Necrotizing Fasciitis (NF) - A Rare, Life-Threatening Infection

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Key Points
➢ Diffuse redness and edema progressing to skin necrosis ➢ High mortality ➢ Causative bacteria ➢ Management

Necrotizing fasciitis (NF) is a rare, life-threatening infection resulting in necrosis of the skin, subcutaneous tissue, and fascia. Mortality rates have been noted as high as 73 percent. Certain conditions can predispose patients to NF, such as diabetes mellitus, immunosuppressive medications, and AIDS. Patients usually complain of excessive pain as well as constitutional symptoms. Cutaneous findings include diffuse redness and edema progressing to necrosis and hemorrhagic bullae. Because of this rapid progression, it is important to diagnose and treat NF quickly to decrease mortality. Treatment includes broad-spectrum antibiotic coverage, nutritional supplements, hemodynamic support, wound care, and prompt surgical debridement. Necrotizing fasciitis carries a high mortality rate because of its ability to progress rapidly while evading detection, making rapid identification in high-risk patients important to ensure optimal clinical outcomes. Limb amputation is the most common complication, with an overall rate of approximately 10%.[1]

For numerous reasons, the number of cases of necrotizing fasciitis is increasing. Several bacteria can be responsible for the destruction of subcutaneous tissue and fat, including group A streptococcus.

Immunosuppressed individuals, diabetics, males, and the aged comprise the largest susceptible groups. Further muscle and nerve necrosis occurs secondary to compartment syndrome and elevating pressure. After surgical debridement, appropriate antibiotic therapy, and healing of necessary skin grafts, residual loss of function may require the use of an orthosis. The practicing orthotist needs to understand the cause, course, and functional limitations of necrotizing fasciitis in order to produce a successful orthotic outcome.[2]

As orthotists, we are commonly called upon to help people ambulate by returning stability to a compromised extremity. There are numerous reasons why a patient can experience a loss of function in the lower extremity. Some of the more common conditions observed are cerebrovascular accident, posterior tibial tendon disorder, multiple sclerosis, and cerebral palsy. These pathologies are seen regularly; therefore, most orthotists understand the benefits from the use of an orthosis. In these situations, it is usually an ankle-foot orthosis (AFO) or, less commonly, a knee-ankle-foot orthosis (KAFO).[3]

However, sometimes we see a case in which the cause of the impairment is a condition that is not so common. One of these conditions is necrotizing fasciitis, commonly known as the flesh-eating disease. The purpose of this article is to define necrotizing fasciitis and to describe the pathomechanics of the disease and how it is treated. In addition, the article will discuss the role of the orthotist in assisting a patient with ambulation.

Soft-tissue infections that cause necrosis are by no means new. Cases of necrotizing fasciitis, which was a feared military disease, were documented as far

back as the 18th century. During the 19th century, civilian outbreaks of this feared infection were seen and it was referred to as the "malignant ulcer." In 1883, Fournier described a necrotizing soft-tissue infection of the male perineum, which was termed "Fournier's gangrene." Then in 1952, Wilson used the term "necrotizing fasciitis" to describe the same infection in other parts of the body. The typical patient who has contracted a type of necrotizing fasciitis usually has an underlying illness that has weakened the immune system and has often incurred a disruption in the skin caused by a cut, ulcer, or even an insect bite. This opening in the skin serves as a portal of entry for the bacteria. Males and the elderly are at a higher risk for contracting the disease. Diabetes remains one of the most common illnesses that weakens the immune system. Other predisposing factors include peripheral vascular disease, end-stage kidney disease, chemotherapy for cancer treatment, and immunosuppression due to organ transplant.

Recently, it seems that the strep A bacteria has become even more virulent, and clusters of outbreaks are usually seen in the winter months. The strep A bacteria is commonly found in the nose and throat of healthy individuals, and it is responsible for many, less-serious illnesses. These illnesses have been divided into two categories: the less serious, noninvasive infections and the more serious, invasive infections. It is unknown why some people become seriously ill with an invasive strep A infection and others do not, even if both are infected with the strep A bacteria.

