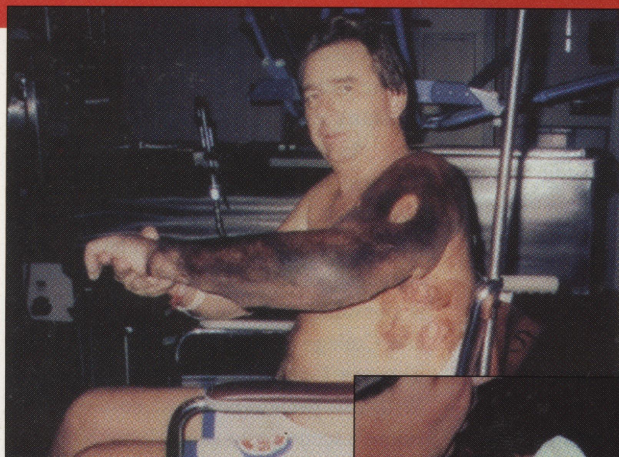


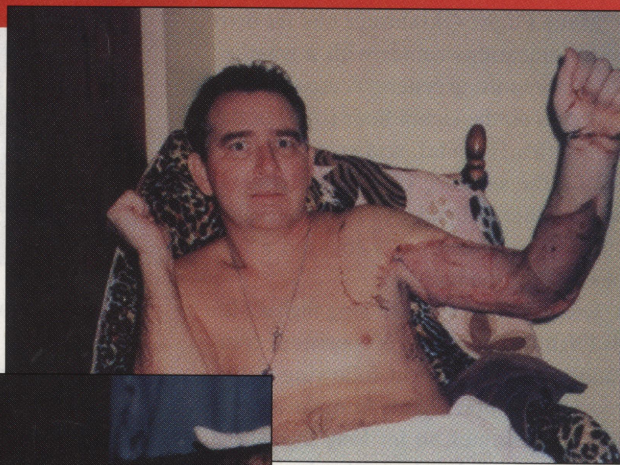
# Necrotizing Fasciitis

## The Flesh-Eating Disease

Debi Zeglin, RN, BSN, CCRN, CEN, and Scott DeBoer, RN, MSN, CFRN



Swelling and discoloration spread very rapidly once they begin.



Prompt treatment includes surgical debridement and fasciotomies and reduces the mortality rate to 40%.

This may sound like the title of a horror movie playing at your local theater, but in reality it could be your next transport. Little did we know it would be ours.

The call came in for an ED response. The patient, RA, was a 43-year-old man, septic, awake and alert, nonintubated, and on his way to a local burn unit. As our crew launched, we prepared to care for a patient in septic shock, expecting fluid resuscitation, sedation, and possible intubation might be necessary.

On arrival, we found RA alert and oriented, on 100% oxygen by nonrebreather face mask, indeed in septic shock with a blood pressure of 100/62 despite having received 6 liters of fluid in the past 6 hours. His heart rate was 129, respiratory rate 32, and temperature 39° C after having received acetaminophen and ibuprofen. His left arm was edematous and tender with a violaceous hue beginning just above the wrist and extending up in to the axilla. The skin in this area was beginning to take on a tissue-paper appearance, forming blisters filled with a purplish fluid. According to RA's wife, an RN herself, the swelling and discoloration had spread rapidly since their arrival in the ED.

RA had been taken to the ED by ambulance from his primary care physician's office, where he initially sought treatment for the flu-like symptoms and pain and swelling in his left arm that he had been experiencing for 3 or 4 days. The ED attending physician diagnosed RA's condition as "a rapidly progressing soft tissue infection of the left upper extremity."

We loaded RA into our aircraft, and he tolerated the 10-minute air transport well. We administered fluids and dopamine to main-

tain his blood pressure and intravenous morphine to ease some of his intense pain and anxiety. At the burn unit, we were met by the attending physician and a surgical team ready to take RA immediately to the operating room. The attending physician

diagnosed his condition as "a life-threatening, rapidly progressive necrolytic infection associated with septic shock, consistent with necrotizing fasciitis." Treatment required "emergent and rapid surgery of an extensive nature in attempt to not only salvage his extremity but preserve his life."

Necrotizing fasciitis is an uncommon soft tissue infection characterized by rapidly spreading inflammation and subsequent necrosis of the muscle fascia and overlying skin. Appearing suddenly, often in previously healthy individuals without history of wounds or injury, these infections can progress within hours to necrosis of an entire limb, often culminating in amputation or death.

The overall incidence of necrotizing fasciitis has been increasing during the past 10 years, primarily as a result of an increase in immune-compromised patients with diabetes, cancer, alcoholism, vascular insufficiencies, organ transplants, HIV, and other diseases with neutropenia. The mean age range for this disease is 38 to 44 years; the male to female ratio is approximately 3:1. The disease is rare in children. If treated properly, necrotizing fasciitis carries a 30% to 40% overall mortality rate. If untreated, this disease has a 100% mortality rate.

Necrotizing fasciitis is classified into two types. Type I consists of polymicrobial infections involving aerobic and anaerobic organisms, which may or may not include gas gangrene.



Type II is caused by strep pyogenes. Currently, the most common cause of necrotizing fasciitis is Group A Streptococci, the same bacteria that cause the common strep throat. Coupled with toxic shock syndrome (TSS), a much stronger variation of Group A strep becomes deadly.

