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Case Report

An Unusual Presentation of Neonatal Cellulitis: Rapidly Progressing Bullous Lesion in a Newborn

***Aishatu Yahya Muhammad[1] and Muhammad Suleiman[2]**

[1]Department of Paediatrics, North-West University Kano, Nigeria
[2]Department of Medicine, Murtala Muhammad Specialist Hospital, Kano, Nigeria
****Corresponding Author's email*: aishayahya35@yahoo.com**

ABSTRACT
Bullous skin lesions presenting at birth are uncommon and may pose a diagnostic challenge, particularly when they are rapidly progressive and associated with systemic features. The differential diagnosis includes infectious, traumatic, and inherited blistering disorders. We report the case of a one-hour-old neonate who developed a unilateral bullous lesion involving the right foot shortly after wearing a sock, which was rapidly progressing with associated fever and well-demarcated erythema extending proximally to the mid-leg. No reported family history of similar lesions. The acute onset, rapid progression, surrounding erythema, and systemic manifestation raised concern for a serious neonatal cutaneous infection, while the temporal relationship with friction from the sock also necessitated consideration of trauma-related blistering disorders. The neonate was evaluated clinically and managed accordingly. A careful history of onset, preceding trauma, family history, systemic features, and evolution of the lesion is important for establishing the diagnosis and guiding early management of neonates with rapidly progressive bullous lesions.

Keywords: Bullous lesion; Cellulitis; Kano State; Neonatal blistering disorder; Neonates

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INTRODUCTION

Neonatal cellulitis is an uncommon but potentially serious bacterial infection of the skin and subcutaneous tissues. It may present with localized erythema, warmth, swelling and tenderness, with systemic manifestations such as fever, well as poor feeding. Although infections of the skin and soft-tissues are relatively uncommon in newborns, they are important because neonates have immature immune defenses and infection may progress rapidly into bacteraemia or sepsis. *Staphylococcus aureus* is an important pathogen in neonatal skin and soft-tissue infections, while *Group B Streptococcus* has also been reported as a cause of neonatal cellulitis (Richard *et al*., 2012).

The neonatal skin is particularly vulnerable to disruption and trauma. Mechanical injury, punctures, instrumentation, maceration and other forms of disruption of the skin barrier can provide a portal of entry for pathogenic organisms. Consequently, cellulitis may develop following apparently minor local trauma (Michael *et al*., 2024).

The clinical diagnosis of neonatal cellulitis can be challenging, particularly when it presents with vesicles or bullae. Bullous lesions in a newborn have a broad differential diagnosis, including bullous impetigo, staphylococcal scalded skin syndrome, traumatic blistering, inherited blistering disorders and other infectious conditions. The presence of rapidly spreading erythema, bullae or skin sloughing should raise concern for more extensive or potentially severe soft-tissue infections and warrants prompt evaluation and treatment (Dennis *et al*., 2015).

Although neonatal skin and soft-tissue infections are often localized, systemic infection cannot be excluded on the basis of appearance alone. In a multi-centre study of infants younger than 60 days presenting with skin and soft-tissue infections, invasive bacterial infection occurred in approximately 2%, with bacteraemia or sepsis being the most frequent invasive complication (Foradori *et al.*, 2021). Furthermore, neonatal cellulitis has been described as a rare condition that may have an atypical presentation and requires early recognition and treatment (El Qadiry *et al.*, 2018). We report an unusual case of rapidly progressive unilateral neonatal cellulitis presenting initially as a bullous lesion of the right foot in a one-hour-old neonate, associated with well-demarcated erythema extending to the mid-leg and fever. This case-report aim at highlighting the importance of early recognition of neonatal cellulitis and prompt management to prevent progression to systemic infection.

CASE REPORT

A one-hour old neonate delivered at home by 38-years-old multipara referred to our clinic from Muhammad Abdullahi Wase Teaching Hospital, Paediatric Out Patient Department with uni-lateral bullous lesion on the right foot after wearing a sock. There was associated fever and poor feeding. There was no history of cough or difficulty in breathing, but has not yet passed meconium at presentation. Delivery was through spontaneous vaginal delivery. There was no history of birth trauma. Labour was precipitate (lasted only few hours). There was history of maternal intrapartum pyrexia and premature rapture of membranes. There was no history suggestive of chorioamnionitis. The mother had no history of rash during pregnancy. No family history of similar illness. The Baby had Apgar score of 6 at 1 minute and 10 at 5 minutes. Clinical examination revealed a newborn acutely ill-looking, irritable and febrile (38.6^0C); the weight of the baby was 3.5 kilograms, acyanosed in respiratory distress, heart rate was 180 beats/minute (tachycardia), respiratory rate was 50 breaths/minutes (tachypnoec). Skin examination revealed a bullous skin lesion on the sole of the right foot with surrounding erythema that extended up to the mid leg, the leg was oedematose there was ulcerated area on the dorsum of the foot which was exudating serous fluid. The lesion rapidly progressed with some areas of crusting (Fig 1).

