

# Management of Necrotizing Fasciitis with Proximal Tibia Fracture

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## Learning Point of the Article:

Necrotizing fasciitis when accompanied by a proximal tibia fracture can be managed with early diagnosis, thorough wound debridement with external fixation such as LRS and flap cover which can help in preserving the limb.

## Abstract

**Introduction:** Necrotizing fasciitis is a rare disease of soft tissue infection with a high mortality. It is characterized by rapidly spreading inflammation and necrosis of fascial planes. It usually follows an injury, though the cause may be a small abrasion or an insect bite or surgical incisions. It is commonly caused by bacteria such as Group A streptococcus. It may be accompanied by septic shock. It causes rapid death unless it is diagnosed quickly and managed aggressively. Prompt surgical debridement must be done to reduce mortality. Rapid diagnosis, antibiotic therapy, fluid resuscitation, and surgical debridement of the infection are all needed in the management of this fatal disease. However, when necrotizing fasciitis is associated with an underlying fracture the treatment becomes even challenging and limb-threatening.

**Case Report:** A 48-year-old male patient of South Asian descent came to Emergency Room with history of road traffic accident and sustained injury to the right (RT) leg. He was admitted with pain, swelling and blisters of the RT leg and suspected to have necrotizing fasciitis with proximal tibia fracture of the RT leg. He was treated with thorough surgical debridement, broad-spectrum antibiotics, free flap, and Masquelet's technique with limb reconstruction system (LRS). At 18 months of follow-up the fracture healed, LRS was removed, pin tracts healed and patient was able to walk without any support.

**Conclusion:** Necrotizing fasciitis is rare, rapidly progressive disease with a high mortality rate which requires prompt diagnosis, early surgical debridement, broad-spectrum antibiotics, careful fluid, and electrolyte management. These patients require a combined multidisciplinary approach for their management.

**Keywords:** Necrotizing fasciitis, proximal tibia fracture, surgical debridement.

## Introduction

Necrotizing fasciitis is a fast spreading and deadly bacterial infection. It is a rapid and serious infection of the dermis, subcutaneous tissue, fat, superficial fascia, deep fascia, and with or without involving muscles causing their necrosis. Risk factors include age more than 60 years, chronic diseases (such as diabetes mellitus and renal failure), trauma, and surgeries [1,2]. Treatment constitutes antibiotics, fluid correction, and thorough debridement. Although, even after treatment, 22% of patients may need amputation, and the mortality rate ranges from 6% to 76% [3].

## Case Report

A 48 year-old male of South Asian descent came to Emergency Room with pain and swelling of right RT leg and fever. He had suffered a road traffic accident 10 days ago and suffered trauma to RT leg. Patient was admitted in a General Hospital and treated. Above knee slab was applied. On the second day, patient developed blisters over the thigh, knee, and leg (Fig. 1). He was advised amputation of RT leg. He came to our hospital for further management. On physical examination, his RT leg was edematous with multiple blisters. Pulse oximetry showed 98%

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## Author's Photo Gallery



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**Figure 1:** (a and b) Clinical pictures of the right knee and leg showing multiple blisters and marked edema present.



**Figure 2:** X-ray of right knee (anteroposterior and lateral views) at admission showing proximal tibia fracture.

saturation. Doppler study showed normal flow. Radiographs were taken and patient was found to have proximal tibia fracture Schatzker's type VI (Fig. 2) Blood investigation showed marked increased in white blood cells, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP). There was increase in serum potassium and serum creatinine levels. Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score [4] was found to be more than 8. Patient developed acute kidney injury and was required to undergo two cycles of dialysis. Patient was started on i.v. cefuroxime and gentamicin after culture sensitivity reports and renal titration. Patient underwent surgical debridement and knee spanning external fixator (Fig. 3). Plastic surgery opinion was taken for soft tissue reconstruction. Thorough debridement was done. A second surgical debridement was done by the plastic surgeon after 2 weeks (Fig. 4). External fixator was removed as it was hindering with flap cover. Hence, two 4mm cannulated cancellous screws with washers were used to fix the articular fragments of proximal tibia and above knee slab was applied (Fig. 5). Patient was shifted to plastic surgery department for flap cover after 1 month of admission (March 2019). We were advised to wait for 4 months for the flap to mature. Patient again came with pain, swelling in RT leg and fever. ESR and CRP was found to be raised. Flap was raised along its margin necrotic tissue was removed and antibiotic (vancomycin 1.5g) cement spacer was kept and limb reconstruction system (LRS) was applied in July 2019 (Fig. 6). LRS was applied spanning the joint as the joint was open. After 6 weeks patients ESR and CRP were repeated and found to be within normal limits. Antibiotic cement spacer was removed and bone grafting was done (Fig. 7). Patient was reviewed every month for clinical and radiological evaluation. In March 2020 patients X-rays showed

consolidation of the graft radiologically, dynamization of LRS was done (Fig. 8). Patient was asked to partially weight bear with walker support. LRS removed in August 2020. At final follow-up, patient had an active knee flexion of 15 degrees.

