**Emergency surgical management of rapidly progressive necrotizing fasciitis in an infant: a case report**

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**ABSTRACT**

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| **Aims:** To present an infant with necrotizing fasciitis following NSAID administration for cutaneous erythema. We describe the therapeutic management, clinical course, and discuss the potential association between NSAID use and the development of necrotizing fasciitis.  **Case presentation:** This case involves an 18-month-old infant with no medical or surgical history who had been treated with non-steroidal anti-inflammatory drugs (NSAIDs) for a truncal erythema. One month after treatment, the child developed fulminant necrotizing fasciitis of the left upper limb, extending to the left flank, accompanied by severe septicemia  **Discussion:** Necrotizing fasciitis is a rare and severe infectious disease. In pediatrics and neonatology, several predisposing factors contribute to the development of necrotizing fasciitis. The evolution of necrotizing fasciitis is extremely rapid, with the appearance of blisters, cutaneous necrosis, and a marked deterioration in the patient's general condition. It constitutes a surgical emergency. The role of non-steroidal anti-inflammatory drugs (NSAIDs) as a risk factor for necrotizing fasciitis has been a subject of controversy.  **Conclusion:** This case clearly illustrates that the spread of the infection beyond the upper limb quickly becomes life-threatening and highlights the importance of radical excisional surgery to eradicate the infection. NSAIDs should be avoided in the management of cutaneous erythema, particularly in children, to mitigate the risk of developing necrotizing fasciitis - a potentially life-threatening condition. |

*Keywords: Necrotizing fasciitis, Non-steroidal anti-inflammatory drugs, Erythema*

**INTRODUCTION :**

Necrotizing fasciitis is a rare and severe infectious disease, not well known among surgeons, and associated with high morbidity and mortality despite significant advancements in resuscitation techniques. It affects the dermis, hypodermis, and fascia.

The initial skin presentation ranges from minimal rash to cellulites.

Early diagnosis and initiation of aggressive surgical and supportive therapy offer the best chance for survival.

**CASE PRESENTATION :**

This case involves an 18-month-old infant with no medical or surgical history who had been treated with non-steroidal anti-inflammatory drugs (NSAIDs) for a truncal erythema. One month after treatment, the child developed fulminant necrotizing fasciitis of the left upper limb, extending to the left flank, accompanied by severe septicemia(figure1,2).

Biological test results revealed a white blood cell count of 13,030/mm³, with neutrophil predominance at 10,760/mm³, and a C-reactive protein (CRP) level of 189 mg/L, without other associated abnormalities. Blood cultures identified a beta-hemolytic streptococcus. The child was initially treated with penicillin-based antibiotic therapy, along with complete excision of necrotic tissues in the first stage. Given the favorable clinical progression, a second-stage procedure was performed five days later, involving flap grafting to cover the skin tissue loss. The child was hospitalized for a total duration of one month.

**Discussion**

Extensive surgical excision of necrotic tissue, combined with medical resuscitation including transfusions and high-calorie, high-protein parenteral nutrition, allowed for eradication of the infection(figure3).

Postoperative intensive care management is essential. Bacterial toxin release following surgical excision may lead to rapid multiorgan failure [1]. A second-look surgery at 24 hours is indispensable.

The residual skin defects were subsequently covered with a meshed split-thickness skin graft(figure4).

The final outcome was satisfactory, with good functional results: normal mobility of the shoulder and elbow, and satisfactory recovery of hand function(figure5).

 

Figure 1,2 : Necrotizing fasciitis of the left upper limb extending to the left flank.



Figure 3 : Extensive surgical excision of necrotic tissue.



Figure 4 : Expanded split-thickness skin graft.



Figure 5 : Final outcome with full range of motion.

Necrotizing fasciitis is an extremely rare clinical entity, with approximately 1,000 cases reported annually in the United States[2]. This incidence appears to have increased, possibly as a result of greater awareness of the condition leading to higher reporting rates, increased bacterial virulence, and growing resistance to antimicrobial agents.

In pediatrics and neonatology, several predisposing factors contribute to the development of necrotizing fasciitis, such as varicella lesions, i.m. injections, application of a cream containing menthol to the cervical region, penetrant gluteal trauma, omphalitis, dental abscess and streptococcal toxic shock syndrome[3]. In our case, there were pre-existing skin lesions prior to the development of necrotizing fasciitis, which may be consistent with varicella lesions, thus representing a predisposing factor.

Varicella skin complications encompass a range of conditions such as cellulitis, abscesses, necrotizing fasciitis, impetigo, and gangrene, with prevalence rates in the pediatric population varying widely [11]. Necrotizing fasciitis is an uncommon but serious complication of varicella-zoster infection [12]. Diagnosis of necrotizing fasciitis can be challenging as it closely mimics cellulitis [13, 14], potentially leading to delayed treatment and increased risk of mortality and morbidity.