The common noninvasive strep A infections include strep throat, rheumatic fever, impetigo, and scarlet fever. Strep throat is a very common illness that is easily treated by using antibiotics. However, if left untreated or partially untreated, it can lead to rheumatic fever that can damage heart valves. Impetigo is a mild skin infection that is characterized by open, draining sores and is easily treated using antibiotics. Scarlet fever is rarer than both impetigo and strep throat and is also easily treated using antibiotics.[2]

Unfortunately, there are no symptoms specific to the necrotizing fasciitis infection, but in most cases, common flu-like symptoms are present. Symptoms of a necrotizing fasciitis infection include swelling and redness of the infected limb, clear blisters in the rash which then turn a dark purple color, severe pain, and in many cases a minor trauma to the skin near the infected area. If undiagnosed, the symptoms worsen and are also accompanied by fever, chills, and nausea, with the rash-associated pain increasing. Uncharacteristic of the "flesh-eating" name, the skin usually remains intact as the infection spreads subcutaneously. Proper diagnosis is critical in the treatment of necrotizing fasciitis, and in many cases, it is the major factor between life and death. One major clue that a soft-tissue infection is in fact necrotizing fasciitis is the failure of the infection to respond to antibiotic therapy within 24 to 48 hours.[4]

Once the diagnosis of necrotizing fasciitis is made, immediate debridement of necrotic tissue is called for. It is very common for a patient to undergo more than one debridement to make sure all of the necrotic tissue has been removed. At the same time, aggressive antibiotic therapy with clindamycin should be started. The wound should be examined daily, and the decision of whether or not to perform further debridement should be made. Dressings should be changed daily, and skin grafts should be performed to cover the wound once it is definite that the infection has been eradicated. Amputation of an entire limb is sometimes performed, but this is only done as a life-saving measure.

Once the infection has been eliminated, the limb can remain compromised because of the debridement process or the myonecrosis and nerve necrosis that may result from a compartment syndrome. It is rare for the actual muscle tissue to undergo necrosis due solely to the infection, but it has been reported in some cases. The debridement process may have called for the removal of muscle tissue, which would leave a compromised limb. Also, a compartment syndrome can cause both muscle necrosis and nerve necrosis, thereby leaving a weakened limb. In any

case, a flaccid limb can result from the removal of muscle or from nerve necrosis. On the other hand, contractures can develop during the myonecrosis process, when rigid scar tissue replaces the muscle.

Surgical debridement of the necrotic tissue is an essential part of the treatment of a necrotizing soft-tissue infection. Antibiotic therapy alone is useless unless the necrotic tissue is surgically removed. If muscle is removed in the debridement process, a weakened or entirely flaccid limb will remain. A flaccid limb is also a common result of nerve necrosis directly related to a compartment syndrome. The appropriate orthosis is determined by the extent of the weakness, the magnitude of the infection, and the lack of range of motion because of muscle contractures.

There is also a good possibility that a contracted limb will remain. If muscle necrosis is caused solely by a compartment syndrome, scar tissue replaces the muscle tissue and the result is a rigid, contracted limb. In this situation, the weakness is also accompanied by a severe lack of range of motion due to the contractures caused by the rigid scar tissue.[5]

Conclusions:

As health professionals, it is important to be aware of the many pathologies that can cause weak and compromised extremities. Patients who experience weak and/or contracted limbs can definitely benefit from the use of an orthosis in ambulation. A person who has experienced a necrotizing soft-tissue infection will present with weakness and/or contractures that are comparable to what orthotists see daily. What orthotists might not be familiar with is the pathogenesis of necrotizing fasciitis and the treatment that the patient may endure. Due to the fact that the number of cases is on the rise and most likely will increase in the future, it is important to understand necrotizing fasciitis infection, its sequelae, and the role that the orthotist may play in its treatment.

Reference:

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