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Neonatal Compartment Syndrome of the Lower Limb: A Case Report

Mariame Karrouchi[1,2*], Lemhaba Abdarahmane[1,2], Assia Mouad[1,2], Loubna Aqqaoui[1,2,3], Houda Oubejja[1,2,3,4,5], Fouad Ettayebi[1,2]

[1]Paediatric Surgical Emergencies Department, Children's Hospital of Rabat, Morocco
[2]Faculty of Medecine and Pharmacy, University Mohammed V, Rabat, Morocco
[3]Laboratory of Genetic and Biometry, Faculty of Science, University Ibn Tofail Kenitra, Morocco
[4]Laboratory of Epidemiology, Clinical Research and Biostatistics, Faculty of Medicine and Pharmacy, University Mohammed V, Rabat, Morocco
[5]SIM: Moroccan society of simulation in health care, Morocco

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***Corresponding author:** Mariame Karrouchi
Paediatric Surgical Emergencies Department, Children's Hospital of Rabat, Morocco

Abstract **Case Report**

Neonatal compartment syndrome is a rare but severe condition caused by increased pressure within the muscle compartment, leading to ischemia and tissue damage. Early signs, such as skin lesions at birth, are crucial for timely diagnosis. Management depends on the extent of injury; early fasciotomy may be beneficial, while delayed cases often require staged surgeries or amputation. In neonates, amputation must be carefully planned to preserve limb length and soft tissue. Prompt recognition and multidisciplinary care are essential to improving outcomes and minimizing long-term disability. In This report we present a case of neonatal lower limb compartment syndrome. The objective is to raise awareness of this rare clinical entity in order to facilitate earlier diagnosis and optimize management strategies.

Keywords: Compartment Syndrome, Neonatal, Lower Limb, Fasciotomy, Amputation.

INTRODUCTION

Compartment syndrome is a serious condition resulting from increased pressure within a closed muscle compartment, leading to impaired perfusion and potential tissue necrosis [1].

Neonatal compartment syndrome may only be clinically recognized at an advanced stage after birth, when irreversible tissue damage has already occurred. Early identification and intervention remain crucial to minimizing long-term functional deficits [1].

CASE REPORT

A 1-day-old male newborn, was admitted to the surgical emergency department of the Children's Hospital in Rabat, Morocco, following the appearance of necrotic and ulcerative lesions on his left lower limb noted at birth.

The infant was born to a primigravida mother who had no history of medication use during pregnancy. The pregnancy was unsupervised, with no antenatal follow-up. Delivery took place, at the proximity hospital, via presumed full-term vaginal birth, although no further details are available regarding fetal presentation or the circumstances of labor and delivery.

From birth, the newborn was noted to have necrotic-ulcerative lesions involving the left lower extremity, accompanied by trophic disturbances and edema of the foot (fig 2,3).

The clinical course was marked by a rapid progression to digital necrosis prompting transfer to the referral center for urgent evaluation and management.

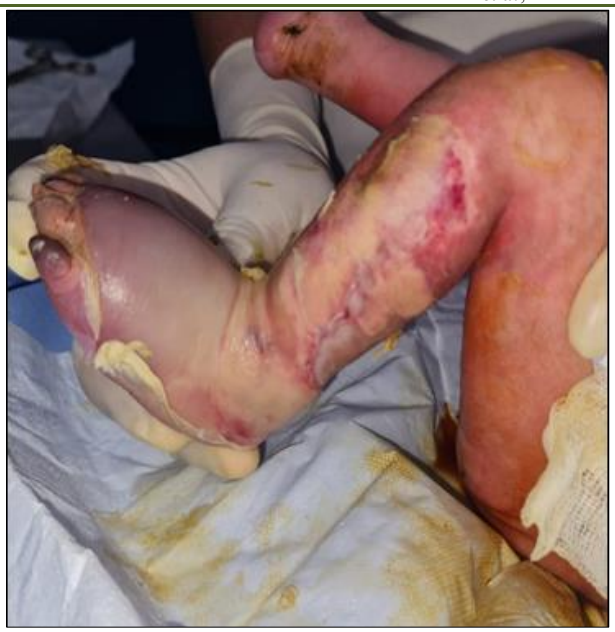

Fig. 1: Clinical image of the neonate's lower limb showing ulcerative skin lesions, desquamation, and significant foot edema

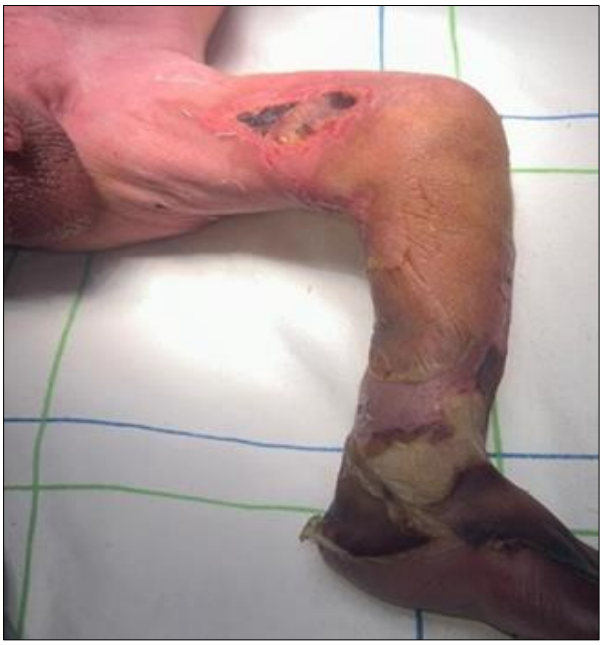

Fig. 2: Clinical image of the neonate's lower limb showing ulcero-necrotic skin lesions

Initial management included hospital admission, warming, the establishment of intravenous access, and fluid resuscitation. The patient was urgently taken to the operating room for surgical debridement and decompressive fasciotomy. The procedure was performed after informing the parents about the potential for clinical deterioration and the possibility of future amputation.

