

Rapidly Fatal Necrotizing Fasciitis After Aesthetic Liposuction

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Abstract. Necrotizing fasciitis (NF) is a rapidly progressive soft tissue infection involving primarily the superficial fascia and subcutaneous tissue. The disease is caused by *Streptococcus pyogenes* or synergistic infection of anaerobic and facultative anaerobic bacteria. Further characteristics are severe, intolerable pain and a mortality rate of 30 to 50%. The NF can be initiated after surgical procedures, minor trauma, trivial scratches, in the setting of a chronic wound, or even in apparently intact skin. The age of the patient is not relevant for the prognosis of NF. As it is shown in this reported case, a young and previously healthy patient died after aesthetic liposuction in the course of a NF. Necrotizing fasciitis is a rare disease, therefore, it is important to review its diagnostic and clinical features, because only early diagnosis and prompt, radical surgery improves the survival rate.

Key words: Necrotizing fasciitis—Rapidly progressive soft tissue infection—Streptococcal toxic shock syndrome

Necrotizing fasciitis (NF) is a rapidly progressive infection characterized by gangrene of subcutaneous tissue and superficial fascia with subsequent death of the overlying skin [1,2]. It is an uncommon infection and represents a diagnostic and therapeutic challenge to the surgeon because of the high associated morbidity and mortality [3]. The NF is caused by *Streptococcus pyogenes* or a synergistic infection of anaerobic and facultative anaerobic bacteria [4,5]. Patients present as surgical

emergencies and require immediate surgical revision and intensive care [1]. The mortality rate is between 30 and 50% [6].

Historically the disease has been known to surgeons for over 150 years. It was first described by Joseph Jones [7] during the Civil War as “hospital gangrene.” Further synonyms were “malignant ulcer” and “phagedena” [8]. In 1924, Meleney [9] defined the *Streptococcus pyogenes* as the causative bacteria of the soft tissue infection and named the disease “hemolytic streptococcal gangrene.” The pathologic descriptive name NF was introduced by Wilson [10] and became generally accepted. Fisher [11] characterized the NF by six diagnostic criteria. Apart from extensive necrosis of superficial fascia and skin, the patients suffer from mild to severe systemic intoxication with clouding of consciousness.

In differential diagnoses with other gangrenous infections, there is no involvement of the underlying muscles, no proof of *Clostridium* in the bacteriology, and no underlying arterial vascular occlusion. Histologically there is leucocytic infiltration, focal necrosis of the fascia, and thrombosed microvasculature in the surrounding subcutaneous tissue.

In 1994 there was an outbreak of NF in England. It was a fulminant form of the disease and 18 of 25 patients died [8]. The lay media quickly named this disease “the flesh-eating bacteria syndrome” [12]. This aggressive type of NF was caused by a subtype of *Streptococcus pyogenes*, which is able to induce shock and organ failure via exotoxins [12,13]. This type of NF was defined as “streptococcal toxic shock syndrome.” The diagnostic criteria are summarized in Table 1 [14]. The NF can occur after any kind of surgery, minor injuries, and even spontaneously [15]. It can affect elderly people with a number of concomitant diseases but also young and previously healthy people [16]. We report a lethal case of a young person who developed the streptococcal toxic shock syndrome after aesthetic liposuction.

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Table 1. The streptococcal toxic shock syndrome

I. Isolation of group A streptococci (<i>Streptococcus pyogenes</i>)
A. From a normally sterile site (e.g., blood, cerebrospinal, pleural, or peritoneal fluid, tissue biopsy, surgical wound, etc.)
B. From a nonsterile site (e.g., throat, sputum, vagina, superficial skin lesion, etc)
II. Clinical signs of severity
A. Hypotension: systolic blood pressure <90 mm Hg and
B. >2 of the following signs
1. Renal impairment: creatinine >177 µmol/L
2. Coagulopathy: platelets >100,000/µl
3. Liver involvement
4. ARDS
5. A generalized erythematous macular rash that may desquamate
6. Soft tissue necrosis, including necrotizing fasciitis or myositis, or gangrene

An illness fulfilling criteria IA and II (A and B) can be defined as a definite case.

