Case
A 33-year-old black male presented at the emergency department with high fever (40°C) and progressive swelling of the left lower leg with redness and tenderness. He had no relevant medical history and he did not take any medication. He had not travelled abroad and had not recently been immobilized. On presentation he had maximum eye, motor and verbal scores and was haemodynamically stable. His left knee was red, warm and swollen with no restriction of movement or loss of function. No subcutaneous crepitations were found on palpation of the skin.

Closer inspection of the skin showed two insect bites, possibly caused by a mosquito, with scratch marks on the medial side of his left lower leg. Laboratory examination showed no abnormalities except for a sedimentation rate of 57 mm/h (discordantly, the C-reactive protein level was not elevated).

The tentative diagnoses of cellulitis or erysipelas were made.

The patient was admitted to hospital and treatment with intravenous antibiotics was immediately started (1 gram flucloxacillin 6 times a day). Within twelve hours the patient deteriorated and became haemodynamically unstable with hypotension and tachycardia. The swelling had increased. Ultrasound examination of the left leg showed debris of superficial tissue together with an enlarged lymph node in the iliacal area.

Because of further deterioration necrotising fasciitis was considered. A limited surgical exploration of the lateral side of the left knee and the medial side of the left upper leg was performed, but no necrotizing fascia was encountered. In the wound cultures gram-positive cocci were isolated. The antibiotic therapy was switched to a combination of clindamycin (600 mg twice a day) and cefotaxim (2 grams four times a day).

Despite seemingly adequate treatment within a few hours he had developed a rapidly progressing septic syndrome with multiple organ dysfunction - respiratory insufficiency as a result of ARDS and anuria as a result of acute tubular necrosis. For this reason the patient was transferred to the ICU at our hospital where treatment with antimicrobial agents and fluid resuscitation was continued with the addition of dialysis with continuous veno-venous haemofiltration and inotropic agents.

Haemodynamic stabilization proved difficult, while the leg showed rapid progression of the lesions as livid discolorations, swelling and formation of blisters combined with dermal and epidermal lysis. A full-blown necrotizing fasciitis of the entire left leg was suspected and a re-exploration under general anaesthesia was performed immediately. During exploration obviously necrotic fascia was encountered and an extended necrectomy from foot sole to gluteal area was performed (Figure 1). Peroperatively a single shot of gentamycin 7 mg/kg was added to the antibacterial regimen.

Re-exploration on the intensive care 12 and 24 hours after surgery revealed no indication of further progression of the necrotizing fasciitis. Eventually group A haemolytic streptococcus (GAS) was isolated from the wound cultures.

Four days later a traction construction was set up on the leg, after which the wound was covered by a split skin grafts of autologous skin. Further recovery was uneventful. Renal function has completely recovered and the split skin grafts have largely grown in (Figure 2).

Additional investigations showed no signs of immune deficiences.

Discussion
Necrotizing fasciitis is an uncommon necrotizing soft-tissue infection, usually caused by toxin producing, virulent bacteria and is
characterized by widespread fascial necrosis and relatively little involvement of the skin and underlying muscles [1]. According to Giuliano et al. necrotizing fasciitis can be divided into two groups: type 1 (polymicrobial) involves non-group-A-streptococci, anaerobes (Clostridium, Bacteroides) and facultative anaerobes (Enterobacteriaceae); in type 2, group A streptococcus (GAS) is the common pathogen, sometimes in combination with *Staphylococcus aureus* [2]. Recently, however, a third type was added, involving vibrio species (*Vibrio vulnificus*, *Vibrio parahaemolyticus*, *Vibrio damselia* and *Vibrio alginolyticus*) [3].

The type of necrotizing fasciitis usually depends on the site of infection; type 1 pathogens are often cultured from abdominal infections and infections of the perineum and type 2 pathogens in infections of the extremities. Type 3, however, is usually caused by a fish bite or originates from a wound that has been exposed to shellfish or seawater [3].

Necrotizing fasciitis of an extremity, which was encountered in our patient, is most often secondary to trauma or micro trauma, intravenous drug use or an insect bite [4]. It may even develop at the site of a trivial scratch or wound or even in seemingly intact skin [4].

Diagnosis is difficult, especially in the absence of the characteristic skin lesions [3]. Hassel et al. have described clinical symptoms in a series of 14 cases of GAS necrotizing fasciitis. Patients presented most consistently with pain in the affected area. Other common complaints were swelling, and systemic symptoms of fever and rigors. Only a relatively small percentage (29%) was noted to have extensive skin erythema, while 64% had local pre-existing wounds or ulceration [5].

However, none of the symptoms described are pathognomonic necrotizing soft-tissue infections [6]. In fact, because necrotizing soft-tissue infections usually begin in deep tissue planes, the epidermis may appear relatively unscathed until late in the course of the infection. Therefore, it can be difficult to differentiate necrotizing soft tissue infections from non-necrotizing infection or even a simple cellulitis [6], which diagnosis in our case was initially also considered.

There is not one specific diagnostic laboratory test, however elevated creatinine kinase (CK), elevated white blood cell count, elevated C - reactive protein (CRP) are commonly found and can point to necrotizing fasciitis [3]. However, the gold standard for diagnosing necrotizing fasciitis is a limited surgical exploration [3], while treatment consists of immediate radical surgery, combined with intravenous antibiotics.

Reported risk factors for necrotizing soft tissue infections include: age over 50 years, peripheral vascular disease, diabetes mellitus, malnutrition, atherosclerosis, obesity and intravenous drug abuse [6]. None of these risk factors were present in our patient.

Mortality rates vary from 8.7 - 73 % depending on the time of diagnosis and surgical intervention [7]. Despite mortality rates of up to 30% in patients with multiple organ dysfunction as a result of necrotizing fasciitis [8], full recovery is possible as was demonstrated by our patient.

References