

# Necrotizing fasciitis after scrotum skin injury in an infant

## A case report

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### Abstract

**Rationale:** Necrotizing fasciitis (NF) is a life-threatening situation that is rare in children, especially infants, and early diagnosis is challenging. Timely identification and broad-spectrum antibiotic and supportive treatment before surgical debridement are very important for survival and may reduce scar formation.

**Patient concerns:** A previously healthy 4-month-old infant was admitted to our pediatric intensive care unit (PICU) with a history of fever and cough for 5 days and extreme swelling of the scrotum for one day. Necrotic-like tissue without margins appeared on his scrotum and perineum in 24 hours.

**Diagnosis:** NF was suspected, and the patient soon developed shock. The patient underwent surgical debridement after his condition stabilized. Pathological analysis confirmed the diagnosis of NF.

**Intervention:** Broad-spectrum antibiotic, immediate fluid resuscitation, assistant ventilation, and vasoactive drugs were administered. Surgical debridement and autologous split-thickness skin grafting were performed.

**Outcomes:** The wound recovered well after 2 months. Ultrasound revealed normal testicles, and no anorectal injury was found.

**Lessons:** Close clinical monitoring and timely treatment of skin injuries in sick children are very important. Sufficient antibiotic administration and supportive treatment before surgical debridement are crucial for survival from NF.

**Abbreviations:** NF = necrotizing fasciitis, PICU = pediatric intensive care unit.

**Keywords:** infant, necrotizing fasciitis, skin injury, treatment

## 1. Introduction

Necrotizing fasciitis (NF) is a life-threatening situation that occurs in 8/10,000,000 children annually.<sup>[1]</sup> This condition is a

serious bacterial infection of subcutaneous tissue and superficial fascia with high morbidity and mortality.<sup>[2]</sup> No established treatment protocol for children with NF is available.<sup>[3]</sup> Herein, we describe the complete clinical process of NF and successful treatment in an infant after a minor skin injury. We emphasize the importance of identifying serious infection conditions in infants with skin injury and the importance of timely, suitable therapy.

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ZXR and CLL contributed equally to this work.

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Informed patient consent: The parents consented to have their child included in this case report.

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## 2. Case presentation

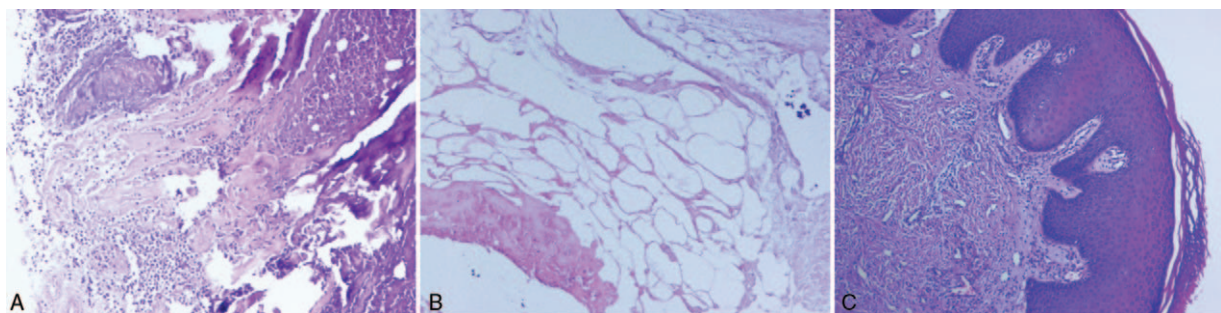
A previously healthy 4-month-old infant was admitted to our pediatric intensive care unit (PICU) with a history of fever and cough for 5 days and extreme swelling of the scrotum for 1 day (Fig. 1 A). His parents had found minor skin damage on the surface of the scrotum before swelling. Examination revealed a temperature of 38.3°C, pulse of 190 beats per minute, respiratory rate of 52 breaths per minute and blood pressure of 119/62 mm Hg. Laboratory tests showed low white blood cell counts, hemoglobin levels, platelet counts, and elevated C-reactive protein and procalcitonin levels. The infant was diagnosed with sepsis and treated with vancomycin (at a dose of 10 mg per kilogram of body weight every 6 hours), meropenem (at a dose of 40 mg per kilogram of body weight every 8 hours), and metronidazole (at a dose of 7.5 mg per kilogram of body weight every 8 hours, after the first dose of 15 mg per kilogram of body weight). However, his condition deteriorated in 24 hours. Necrotic-like tissue without margins was observed on the scrotum and perineum (Fig. 1B). NF was suspected, and surgical consults were obtained. However, the patient soon developed shock that manifested with cyanosis, dyspnea, and hypotension.



