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## CASE REPORT

## Necrotising Fasciitis following Intramuscular Injection in a Nigerian Neonate: A case report

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### Summary

Necrotising fasciitis (NF) is a rare but severe, life-threatening bacterial infection of the fascia, with secondary necrosis of the subcutaneous tissues. Necrotising fasciitis is caused by an infection of the skin, subcutaneous tissue, and fascia by one or more bacterial organisms, resulting in the death of these tissues. NF is rare in neonates, but it has been reported following omphalitis, balanitis, mastitis, and postoperative complications. The mortality in neonates with necrotising fasciitis has been reported to be as high as fifty per cent. We report a case of NF in a term male neonate with an intramuscular injection at the left shoulder at birth under suspected septic conditions. The wound swab yielded *Escherichia coli* and *Pseudomonas* species, while the blood culture yielded *Staphylococcus aureus* and *Pseudomonas* species. The infant received antibiotics, and the wound was debrided. He was discharged after sixteen days of hospitalization. This case is reported to highlight the possible role of injections under septic conditions as a risk for necrotising fasciitis in the newborn. Health workers are encouraged to ensure aseptic skin preparation before injections.

**Keywords:** Bacterial Infection, *Escherichia coli*, Fasciitis, Intramuscular Injection, *Pseudomonas aeruginosa*, *Staphylococcus aureus*.

### Introduction

Necrotising fasciitis (NF) is a rare but severe, life-threatening bacterial infection of the fascia, with secondary necrosis of the subcutaneous tissues. [1] It is also known as a flesh-eating disease. The rate of spread of NF is directly proportional to the thickness of the subcutaneous layer, and it moves along the fascia plane. [2, 3]

Necrotising fasciitis is caused by one or more bacteria that attack the skin, subcutaneous tissue, and fascia, resulting in the death of these tissues. These infections can be abrupt, rapidly

progressing, and severe. The management with antibiotics and debridement of the necrotic tissue should be promptly done; if this is delayed, it may lead to multiple organ failures and death from toxic shock syndrome or toxic shock-like syndrome. [4] People whose immune systems are weakened have a greater risk of developing NF. Although NF is rare in neonates, it has been reported following infections such as omphalitis, mastitis, balanitis and bullous impetigo. [5] It has also been associated with postoperative complications. [6]

Necrotising fasciitis develops when the skin integrity is compromised following trauma. It rarely develops in a healthy person with intact skin. [7] Some procedures may result in necrotising fasciitis; these include intramuscular injections, intravenous infusions, drainage of ischio-rectal and perianal abscesses, and intraperitoneal infections. [2] The bacteria implicated in NF may be aerobic, anaerobic, or mixed, [8] and survival is associated with the type of pathogens, patient characteristics, infection site, and promptness of treatment. The mortality in patients with NF is notably high [2] and can be as high as 50% in neonates. [9] This case is reported to highlight the possible role of injections under septic conditions as a risk for necrotising fasciitis in the newborn.

### Case Description

A term male neonate was admitted on the 6th day of life into the Newborn Unit of the Wesley Guild Hospital (OAUTHC), Ilesa, Nigeria, on account of left upper arm swelling, fever, and poor suck, of two-day duration. He did not cry at birth following delivery at a private hospital. As part of the resuscitative measures, he was given hydrocortisone injection on the left upper arm (shoulder). The Apgar score was unknown, and he did not receive Vitamin K injection at birth. The baby was subsequently discharged home within twenty-four hours of life. The mother noticed a swelling on the left upper arm on the fourth day of life. The swelling was tender, with a limitation of movement of the affected limb. The baby was taken to the place of birth, where the swelling was incised, and a copious amount of pus was drained. After that, the infant was placed on an oral ampicillin-cloxacillin combination and was managed on an outpatient basis. On the sixth day of life, the mother noticed

that the baby was bleeding from the same site, had a fever and could not suck well hence the verbal referral to our facility. The mother was a twenty-three-year-old primipara who received antenatal care at the same private hospital where the infant was delivered. The pregnancy was booked for antenatal care at a gestational age of 12 weeks.

Physical examination revealed a male neonate weighing 2.2kg, severely pale and febrile (38.4°C). He had a diffuse, fluctuant, tender oedema measuring 18cm in diameter across the left shoulder joint, with ecchymotic lesions extending from the shoulder to the elbow joint. An overlying 2cm incision wound was seen draining pus. There was differential warmth over that shoulder with tenderness, but the distal pulses were palpable (Figure 1). The infant was tachypnoeic with a respiratory rate of 120cycle/minute but a peripheral oxygen saturation of 95-97% in room air. He was tachycardic with a heart rate of 172beats per minute, the first and second heart sounds were normal, and there was no murmur. The infant was conscious with fair cry and activity, and primitive reflexes were present.

