

NLN

NATIONAL LYMPHEDEMA NETWORK

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### The NLN Mission Statement

The mission of the NLN is to create awareness of lymphedema through education and to promote and support the availability of quality medical treatment for all individuals at risk for or affected by lymphedema.

The NLN is dedicated to:

- ♦ promoting research into the causes, prevention and treatment of lymphedema;
- ♦ securing adequate insurance coverage for medically necessary, safe and effective treatment;
- ♦ expanding the number and geographical distribution of lymphedema treatment facilities and certified therapists

To achieve these goals, the NLN disseminates information about lymphedema to health care professionals so they can appropriately counsel their patients on its avoidance, and prescribe safe, effective treatment for those affected by this condition. The NLN also provides this information to the general public.

## The Challenge Of Infection In Lymphedema

By Joseph L. Feldman, MD, CLT-LANA

An individual with arm lymphedema awakens one night with flu-like symptoms: fever, chills, headache, nausea. The affected limb is red, hot, aches and is more edematous. The emergency room physician notes the classic signs of acute inflammation: rubor (redness or erythema), calor (increased skin temperature), dolor (pain, tenderness) and swelling. A diagnosis of cellulitis is made and the patient is admitted for treatment with IV antibiotics. Upon discharge after two days, an oral antibiotic was prescribed for twelve days.

The above scenario is, unfortunately, common to lymphedema patients. This article will describe acute inflammatory episodes and their treatment.

There are various terms in the literature for acute inflammatory episodes (AIE), including cellulitis, erysipelas, lymphangitis and dermatolymphangioadenitis (DLA). Cellulitis is the term most commonly used in the United States. Cellulitis is a diffuse, spreading, acute or sub-acute infection of the skin and subcutaneous tissues, characterized by erythema, tenderness and pain and edema. In some cases, there is epidermal bulla formation or necrosis resulting in epidermal sloughing and erosions. Cellulitis is generally caused by a bacterial infection. Erysipelas (a type of cellulitis) is a bacterial infection of the dermis and upper subcutaneous tissue with superficial lymphatic involvement. It is almost always due to streptococcus pyogenes (Group A streptococci). Classic erysipelas is characterized by a well-defined, raised edge, but cellulitis may extend superficially and erysipelas deeply, so it may be impossible to make a meaningful distinction. Streptococcus pyogenes is the usual cause of lymphangitis, an acute inflammation of the subcutaneous lymphatics. Red, warm, tender linear streaks are present, usually extending from a wound or skin infections toward regional lymph nodes. The nodes become swollen and tender.

At times, the onset of cellulitis is less dramatic. A few red papules ("spots") or a patch of erythema—a "rash"—may be present with-

out constitutional symptoms. The papules or rash will spread to adjacent skin and coalesce. Aching discomfort and increased swelling may precede inflammation. The condition may remain sub acute for days or weeks. In these cases, it is necessary to consider other forms of acute inflammation. Superficial thrombophlebitis presents with localized pain, cordlike in duration, erythema and warmth. A deep vein thrombosis can be diagnosed by a duplex Doppler ultrasound examination. Patients with lower extremity chronic venous insufficiency may have lipodermatosclerosis and stasis dermatitis. The most common bacterial infection associated with lymphedema is streptococcus pyogenes. Non-Group A streptococcus, staphylococcus aureus, escherichia coli and pseudomonas infections are less common.

Simon and Cody<sup>1</sup> reported cellulitis in 15/273 lymphedema patients (6%) over 42 months following axillary lymph node dissection. The mean interval between axillary lymph node dissection and the onset of cellulitis was 38 months. Mozes<sup>2</sup> reported that 41% of patients with post-mastectomy lymphedema developed an acute inflammatory episode, the incidence increasing with the interval since the original cancer treatment. Dankert<sup>3</sup>, et al.,

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## The Challenge...

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reported that 9/336 patients who underwent a hysterectomy with pelvic lymphadenopathy developed cellulitis in their legs. All nine had received pelvic radiation therapy. A retrospective study of the incidence of cellulitis and lymphedema found a 1% incidence in Stage 1, 27% in Stage 2 and 72% in Stage 3<sup>4</sup>.