**Figure 1.** Clinical process of NF and treatment in a 4-month-old infant. (A) Extremely swollen scrotum after minor skin damage. (B) Necrosis in the scrotum and perineum. (C) Necrotic tissue with clear margins after antibiotic treatment. (D) Autologous split-thickness skin grafting after debridement. (E) Healed wound after 2 months.

Immediate fluid resuscitation, assisted ventilation, and vasoactive drugs were administered. Blood culture and bacterial cultures from the wound revealed *Pseudomonas aeruginosa* and *Proteus mirabilis* infections, which were sensitive to the antibiotics given. His condition stabilized after continuous supportive treatment. Assisted ventilation and vasoactive drugs were withdrawn after 1 week. The antibiotics were withdrawn after 2 weeks. The area of necrotic tissue diminished and exhibited clear margins from normal skin (Fig. 1C). The infant then underwent surgical

debridement with deep incisional tissue biopsy. Pathological analysis revealed necrosis of all tissue layers with neutrophil infiltration (Fig. 2 A and B). Autologous split-thickness skin grafting was performed approximately 4 weeks after surgery (Fig. 1D). The wound recovered well, and ultrasound revealed normal testicles. No anorectal injury was found. Repeated skin pathological analysis revealed fibrous repair and granulomatous reaction (Fig. 2C). The patient was discharged after 3 weeks, and the wound healed well during the 2-month follow-up (Fig. 1E).



**Figure 2.** Histopathology of skin biopsy. (A) Necrotizing muscle tissue with infiltration of neutrophils. (B) Ischemic necrosis in fibrous connective tissue and adipose tissue. (C) Fibrous repair and granulomatous reaction in the dermis and subcutaneous tissue during wound healing (hematoxylin and eosin, original magnification  $\times 100$  in A and C and  $\times 200$  in B).

### 3. Discussion

NF is a rare, life-threatening condition in infants. Early diagnosis is difficult because of the lack of specific manifestations that are suggestive of NF.<sup>[4]</sup> NF may initially present as only minor skin injuries but develop very aggressively to shock and death.<sup>[1]</sup> An underlying medical condition, such as a predisposed immunocompromised condition, is common in most cases.<sup>[1,2]</sup> The infant in our case had a respiratory tract infection, and only a minor skin injury in the scrotum was initially found, which is very easily overlooked. The injury would recover quickly without treatment in most situations, but it may also rapidly develop into a very severe infection.<sup>[5]</sup> This progression makes it very difficult to manage skin injuries in sick children compared to healthy ones.<sup>[6–8]</sup> Timely identification and broad-spectrum antibiotic and supportive treatment are very important for survival because septic shock develops quickly.<sup>[3]</sup> In our case, broad-spectrum antibiotics, which covered the most likely pathogens, were given in a timely manner. This rapid treatment likely contributed to the infant's successful recovery.

To date, there is no established treatment protocol for children with NF.<sup>[3,6]</sup> Urgent surgical debridement of necrotic tissue is crucial and recommended for adults.<sup>[4]</sup> However, surgery was not performed in our case until the injury exhibited clear margins. The wound size was reduced during antiseptic therapy, which may have helped preserve the healthy tissue during debridement and reduce scar formation.

In conclusion, we herein described the complete clinical process of NF after a minor skin injury and provided an alternative strategy for surgical treatment. Sufficient antibiotic administration and supportive treatment before surgical debridement are crucial for survival in NF. We also emphasize the importance of close clinical monitoring and timely treatment of skin injury in sick children.

### Author contributions

**Formal analysis:** Q. Zhang.

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**Visualization:** C.L. Liu.

**Writing – original draft:** Z.X. Ren.

**Writing – review & editing:** J. Yang.

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