The acute onset, rapid progression, surrounding erythema, and systemic manifestation raised concern for a serious neonatal cutaneous infection, while the temporal relationship with friction from the sock also necessitated consideration of trauma-related blistering disorders. The neonate was evaluated clinically and managed accordingly. Skin swab was taken for microscopy, culture and sensitivity. The culture yielded *Streptococcus species*. Full blood count showed a white blood cell count of 15000/mm^3 with neutrophilia (1100/mm^3); lymphocyte count was 2763 /mm^3 while platelet count was 16900 /mm^3. Cerebrospinal fluid culture was sterile. Skin biopsy was taken for histology, which showed marked tissue oedema with an intense neutrophilic infiltrate extending through the dermis and deep subcutaneous tissue.

The patient was placed on daily wound dressing, intravenous Ampiclox (200mg /kg/day in two divided doses, intravenous gentamicin 5mg/kg/day in two divided doses, intravenous paracetamol 10mg/kg/dose 8 hourly, intravenous fluid (paediatric saline). The inflammation decreased rapidly and significant clinical improvement was noticed within 48 hours. The antibiotics were continued for one week. The lesion healed with no recurrence at 6 months later during follow up visit.

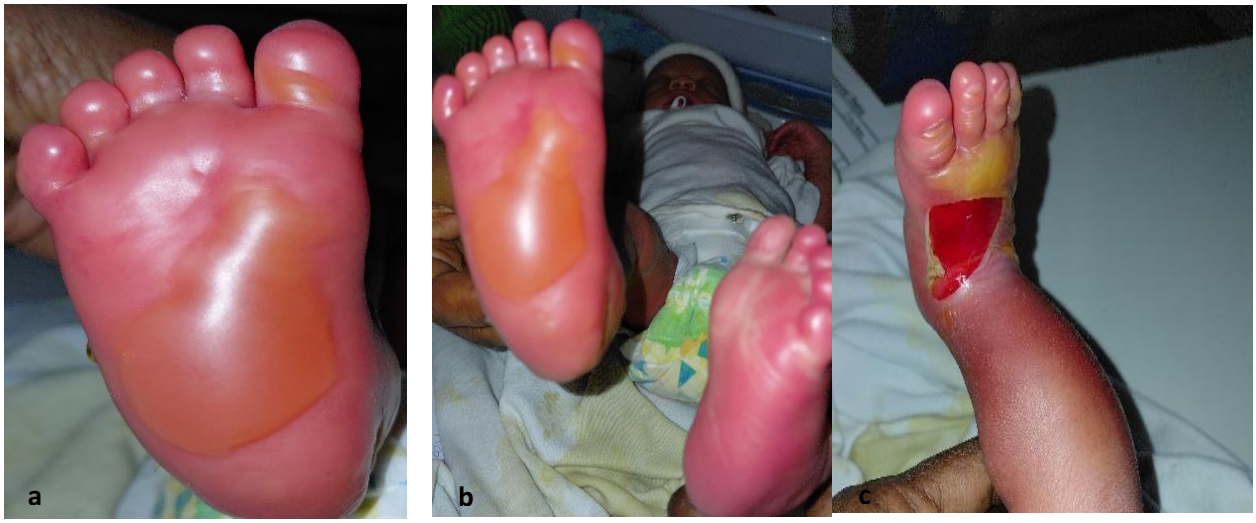

Figure 1a-c: Presentation of the right foot at the point of admission

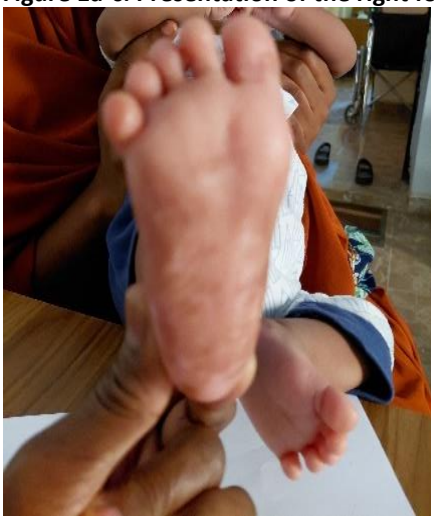

Figure 2: presentation of the right foot after 6 months

DISCUSSION

Neonatal cellulitis is an uncommon but potentially serious bacterial infection. It is particularly important in newborns because clinical manifestations may be atypical and progression to systemic infection can be rapid. El Qadiry *et al.* (2018) described neonatal cellulitis as a rare condition that may present with sepsis and extensive inflammatory skin lesions, emphasizing the need for early recognition and treatment. The present case is unusual because the lesion appeared within the first hour of life, was localized initially to the sole of the right foot, and progressed rapidly to involve the surrounding foot and mid-leg.