The mode of entry for this bacterium varies. It can enter the body through a very minor opening in the skin, such as a paper cut or pin prick. It can work its way in through weakened skin, such as a bruise or abrasion. Major trauma or surgery are more obvious modes of entry. Cases also have been reported in which the point of entry was unidentifiable. Group A strep is transmitted by respiratory droplets (coughing and sneezing) and direct contact. Approximately 15% to 30% of the population carries Strep A at any given time without experiencing symptoms. Inanimate objects are an unlikely mode of transmission.

Unfortunately, no vaccine exists to prevent acquiring necrotizing fasciitis. However, the incidence decreases with good basic hygiene, such as covering the mouth during coughing and sneezing and remembering to clean and care for the smallest of traumas.

Some issues to consider when transporting a patient with necrotizing fasciitis include the following:

- Universal precautions should be used at all times, but no additional isolation procedures need to be taken.
- Antibiotic prophylaxis for crew members involved in the transport is not necessary, unlike transporting a patient with meningitis.
- Routine disinfection of equipment and aircraft is appropriate.

The clinical presentation of necrotizing fasciitis is quite similar in all the cases reviewed. The symptoms are categorized as early (usually within 24 hours), advanced (usually within 3 to 4 days), and critical (usually within 4 to 5 days). When a patient presents with early symptoms, usually a minor trauma or other skin opening has occurred. The wound does not appear infected and often goes unnoticed by the patient. Pain occurs in the general area of the injury but usually not at the site. *The pain is disproportionate to the injury.* The pain often feels like a pulled muscle but continues to increase. Flu-like symptoms can be present, such as nausea, vomiting, diarrhea, confusion, dizziness, weakness, malaise, and intense thirst. The combination of all these symptoms is a key factor in diagnosing the disease early.

If misdiagnosed or untreated at the early stage, this disease will progress rapidly to the advanced stage. Most patients do visit their primary care physician in the early stage, but a misdiagnosis often is made because of symptoms similar to other minor ailments.

In the advanced stage, diffuse erythema and swelling occur, along with exquisite tenderness and pain in the infected limb or area of the body involved. Bullae form filled with clear fluid that rapidly becomes maroon or violet. Necrosis of the tissue begins to occur as it takes on a bluish-white or dark, mottled, flaky appearance, followed by inflammation extension along fascial planes. Overlying skin anesthesia occurs, which is a clue that the process is necrotizing fasciitis and not a simple cellulitis.

A severe decrease in blood pressure occurs as the patient begins to develop TSS. The patient enters the critical phase of the disease and often lapses into unconsciousness. Aggressive treatment is essential at this point to save to patient's life. Initial treat-

ment in the ED includes fluid resuscitation, airway maintenance, oxygen administration, IV access, and sedation. Antibiotic treatment also should be started in the ED after initial blood cultures are drawn; Ceftriaxone (Rocephin) is the drug of choice.


Along with blood cultures, such laboratory studies as a complete blood count, electrolytes, glucose, BUN, and creatinine also may be conducted. Leukocytosis (elevated white blood cells) usually is present because of the infection. A result of muscle damage, a severely elevated serum creatinine kinase level often is a clue to the presence of necrotizing fasciitis. Soft tissue radiographs may show tissue inflammation, fractures, or gas collection, but these tests often are not as conclusive in diagnosing necrotizing fasciitis as the "hemostat test." This procedure involves putting a hemostat into the infected area and slicing across a few inches. If necrotizing fasciitis is present, the hemostat will move along the fascial plane with the ease of a hot knife slicing through butter, easily separating the necrotic tissue from the viable tissue.

As soon as the patient is stabilized, the treatment of choice for necrotizing fasciitis is immediate surgical debridement and fasciotomies of the infected area. The three important goals of immediate surgery are to remove all necrotic tissue, preserve as much viable tissue as possible, and maintain hemostasis. Delays in initially performing fasciotomies directly decrease survivability. Amputation also may be necessary at this point.

A "second look" often is done at 12 to 24 hours. Multiple subsequent debridements over several weeks usually are required. A study by McHenry et al. (1995) reported an average of 33 operative debridements.

Along with surgery, the patient is managed medically with continued antibiotic therapy and hydrotherapy to promote wound healing. Hyperbaric oxygen treatment also has been shown to improve tissue defense against infection and prevent the necrosis from spreading, although it should not be done in place of surgery.

Patients who survive necrotizing fasciitis are faced with multiple long-term physical and psychosocial issues. Physical and occupational rehabilitation should be started before the patient leaves the hospital and continue for several months after discharge. Reconstructive surgery, including skin grafting and prostheses, may be necessary. Changes in body image, employment disability, and spousal rejection are issues that survivors often must face during rehabilitation.

The patient in this case, RA, survived necrotizing fasciitis. His total hospitalization period was 30 days, during which he received 16 surgical debridements, daily hydrotherapy, antibiotic coverage, and multiple skin grafts. He underwent intense physical therapy and rehabilitation and gained full systemic recovery. He sustained some disfigurement and loss of sensation to his left arm and anterior chest, but most important to him and his family, he did not lose his limb or his life. 

*Debi Zeglin, RN, BSN, CCRN, CEN, is a flight nurse with the University of Chicago Aeromedical Network (UCAN). Scott DeBoer, RN, MSN, CFRN, is the flight nurse educator for UCAN.*

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