There are reports of breast lymphedema and cellulitis as a complication of breast-conserving surgery. Hughes<sup>5</sup>, et al., observed initial episodes of breast cellulitis in patients with breast-conserving surgery occurring before, during and after breast irradiation. They hypothesized that impaired lymphatic circulation after excision and/or irradiation causes a predisposition to cellulitis in the breast and adjacent soft tissues early in breast cancer treatment. Brewer<sup>6</sup>, et al., studied 17 patients with a history of breast cellulitis to determine risk factors. The following factors were statistically associated with increased breast cellulitis: presence of lymphedema, a hematoma, the previous number of seroma aspirations and resected tissue volume. The latter factor was difficult to explain since there was no association with tumor size. As noted by Mortimer<sup>7</sup>, the "naïve view" of acute inflammatory episodes is that stagnant lymph fluid provides an ideal medium for bacterial growth. Numerous investigators have reported low yield of bacteria in microbiological specimens. The incidence of positive blood cultures is generally less than 10%. The isolated organism is usually a streptococcal species. Tissue cultures are positive in a somewhat higher percentage. The local inflammatory response may be due to bacterial extracellular toxins rather than to the local proliferation of microorganisms.

DeLong and Simmons<sup>8</sup> studied bacterial clearance from rabbit ears. The removal of bacteria by the regional lymphatics was insufficient to abort the infection process and occurred slowly within the initial 24 hours. The authors concluded that the lymphatic clearance of bacteria from soft tissues is of negligible importance as a host defense mechanism in the 6-hour decisive period of soft-tissue infection. Real clearance began after the bacteria has been phagocytosed and slowly lysed.



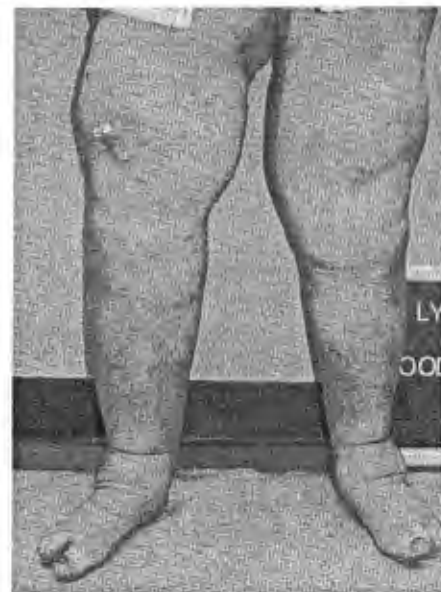
DeGodoy<sup>9</sup>, et al., performed lymphoscintigrams in 30 non-lymphedema patients who had had at least two episodes of erysipelas 40 to 90 days after treatment. They concluded that most patients with repeated erysipelas have significant and even permanent abnormalities in regional lymphatic drainage.

A regional immunodeficiency contributes to the susceptibility of lymphedematous tissue to infection. Intact lymphatics are necessary for a primary immune response to develop. As noted by Mortimer, disturbances in lymphocyte motility may interfere with host defense mechanisms within the lymphatic drainage area.

### Risk Factors

Any individual with lymphostasis or lymphedema is at risk for developing cellulitis. In the majority of patients, no antecedent event can be identified. Predisposing conditions include injury to the skin, lymphorrhea, skin diseases such as eczema or psoriasis and dermatophytoses.

Dermatophytosis—a superficial fungal infection—is a risk factor for developing cellulitis, especially in patients with lower extremity lymphedema. Dermatophytes can invade the stratum corneum of the skin, hair or nails. Dermatophytosis is most common in the feet (tinea pedis), groin and intertriginous areas (tinea



cruris) and the nails (onychomycosis). Tinea pedis results in itching and burning between the toes as well as scaling, erythema, maceration and fissures. Vesicles can be present in more severe cases. Tinea pedis can extend to the plantar surface.