The clinical features in this neonate strongly supported an acute infective process. The presence of fever (38.6^0 C) irritability, poor feeding, tachycardia, tachypnoea, extensive erythema, oedema and tenderness indicated both localized inflammation and systemic involvement. The rapid progression of the lesion over several hours, with ulceration, serous exudation and crusting was also concerning for an aggressive bacterial skin and soft-tissue infection. Neonatal skin and soft-tissue infections are particularly important because the immature neonatal skin barrier is susceptible to trauma and bacterial invasion. *Staphylococcus aureus* is an important pathogen in neonatal skin and soft-tissue infections, while group B *Streptococcus* (GBS) is a recognized cause of neonatal cellulitis (Richard *et al*., 2012).

A striking feature of this case was the bullous presentation. Bullae are not the classical description of uncomplicated cellulitis and therefore broaden the differential diagnosis. Important considerations include bullous impetigo, staphylococcal scalded skin

syndrome (SSSS), traumatic/friction blisters, epidermolysis bullosa and other inherited or acquired neonatal blistering disorders. Bullous impetigo is usually caused by *S. aureus* and can produce flaccid bullae in neonates (Shalini *et al.,* 2016). Occurrences of SSSS can also present with fever, irritability, rapidly developing flaccid bullae and extensive erythema. Indeed, a reported preterm neonate developed SSSS within the first 24 hours of life, with rapid progression of erythema and bullae (Prem *et al*., 2011).

However, the distribution and clinical evolution in the present case were more suggestive of a local cellulitic process than SSSS. The lesion remained predominantly unilateral, beginning on the sole of one foot, with marked surrounding erythema extending proximally to the mid-leg. Usually, SSSS produces a more generalized superficial epidermal process, often with widespread tenderness, superficial flaccid bullae and desquamation rather than a single anatomically localized focus. Histology in SSSS typically demonstrates superficial intraepidermal cleavage, whereas the biopsy in this patient demonstrated marked tissue oedema with an intense neutrophilic infiltrate extending through the dermis and into the deep subcutaneous tissue. The latter finding is compatible with a deep inflammatory infective process such as cellulitis (Saleh *et al*., 2025); although it is not by itself pathognomonic.

The temporal relationship between wearing a sock and the development of the lesion is noteworthy. Mechanical friction or pressure might have disrupted the neonatal skin barrier and potentially facilitated bacterial entry. Neonatal skin is fragile and can be traumatized by mechanical pressure, instrumentation and other forms of local injury (David, 2013). Nevertheless, it would be in-appropriate to conclude that the sock directly caused the cellulitis. It may have been coincidental, or local friction might have provided a portal of entry for infection. The precipitate of labour and premature rapture of membranes give a possible clue to the route of bacterial entry.

The microbiological investigations in this patient showed *Streptococcus species*. The cerebrospinal fluid was sterile. This further support diagnosis of bacterial cellulitis. El Qadiry *et al.* (2018) described a neonate with extensive inflammatory facial cellulitis whose lumbar puncture and blood culture were sterile, yet the clinical and inflammatory findings supported the diagnosis and the patient responded to antimicrobial treatment. Neonatal cellulitis may be associated with bacteraemia, particularly when caused by GBS. Cellulitis caused by GBS is rare but it remains clinically important because it can be accompanied by severe systemic infection (El Qadiry *et al.,* 2018).

The haematologic findings further supported an inflammatory /infective process. The treatment with intravenous ampicillin and gentamicin was appropriate empirical therapy as it provides coverage for important neonatal pathogens. The reported neonatal cellulitis cases, similarly describe successful treatment with combinations of beta-lactam antibiotic and aminoglycosides (Kharazmi *et al*., 2012).

The histologic findings, together with fever, poor feeding, marked erythema, positive blood culture and rapid response to antimicrobial treatment, supports an infectious process not another bullous disorder mimicking cellulitis.

The very early onset of this case is remarkable. Most published neonatal cellulitis occurs later in the neonatal period (Breinig *et al*., 2012; El Qadiry *et al*., 2018). The presence of maternal fever, delivery at home, premature rapture of membrane, and precipitate labour may support possibility of infection around delivery.

CONCLUSION

This case has important clinical implication as it showed that bullous lesion appearing in a neonate should not be automatically attributed to trauma even with plausible history of friction or pressure. Localized cellulitis in neonate may coexist with systemic manifestations and should be regarded as potentially serious. The differential diagnosis should include life-threatening neonatal blistering disorders. Early dermatological and microbiological assessment may be valuable. The case highlights the diagnostic challenge posed by bullous lesions in newborns.

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