International Journal Dental and Medical Sciences Research
Volume 7, Issue 6, Nov – Dec 2025 pp 223-224 www.ijdmsrjournal.com ISSN: 2582-6018

Case Report: Above-Elbow Amputation for Unilateral Upper Limb Gangrene in a Neonate

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Date of Submission: 10-12-2025 Date of Acceptance: 20-12-2025

ABSTRACT
Neonatal upper-limb gangrene is rare and often related to vascular compromise, sepsis, or iatrogenic injury. Early recognition and timely surgical management are essential to prevent systemic morbidity. We report the case of a 16-day-old neonate who developed extensive gangrene of the right upper limb following axillary catheterization, ultimately requiring above-elbow amputation. This report highlights diagnostic considerations, surgical challenges, and the need for multidisciplinary rehabilitation.

I. INTRODUCTION

Limb gangrene in neonates is an uncommon but serious condition associated with high morbidity. Etiological factors include sepsis, hypercoagulable states, birth trauma, and iatrogenic vascular injury, particularly from catheterization.1–3 The immature neonatal vascular system, combined with limited collateral circulation, predisposes to rapid progression of ischemia. Early diagnosis and management are critical in determining limb salvage versus amputation. This case report describes an unusual presentation of unilateral upper-limb gangrene in a neonate requiring above-elbow amputation.

II. CASE PRESENTATION

A 16-day-old neonate presented with bluish discoloration of the right arm and established gangrene of the forearm and hand, noted after axillary venous catheterization.

Examination

- No clinical evidence of hypercoagulability
- Colour Doppler ultrasonography: absence of color flow signals in affected limb
- Axillary temperature: 36.6°C

Laboratory Investigations

- Sepsis screen: negative
- Total leukocyte count: 9×10^9 /L
- CRP: <6 mg/L (at admission and 24 hours later)
- ESR: 4 mm (1st hour)
- Absolute neutrophil count: 2.5×10^9 /L
- Blood glucose: 94 mg/dL
- Hematocrit: 54%
- VDRL and HIV serology: negative

The findings were consistent with iatrogenic ischemic injury secondary to axillary catheterization, resulting in progressive upper-limb gangrene.

Surgical Procedure

After assessment of the line of demarcation, preservation of shoulder abduction was prioritized, and an above-elbow amputation below the deltoid insertion was planned.

Operative details:

- Incision made proximal to the gangrenous zone
- Elevation of anterior and posterior skin flaps
- Identification and resection of biceps, brachialis, and triceps muscle groups
- Ligation of brachial artery, basilic vein, and other vascular structures
- Median and radial nerves identified and resected proximally
- Humerus transected just below the deltoid insertion
- Periosteal flaps used to seal the medullary canal
- Vessels ligated; myoplasty performed
- Skin closure achieved according to standard amputation principles

Outcome

Postoperatively, the neonate remained stable and tolerated feeds well. The stump healed uneventfully. The caregivers were counselled regarding:

- Long-term follow-up
- Potential need for revision surgeries
- Prosthetic planning and timing
- Physiotherapy and occupational therapy
- Psychological support for child and caregivers

III. DISCUSSION

Neonatal gangrene of the upper limb is exceptionally rare, with most cases linked to sepsis, thrombosis, congenital vascular anomalies, or iatrogenic injury.1,2 In this case, the temporal association with axillary catheterization and absence of systemic infection strongly suggested an iatrogenic vascular insult.

Catheter-related compromise of the axillary artery or its branches can lead to acute ischemia, particularly in neonates whose collateral networks are poorly developed.4 Even when systemic parameters are stable, limb necrosis may progress rapidly, often leaving amputation as the definitive management.

Early identification of ischemia, discontinuation of the offending catheter, and vascular imaging may allow limb salvage in select cases.5 However, in established gangrene, timely amputation prevents secondary infection, sepsis, and disseminated intravascular coagulation.

Rehabilitation, including early prosthetic planning, is essential for functional outcomes in growing children. Multidisciplinary involvement ensures better long-term adaptation and psychosocial health.

IV. CONCLUSION

This case underscores the severity of iatrogenic vascular injury in neonates and its potential to cause irreversible limb damage even in the absence of systemic illness. Prompt diagnosis, appropriate surgical decision-making, and comprehensive postoperative rehabilitation are crucial for optimal outcomes. Increased awareness and careful monitoring during neonatal catheterization can help minimize such complications.

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