### Risk Reduction And Treatment

Following the National Lymphedema Network Risk Reduction Guidelines ([www.lymphnet.org](http://www.lymphnet.org)—click on Position Papers) should reduce the risk of developing cellulitis or reduce the frequency of

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## The Challenge...

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these episodes. Proper skin care is important. This can be accomplished with meticulous hygiene, moisturization of the skin with emollients and prompt treatment of fungal infections. Compression bandages and garments should be washed daily.

The appropriate antibacterial therapy for treating cellulitis and lymphangitis is best determined by the treating physician since there are indications and contraindications for each antibiotic and antifungal medication. Penicillin is the antibiotic most often cited in the medical literature.<sup>7,10,11</sup> Mild early cellulitis presumed to be of streptococcal etiology can be treated with oral penicillin V 0.5 gm every six hours. When staphylococcal infection is suspected or the etiology is uncertain, a penicillinase-resistant penicillin (e.g., dicloxacillin 0.5 gm every six hours) should be used. In patients allergic to penicillin, an alternative is erythromycin 0.5 gm every six hours. For severe infections with sepsis, intravenous antibiotics will be necessary such as nafcillin 1.0 to 1.5 gm every four hours or vancomycin 1.0 gm every 12 hours. Several other antibiotics are effective including first generation cephalosporins and ampicillin-clavulanate.

Patients with lymphedema do have a prolonged systemic and local inflammatory response. Fever and tachycardia may persist for 6 or more days. The erythema may take several days to resolve and the increased edema may not return to baseline. Frequently, a formally well-fitting compression garment will become too tight due to increased edema and should not be worn. The use of compression bandages, manual lymph drainage and exercises should be put on hold until the patient is afebrile, skin temperature returns to normal and the erythema is receding. Some patients may require outpatient complete decongestive therapy to reduce the edema. Tinea pedis and tinea cruris can be treated with antifungal medication such as tolnaftate cream, micronezole cream, clotrimazole cream or lotion, ketoconazole cream and cyclopirox cream or suspension. Tolnaftate and micronezole are available as powders and can be used in stockings to keep the feet dry and reduce the risk of

developing tinea pedis. Oral antifungal medications are available. These include itraconazole and terbinafine.

## Recurrent Cellulitis

Individuals with three or more episodes of cellulitis are candidates for prophylactic antibacterial therapy. Penicillin has been the medication of choice for many years, either long-acting benzathine penicillin, 1,200,000 units intramuscular every 3 weeks for one year or oral penicillin V 0.25 to 0.5 gm/day. Patients allergic to penicillin can take erythromycin .25 to 0.5 gm/day. Break-through episodes can occur requiring full dose antibiotic therapy. When the prophylactic antibiotic is discontinued, episodes of cellulitis can recur. One study showed that benzathine penicillin was not effective in preventing further episodes of cellulitis, but another prospective study reported that acute inflammatory episodes were abolished in 41/45 patients. Early self-treatment by patients can help attenuate the severity of an episode of cellulitis by stopping bacterial replication in the initial stages and minimize further damage to the lymphatic system.<sup>12</sup> Patients who have had an episode of cellulitis or are at high risk should have an antibiotic available.

E. Földi<sup>13</sup> reported that in women with arm lymphedema after breast cancer treatment, there was a near elimination of recurrent cellulitis through the improvement in arm swelling by complete decongestive therapy. Patients with risk factors of the skin (psoriasis, fungal infection, dermatitis) continued to have susceptibility to cellulitis and prophylactic antibacterial therapy was recommended. The trace mineral and antioxidant selenium has not been shown to be effective in preventing acute inflammatory episodes.

The prevention and treatment of cellulitis is a challenge for the lymphologist and the patient since each episode of infection can further impair lymphatic transport, increase the cost of medical care and stress the patient and caregivers. Lymphologists, including therapists, must educate the patient about the signs and symptoms of acute inflammatory episodes and inform the patient about the Risk Reduction Guidelines. The challenge to the patient is to comply with the recommendations and to maintain good garment and personal hygiene. □

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