An illness fulfilling criteria IB and II (A and B) can be defined as a probable case if no other etiology for the illness is identified

Case Report

A 28-year-old woman was admitted for day surgery into an outlying hospital for aesthetic liposuction of buttock and thigh. After an uneventful operation the patient was discharged on the same day. On the second day postoperatively the patient developed influenza-like symptoms characterized by fever, chills, myalgia, nausea, vomiting, and diarrhea and was readmitted to the hospital. At clinical examination she complained of pain and tenderness at the operated site and showed minor skin changes such as erythema and swelling. She was admitted to the intensive care unit and received intravenous fluids and broad spectrum antibiotics. On the third day the patient was disoriented and developed a septic shock. Blood cultures showed *Streptococcus pyogenes*. Supplemental oxygen and finally mechanical ventilation was indicated. The skin color of her buttock and thigh turned to a grayish color and necrosis occurred. Necrotized lesions were removed surgically on the fourth day and suction drains were applied. At surgery the typical grayish and edematous subcutaneous tissue and superficial fascia were present and the diagnosis of necrotizing fasciitis was made. The patient was transferred to our unit on the fifth day with additional renal insufficiency. Figure 1 shows the clinical picture during the first dressing change with left open longitudinal incisions and additional suction drains in areas of necrotic tissue. Meanwhile the patient showed the full picture of streptococcal toxic shock syndrome with hypotension (systolic blood pressure <90 mm Hg), acute renal failure which required dialysis, coagulopathy (platelet count 54,000/µl), and acute respiratory distress syndrome. Under these unstable conditions

no further debridement was possible. The septic shock and multiorgan failure progressed rapidly and the patient died on the following day.

Discussion

Necrotizing fasciitis is a rare, uncommon soft tissue infection that presents a real threat to a patient's life [3,12]. It is described as a quickly advancing necrosis of subcutaneous tissue and fascia with substantial morbidity and mortality [3]. The incidence of NF is 0.4/100,000 inhabitants [1]. It can be initiated after surgical procedures, minor trauma, trivial scratches, in the setting of a chronic wound, or even in apparently intact skin [8,15]. It affects patients of any age, patients who are chronically ill, and also healthy patients [15]. NF can start at any site of the body [17]. This is why patients with NF present to a variety of specialists including accident and emergency, gynecology, urology, orthopedics, general medicine, geriatric medicine, and general surgery [18].

Etiologically NF may be caused by more than one bacterium and often has a polymicrobial nature [4,19]. The most detailed bacteriologic study of NF was published by Giuliano [5] who suggested that there are two forms of the disease: infections by *Streptococcus pyogenes* and mixed infections caused by a variety of bacteria ranging from *Escherichia coli*, *Proteus* species, *Enterobacter* species, *Citrobacter freundii*, *Serratia marcescens* to *Staphylococcus aureus* and *epidermidis* [5,15, 19]. The *Streptococcus pyogenes* is ubiquitous and one of the most common human pathogens [12]. It causes a wide array of illnesses such as pharyngitis, pyoderma, scarlet fever, and cellulitis. It is also responsible for the NF. When accompanied by shock, organ failure, and bacteriemia, these infections are called streptococcal toxic shock syndrome [12,20]. Apart from this fulminant type of NF caused by *Streptococcus pyogenes* there are clinically no differences in the types of NF caused by a mixed infection [5]. The rapidly progressive gangrene is limited in extent to skin, subcutaneous tissue, and superficial fascia and can be differentiated from *Clostridium* gangrene, which involves the underlying muscle [11].

Clinically, the NF presents with erythema and edema. Later, as the blood supply to the skin is compromised, this may progress to cyanosis, blister formation, and gangrene [4]. The extent of the gangrene at the fascia level is typically much greater than at the skin surface [19]. From the beginning there is severe, intolerable pain, which can even torture the patients [8]. The clue for surgical intervention is an acutely ill patient with a patient cellulitis that is spreading in spite of antibiotic therapy [4].