The Packed Cell Volume (PCV) was 17%, necessitating a single volume exchange blood transfusion. Other investigations requested included wound swabs for microscopy, culture and sensitivity, full blood count, blood culture, and plain X-ray of the affected shoulder joint. The infant received intravenous cefuroxime, gentamicin, intramuscular vitamin k, Dextrose/Saline intravenous fluid, and anti-tetanus serum in doses recommended according to the unit's protocols. The X-ray revealed soft tissue swelling over the deltoid region with multiple radiolucencies. There was no obvious bony abnormality.



**Figure 1: Left shoulder of the baby at presentation**

The surgeon debrided, incised and drained the wound, and the cavity was irrigated with hydrogen peroxide and normal saline on the second day of hospitalization. The wound was dressed daily with povidone-iodine-soaked gauze, dry gauze and crepe bandage. On the third day of hospitalization, moderate oedema involving the entire upper limb was noticed. The wound was debrided again because there were significant devitalized tissues with offensive darkish effluent from the wound. (Figure 2). Intrasite gel was prescribed but was not purchased until the next day. The fever subsided on the fourth day of admission, and the infant had another session of top-up transfusion. The wound swab microbiologic examination yielded *Escherichia coli* and *Pseudomonas* species, and both organisms were sensitive to cefuroxime and gentamicin. Wound inspection revealed a greenish, pyogenic membrane over the deltoid and exposed proximal 2cm of the humeral head; hence, intravenous metronidazole was added to the antibiotic regimen. On the seventh day of hospitalization, despite daily dressings, there was still copious pus discharge from the wound.

Blood culture yielded *Staphylococcus aureus* and *Pseudomonas* species, both sensitive to ciprofloxacin. Therefore, the antibiotic therapy was changed to intravenous ciprofloxacin and metronidazole. He received another blood transfusion on the eighth day of admission. The wound progressively healed well (Figure 3), and the baby was discharged after spending sixteen days on admission.

## **Discussion**

Necrotising fasciitis (NF) is an uncommon but severe infection of the skin, soft tissues, and muscles. It progresses rapidly through the fascia planes, destroying the fascia at a rate of 2.5cm an hour. [10] Although NF is believed to be an adult disease rare in neonates, [11] the index case was a six-day-old boy who presented with an extensive lesion involving almost the whole left arm. The rate of spread in this patient was fast, and within a few days, the tissue necrosis was very extensive.

Typically, the causative organisms gain entry when there is a break in skin integrity. [1] In neonates, NF has been ascribed to secondary infections like omphalitis or surgical complications. [5] The index patient received an intramuscular injection, which is a minor procedure; although there was a breach in the skin integrity, no complication was ordinarily envisaged. However, studies have shown that

intramuscular injections can cause local reactions, such as irritation, inflammation, necrosis, and sepsis. [12] In the index case, blood culture yielded *Staphylococcus aureus* and *Pseudomonas*, similar to the finding in a previous study by Rossi and Conen, [15] where *Staphylococcus aureus* was the implicated organism in all six cases of sepsis reported following intramuscular injection. [13]



Figure 2: Left shoulder after debridement



Figure 3: Left shoulder at the point of discharge from the hospital

In terms of aetiology, NF is classified into four types based on microbiological findings. Most cases are polymicrobial, classed as Type I (70-80% of cases). Others are Type II (monomicrobial of any organism type), Type III (Gram-negative monomicrobial, including marine-related organisms), and Type IV (fungal) [2]. Therefore, a combination of antibiotics has been recommended because type 1 NF is the most common. This includes penicillin or cephalosporin for Gram-positive, an aminoglycoside for Gram-negative, and clindamycin or metronidazole for the anaerobic organism. [14] This explains why this patient received cefuroxime, gentamicin, and metronidazole, but the drug cefuroxime was changed to ciprofloxacin based on the blood culture findings and sensitivity test. So, it is imperative to perform both wound and blood cultures as soon as possible to choose appropriate antibiotics.

Bakleh *et al.* [11] reported that lack of acute inflammatory reaction and the existence of bacteria at the site of infection was linked with a worse clinical outcome in NF. The index patient presented with features that suggest an acute inflammatory response, including redness, swelling and pain. This may support the good outcome seen in this child despite the extensive tissue loss at presentation. The host factors and pathogen involved in necrosis fasciitis influence the prognosis. [15] However, early diagnosis and prompt surgical debridement are believed to be the leading factors in favourable prognosis [8] Although this patient is a neonate whose immune system was not well developed, still, the outcome was good due to prompt and aggressive treatment, including appropriate antibiotics and surgical debridement.

### Conclusion

Neonatal NF is a rare but often fatal bacterial infection affecting subcutaneous tissues. In the index case, the causative organisms were introduced via IM injection under suspected septic conditions. Clinically, it is characterized by signs of inflammation and systemic toxicity such as fever and poor suck in this patient. Therefore, a high index of suspicion, prompt aggressive debridement, appropriate antibiotics, and supportive care are the mainstays of management in newborn infants with NF.

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**Authors' Contributions:** OT and OOA conceived and designed the study along with EAE, while OT and EAE did the literature review. All the authors participated in drafting and revising the manuscript for sound intellectual content and approved the final version of the manuscript.

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