### Discussion

Necrotizing fasciitis is a rare and severe bacterial infection that is known since the 18th century. It has been given several names such as phagedena gangrenosum, hospital gangrene, and Meleny's gangrene [5]. Earliest description of necrotizing fasciitis was given by Joseph Jones, a Confederate Army surgeon [6].

In 1952 Wilson first named this condition as necrotizing fasciitis. It included both gas forming and non gas forming bacteria. He proposed necrosis of the fascial planes as a characteristic feature of this condition [7]. It is commonly a result of polybacterial infection.

Initially, the patient may present with symptoms of cellulitis such as pain, redness, and edema. This may lead to a misdiagnosis. It then progresses rapidly within a few hours in spite of treatment with antibiotics. This may be a diagnostic clue.

It commonly affects the upper or lower limbs in about 57.8% patients [8]. Patients with a multibacterial, or those having anaerobic or gram-negative bacterial infections have a higher incidence of amputation [9].

The mortality rate from necrotizing fasciitis ranges from 9.3% to 76%. Callahan et al. performed a meta-analysis of 14 studies which shows a mortality rate of 26% [10].

Bodansky et al. conducted a 16 year longitudinal cohort study of incidence of necrotizing fasciitis in England and found that age-



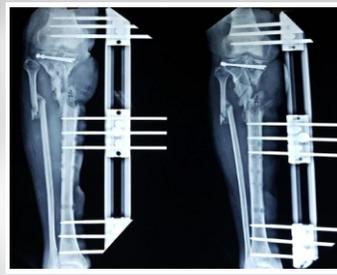
**Figure 3:** (a and b) Clinical picture and X-ray after first surgical debridement and knee spanning external fixator.



**Figure 4:** Clinical picture of the leg after second surgical debridement.



**Figure 5:** X-ray of right knee and leg Anteroposterior and lateral views showing external fixator was removed and cannulated cancellous screw fixation for proximal tibia fracture 3 weeks after injury.



**Figure 6:** X-ray of right leg anteroposterior and oblique view showing Limb reconstruction system and antibiotic cement spacer was done 6 months after injury.



**Figure 7:** X-ray right leg anteroposterior and lateral view showing bone grafting done 7 months after injury.



**Figure 8:** Final X-rays of right leg anteroposterior and lateral view showing bone graft consolidation at 16 months after injury.

standardized mortality rate remained as high as 16%. They also found that the incidence of NF due to Gram-positive bacteria such as Staphylococcus decreased while due to Gram-negative bacteria due to E. coli increased in their study period [11].

The term “time is fascia” is well known. When wound debridement is carried on within 6 h the mortality rate was 19% as compared to 32% when debridement was delayed over 6 h. Also surgery within 12 h reduced the mortality as compared to if surgery was delayed more than 12 h [12].

The probability of having NF with a LRINEC score of more than 6 is more than 90% in study conducted by Wong et al. Francis et al. reported a mortality rate of more than 50% in patients having three comorbidities (>50 years age, diabetes, malnutrition, hypertension, or iv drug abuse) [13].

Plain radiographs may show gas in subcutaneous plane. A computed tomography scoring system has been described for use in patients with equivocal physical and laboratory findings based on the presence of fascial air, edema, fluid tracking, and lymphadenopathy. A score >6, generated a high sensitivity and specificity for NF.

Magnetic resonance imaging is reported to attain a 100% sensitivity and 86% specificity; however, this is a scarce resource and takes time to acquire the images studies on necrotizing fasciitis which is accompanied with fracture are few.

This case required a combined effort of orthopedicians, plastic surgeons, microbiologists, pathologists and nephrologists in

the management. To reduce the mortality rate vigorous treatment is required. It should be started when it is suspected. It should include appropriate intravenous antibiotics, fluid management and meticulous debridement.

Due to scars, amputations, joint contractures, grafts, or flaps these patients may continue to have functional limitations after recovering from NF. Assistive devices or permanent need for care may be needed.

### Conclusion

Early diagnosis and aggressive treatment can help reduce mortality in patients with necrotizing fasciitis. This patient was able to recover from a limb and life threatening disease which was possible due to a multi-disciplinary approach.

### Clinical Message

Necrotizing fasciitis is a rare, rapidly spreading inflammation of bacterial origin and characterized by necrosis of fascial planes and surrounding tissue. It requires prompt diagnosis and aggressive treatment with broad-spectrum antibiotics, early surgical debridement, and adequate fluid replacement. Studies published of patients with a fracture along with necrotizing fasciitis are few. When necrotizing fasciitis is accompanied by a fracture the management becomes more challenging and limb threatening.

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