Postoperatively, the patient received wound care and dressings, a full laboratory workup was initiated, and empirical antibiotic therapy was started.

On postoperative day 2, the fasciotomy was associated with a noticeable decrease in soft tissue edema; however, this was contrasted by a significant worsening and expansion of necrotic involvement.

In light of the clinical deterioration, amputation was deemed necessary (fig 3).

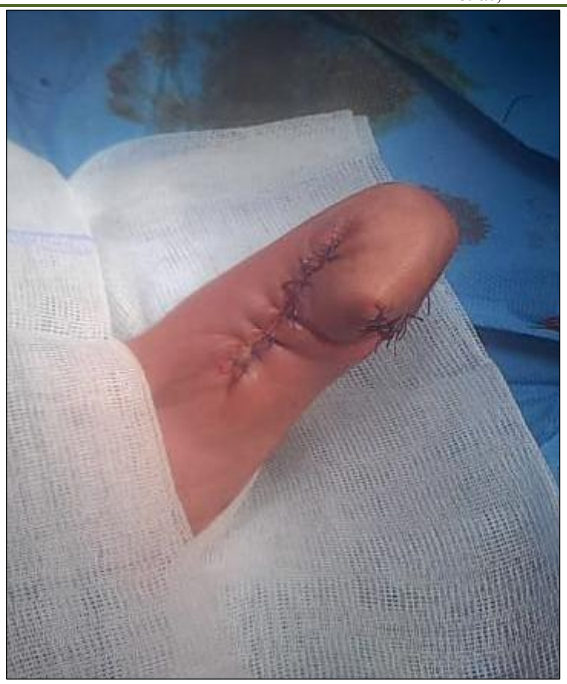

Fig. 3: Clinical image of the amputated limb following clinical deterioration

DISCUSSION

The etiology of neonatal compartment syndrome remains largely unclear. In the literature, potential causes are generally categorized as either extrinsic or intrinsic. Extrinsic factors include oligohydramnios, constriction by umbilical cord loops, or amniotic band syndrome, all of which may lead to mechanical compression and compromised perfusion in utero. Intrinsic factors primarily involve arterial thromboembolism or underlying neonatal hypercoagulable states, which may impair blood flow and contribute to ischemic injury [2].

However, in a case series of 24 patients reported by Ragland *et al.,* no specific neonatal or maternal conditions were found to have a strong association with the occurrence of compartment syndrome, suggesting that its pathogenesis may be multifactorial and not easily predicted based on perinatal history alone [3].

In our case, the absence of any recognized predictive factors supports amniotic band syndrome as the most plausible underlying etiology.

Neonatal compartment syndrome is frequently heralded by sentinel cutaneous signs, most notably localized skin lesions present at birth. These early manifestations often include superficial "sucking blisters," desquamation, taut edema, bullae, or blister formation overlying the affected compartment—commonly the forearm, wrist, or hand. The skin may present erythema, cyanosis, or purplish mottling, progressing to full-thickness epidermolysis, necrosis, and eschar formation in severe cases. These cutaneous lesions serve as sentinel signs of underlying ischemia and rising compartmental pressure, often preceding neurologic deficits or contracture [4].

In a comprehensive review by Cherry *et al*., clinical features observed in neonatal compartment syndrome included swelling (41%), sentinel skin lesions (94.2%), extremity cyanosis (89.5%), and necrosis of the fingers (7%) [5].

A thorough clinical and laboratory workup should be conducted to confirm the diagnosis and identify potential predisposing factors such as dehydration, infection, maternal diabetes, and amniotic band syndrome. Furthermore, brain MRI is currently considered essential by most authors to assess for associated cerebrovascular lesions [6].

Treatment options for neonatal compartment syndrome are often limited and largely determined by the extent of ischemic injury. The decision to proceed with emergent surgical intervention is frequently complicated by an ambiguous clinical presentation. Additionally, the risks associated with anesthesia in this population are considerable; neonates under 30 days of age exhibit significantly higher perioperative mortality rates compared to older pediatric patients [7].

Fasciotomy remains the mainstay of treatment when compartment syndrome is diagnosed early and there is evidence of increasing compartmental pressure or progressive ischemia. However in many reported cases, fasciotomy was not performed emergently, often due to delayed diagnosis or the presence of established ischemic damage at the time of presentation [3-9].

Delay in diagnosis and surgical intervention has been associated with the need for multiple staged surgical procedures, including debridement of necrotic tissue, complex reconstructive surgeries, and, in severe cases, limb amputation —as was observed in our case [3-10].

Amputation in the neonatal population requires meticulous planning. Key objectives include the preservation of maximal limb length and ensuring adequate soft-tissue coverage over osseous structures. These factors are critical for future prosthetic fitting and functional use [2].

CONCLUSION

Neonatal compartment syndrome is a rare but serious condition requiring early recognition. Sentinel skin lesions at birth should prompt urgent evaluation. When diagnosed promptly, fasciotomy may help prevent irreversible damage. In delayed cases, staged surgical management and careful planning for potential amputation are essential. A multidisciplinary approach is crucial for optimizing long-term functional outcomes.

Conflict of Interests: The authors have no conflict of interest to declare

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