The main diagnostic tool is surgical exploration [18]. The pathognomonic finding is a gray, edematous, subcutaneous fat, which strips off the underlying fascia with a sweep of the finger [18]. The time for surgical intervention is critical in patients with NF [3]. Confirmation of bacterial entities should not delay surgical treatment, because only prompt and radical debridement reduces

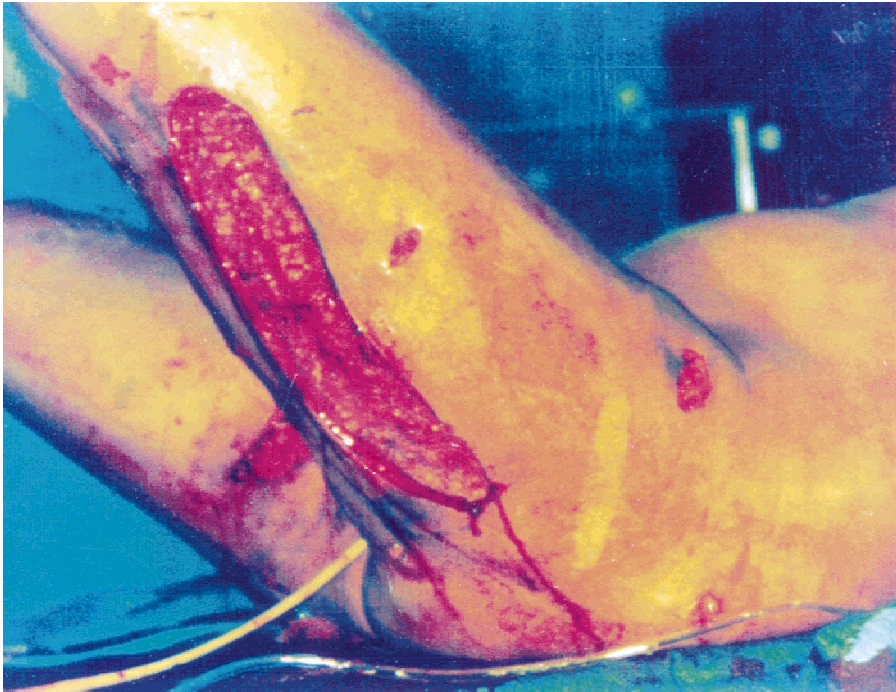


Fig. 1. Clinical aspect of a patient with necrotizing fasciitis. The upper thigh was incised at an outside hospital 2 days ago. The stab incisions result from drainage. At the day of hospital admission the buttock and thigh region was grotesquely swollen, edematous, and showed vast amounts of necrotic tissue.

the mortality [3]. Bilton et al. [21] reported a mortality rate of 38% in patients with delay in therapy compared with 4.2% after immediate surgical intervention [21]. In cases where NF is not treated by radical surgery, the mortality rate approaches 100% [1]. Therapeutically, all necrotic areas have to be removed since neither host defense nor antibiotics are effective in necrotic tissue [4]. Wide incisions have to be made to drain all undermined areas and to remove the necrotic tissue. Stab incisions and the placement of drainages are insufficient in cases of NF [4].

After Burge and Watson [18] there has been no evidence that antibiotics halt the infection, but a broad spectrum antibiotic therapy is common practice [1,2,6]; aerobic as well as anaerobic coverage should be included [3]. Antimicrobial agents that generally provide coverage for *Staphylococcus aureus* as well as anaerobic bacteria include cefoxitim, clindamycin, imipenem, and the combination of a β lactamases inhibitor (i.e., clavulanic acid) and a penicillin (i.e., ticarcillin), and the combination of metronidazole plus a β lactamase-resistant penicillin [19]. Hyperbaric oxygen is strongly advocated by some as a therapeutic option [13], but doubts remain over its use based on logistic problems and lack of hard evidence [16].

Despite all therapeutic efforts, the mortality rate is still 30% [1–3]. The patients die because of organ failure and septic complications [12]. Necrotizing fasciitis is a once seen but never forgotten disease [8].

In the present case the suction lipectomy provided a portal of entry for *Streptococcus pyogenes*. The patient was 28, healthy, and without concomitant diseases. During the treatment elsewhere, she developed the “streptococcal toxic shock syndrome.” The time to diagnosis was

3 days, the time for adequate surgical therapy was 5 days. The patient died 1 day later due to multiorgan failure. This again emphasizes that only early diagnosis of NF combined with radical surgical debridement along with broad spectrum antibiotics and aggressive fluid resuscitation is useful to decrease morbidity and mortality.

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