This highlights the importance of vaccination and preventive measures in mitigating the risk of varicella-related complications, even in seemingly healthy individuals. In the United States, 70% of varicella related hospitalizations were among healthy individuals with no contraindications for vaccination [16].

Fever is common, and signs of severe sepsis (shock, tachypnea, and oliguria) are present in nearly half of cases. The most frequently involved pathogen is group A β-hemolytic Streptococcus (GAS), although the infection can also be polymicrobial, involving both aerobic and/or anaerobic organisms.

The evolution of necrotizing fasciitis is extremely rapid, with the appearance of blisters, cutaneous necrosis, and a marked deterioration in the patient's general condition. The extent of subcutaneous necrosis typically exceeds the visibly affected skin area. Necrotizing fasciitis constitutes a surgical emergency. Treatment requires prompt and complete debridement, which may be extensive and, at times, mutilating. Even with appropriate medical and surgical therapy, the mortality rate in NF is more than 50%[4].

Complications in survivors include peritonitis, visceral abscesses with consequent peritoneal adhesions, skin grafting and amputations[5].

The role of non-steroidal anti-inflammatory drugs (NSAIDs) as a risk factor for necrotizing fasciitis has been a subject of controversy since the publication in 1966 of three cases of necrotizing fasciitis in adults treated with indomethacin[6].

The publication, in 1995, of a series of 14 pediatric cases of necrotizing fasciitis following chickenpox[7] 35% of which had been exposed to ibuprofen reignited the controversy over the role of NSAIDs in the development of this condition and led the Americans to issue a warning against the use of NSAIDs during chickenpox.

Varicella, typically considered a mild illness, can result in hospitalizations due to various complications affecting both children and adults, with rates typically below 1% [15].

A case-control study [8] compared 19 children hospitalized for necrotizing fasciitis within three weeks following chickenpox with 29 control children, also hospitalized within the same timeframe after chickenpox, but for a soft tissue infection (that was not necrotizing fasciitis). The groups were matched for sex, age, and presence of group A Streptococcus (GAS). The necrotizing fasciitis cases had more frequently received ibuprofen prior to hospitalization than the controls , suggesting that ibuprofen may promote the development of necrotizing fasciitis in children with chickenpox. In most children (whether or not they had fasciitis), ibuprofen was started after the onset of skin infection symptoms, suggesting a promoting rather than triggering role of ibuprofen, which would require a pre-existing skin infection.

Between January 1969 and November 1995, 33 cases of necrotizing fasciitis considered secondary to the use of NSAIDs were reported to the FDA (Food and Drug Administration)[9], one-third of which involved children. The NSAID had been prescribed for varicella (33%), in the postpartum period (18%), or following trauma (18%). The medications involved were diclofenac (48%), ibuprofen (33%), piroxicam (9%), and indomethacin (6%). NSAIDs were administered orally (50%), intramuscularly (21%), rectally (15%), or topically (3%). All patients except one were hospitalized; 80% required surgical debridement, and 6% underwent amputation. The mortality rate was 30%.

For the responsible pathogen, Coagulase-negative Staphylococcus (CONS) infection is the most common bloodstream infection treated in neonatal and pediatric intensive care units and significantly affects patient mortality and morbidity. S. epidermidis is the most common CONS species isolated clinically and investigated for its pathogenicity, virulence, and is a major nosocomial pathogen, even though it is a member of the normal bacterial flora of skin and the mucous membranes[10].

In our patient, this is an 18-month-old infant who was treated with NSAIDs for a skin rash that could be chickenpox, based on the location of the lesions on the trunk and limbs, and who subsequently developed necrotizing fasciitis. Based on these studies, a link can be suggested between the use of NSAIDs for chickenpox and the development of necrotizing fasciitis.

**CONCLUSION :**

It cannot be stated with certainty that NSAIDs promote the development of necrotizing fasciitis, but their use can be discouraged in cases of chickenpox and during any soft tissue infection.

This case clearly illustrates that the spread of the infection beyond the upper limb quickly becomes life-threatening and highlights the importance of radical excisional surgery to eradicate the infection.

Necrotizing fasciitis (NF) is a serious medical condition associated with high morbidity and mortality. Since the onset of the COVID-19 pandemic, paediatricians have observed an increase in severe and life-threatening NF cases among previously healthy children. Enhancing our understanding of the risk factors and treatment strategies - pharmacological and surgical - is therefore essential.

In summary, NSAIDs should be avoided in the management of cutaneous erythema, particularly in children, to mitigate the risk of developing necrotizing fasciitis - a potentially life-threatening condition.

**Authors’ contributions :**

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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**CONSENT :**

All authors declare that ‘written informed consent was obtained from the patient’s next of kin for publication of this case report and accompanying images.

**ETHICAL APPROVAL :**

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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**COMPETING INTERESTS :**

Authors have declared that no competing interests exist.

**DISCLAIMER (ARTIFICIAL INTELLIGENCE) :**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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