changes in atmospheric pressure may increase the pressure balance in the leg (National Lymphedema Network, 2005).

## Quality of Life

Lymphedema may have a profound effect on the lives of cancer survivors (Kwan et al., 2002; Ryan, Stainton, Jaconelli, et al., 2003). H.F. described a heavy, achy feeling

in her leg, which has been reported in patients with breast cancer before swelling occurred (Armer, Radina, Porock, & Culbertson, 2003). Pain assessment is crucial in helping patients to cope. An over-the-counter medication may suffice, but some patients may need prescription-strength pain medication, making individual assessment critical.

H.F. stated that her pace was slower in her walks. In patients with breast cancer, fatigue often is a troublesome symptom affecting quality of life (Armer & Porock, 2002). Pacing activities or decreasing distances may help to maintain stamina. Pacing also may deter swelling that is associated with strenuous or long-distance exercise. The need for sleep medication should be evaluated because insomnia caused by leg discomfort or worry may contribute to fatigue.

Changes in wardrobe often are necessary when swelling occurs (Ryan, Stainton, Jaconelli, et al., 2003). Alteration in body image may result in changes to regular social activities and may lead to social isolation (Tobin, Lacey, Meyer, & Mortimer, 1993). Referrals to support groups or individual therapy sessions may be indicated depending on patient preference. H.F. found that she gained much by participating in a support group and thereby moved from one type of social interaction to another. Healthcare professionals must be sensitive to lifestyle changes as well as the financial burden that may result from a forced change in wardrobe.

With increased survival after cancer treatment, the long-term sequelae caused by cancer treatment should be recognized and treated. Patients must be informed about the potential lifelong side effects of treatment. Although H.F. was informed about the possibility of lymphedema development, many patients have reported that they were not informed about this life-altering condition until they developed symptoms (Beesley, Janda, Eakin, Obermair, & Battistutta, 2007; Ryan, Stainton, Jaconelli, et al., 2003). Continued research is needed to determine the best interventions to decrease the side effects of treatment and maximize quality of life.

**Author Contact:** Kathleen Appollo, RN, BSN, OCN®, can be reached at appollok@mskcc.org, with copy to editor at ONF Editor@ons.org.

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## Clinical Highlights: Lower-Extremity Lymphedema

### Definition

Lymph is extracellular fluid composed of water, fats, proteins, bacteria, and waste products. Lymphedema occurs when lymph remains in the tissues because of an inability of the lymphatic system to transport the interstitial filtrate (Foldi, 1998; International Society of Lymphology, 2003). Primary lymphedema is caused by an absence of or abnormality in lymphatic tissue. Secondary lymphedema results when the flow of lymph is interrupted and the lymph remains in the tissue because of malignancy, surgery, infection, trauma, or postradiation fibrosis.

### Pathophysiology

The lymphatic system is an interconnected network of organs, lymph vessels, and lymph nodes that transports lymph from body tissues to the bloodstream and helps to maintain body fluid balance. Superficial lymphatic capillaries are anchored to surrounding tissue by filaments. In response to changes in tissue pressure, the filaments pull on capillary cells, causing drainage of fluid into the capillary. Pressure changes occur during muscle contraction, respiration, and arterial pulsation and when the skin is stretched. The lymph flows into progressively larger deep vessels that have one-way valves to ensure that lymph moves away from tissues in a slow, steady, low-pressure system. Lymph also flows into lymph nodes, where it is filtered of cellular waste products, pathogens, and cancer cells and lymphocytes are added. Lymph drains from the lower limbs into the lumbar lymphatic trunk, which joins the intestinal lymphatic trunk and cisterna chyli to form the thoracic duct. At the thoracic duct, lymph empties into the left subclavian vein and the general circulation (Mortimer, 1998).

### Risk Factors

Disruption of lymphatics and lymph nodes during cancer staging surgery is the most common risk factor in the development of lymphedema. Postoperative radia-

tion is another risk factor because radiation can further damage the lymphatic pathways. Other risk factors are believed to be those that add to the lymph volume or decrease the lymph flow—injury, trauma, heat changes, infection to the extremity, weight gain, and a decrease in mobility.

### Clinical Findings

Patients may report early lymphedema as a heavy or achy feeling in the limb. Swelling may not be present, but the transport may be impaired. Pitting edema, which may be relieved by elevation, usually follows swelling. Swelling traditionally starts distally and progresses proximally. If left untreated, fibrosis of connective tissue may occur, which will result in swelling that no longer dissipates with elevation. Eventually, the limb may become large and misshapen with skin breakdown. Fluid may seep through the tissue onto the skin.

### Differential Diagnosis

Deep vein thrombosis (DVT) can cause lower-extremity edema. DVT can be difficult to diagnose, especially when it does not cause traditional calf pain. A lower-extremity ultrasound must be done to rule out DVT. If indicated, anticoagulation should begin immediately. Lower-extremity edema may be a hallmark of cancer recurrence. A workup for recurrence and possible treatment is necessary before lymphedema is diagnosed.

### Treatment

The goals of treatment are to restore appearance and range of motion, reduce pain, and improve the quality of life. Manual lymphatic drainage is a slow, gentle massage starting at the body center and moving to the extremities. It encourages lymph to drain centrally, creating room for the fluid to move from the extremity in a type of siphoning action. Compression wrapping is used to prevent lymph reaccumulation by padding the limb with short stretch bandages that support without binding. The bandages are applied with higher pressure distally and lower pressure proximally to encourage the flow of lymph upward against gravity. Patients are taught to apply the bandages so they can be independent.

Exercises are taught to promote flexibility for better movement and to allow for easier application of bandages. Deep breathing is believed to increase the flow of lymph into the cisterna chyli and thoracic duct, thereby promoting the lymph drainage.

Skin care is emphasized to maintain skin integrity. By keeping the skin clean and supple, the risk for the skin to be a portal for bacteria is reduced. Compression hosiery is used to prevent lymphedema accumulation or reaccumulation. Stockings must be fitted individually to promote support without constriction. Some therapists encourage the use of a garment during air travel because changes in atmospheric pressure can cause limb swelling. Pneumatic compression pumps sometimes are recommended, but their use remains controversial.

### Implications for Nursing Practice

Lower-extremity lymphedema may have a profound effect on the lives of cancer survivors. Fatigue, changes in wardrobe, and poor body image may result in avoidance of regular social activities, loss of income, and social isolation. Activities or situations that increase the volume or further disrupt the flow of fluid in the extremity should be avoided. Education in the basic physiology of the lymph system and general prevention guidelines is needed. Ongoing education, assessment, and surveillance at each outpatient visit are essential because lower-extremity lymphedema may occur months or years after surgery. The profound effect of lymphedema development may lead to compromised quality of life.

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