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SUMMARY

Plantar foot reconstruction in children is uncommon but uniquely challenging, particularly when tissue loss follows systemic illness like neonatal sepsis. In weight-bearing areas, skin grafts are often insufficient. The medial plantar artery flap offers a glabrous, sensate, and durable alternative.

We report the case of a 10-year-old boy with a history of neonatal sepsis complicated by unilateral lower limb gangrene. He underwent a left transmetatarsal amputation in infancy, which was managed with a skin graft. Years later, recurrent ulceration and blistering prompted definitive reconstruction. A free sensate medial plantar artery flap (MPAF) was harvested from the contralateral foot. Postoperative recovery was uneventful. The child returned to pain-free ambulation, with preserved function at both donor and recipient sites.

In conclusion, this case demonstrates the successful use of a free sensate MPAF in a paediatric patient with a rare sequela of neonatal sepsis. It highlights the potential of this flap in long-term limb salvage and encourages further reporting of similar cases in children.

INTRODUCTION

Soft tissue loss of the plantar foot in paediatric patients is rare, especially when it arises as a delayed complication of neonatal sepsis. These cases present a dual challenge: the defect often lies in a high-pressure, weight-bearing zone, and the reconstruction must endure through growth and activity without compromising foot function (1).

In children, traditional options like skin grafts often fail under mechanical stress. They lack durability, and more importantly, protective sensation—making re-ulceration common (1). When early amputations or grafts fail later in life, free flaps may be the only option for restoring form and function. However, few cases in the literature describe their use in children with sepsis-related tissue loss.

The free sensate medial plantar artery flap (MPAF) is based on the medial plantar artery and branches of the medial plantar nerve. Harvested from the non–weight-bearing instep of the foot, the flap offers thick, glabrous, and sensate tissue similar to the plantar surface (2). It has been widely used for heel pad reconstruction (3,4), but its application as a free flap, especially in contralateral or paediatric foot reconstruction, remains uncommon (5,6).

This case report presents a rare instance of plantar reconstruction using a free sensate medial plantar artery flap in a child, nearly a decade after a transmetatarsal amputation following neonatal sepsis. The case highlights the importance of tailored reconstruction in paediatric patients, long after the initial systemic event.

CASE PRESENTATION

A 10-year-old boy was referred to our clinic with persistent ulceration and blistering of the left forefoot, at a site previously covered by a split-thickness skin graft. His clinical history revealed a challenging neonatal course: at two weeks of age, he developed sepsis complicated by acute kidney injury and unilateral lower limb gangrene. A left foot trans metatarsal amputation was done and a skin graft was applied over the stump during infancy to close the defect.

As the child grew and began ambulating, the skin graft proved inadequate for long-term weight-bearing. He started to develop recurrent blisters and ulcerations at the grafted site, making walking painful and unstable.

On examination, there was an area of unstable graft with an overlying ulcer on the left forefoot (Figure 2). The skin was visibly unable to withstand normal mechanical stress. The child's development and vaccination history were otherwise normal, and he had no known allergies or comorbidities.

After evaluating reconstructive options, we planned a free sensate medial plantar artery perforator flap from the contralateral (right) foot. This choice was based on the need for durable, glabrous, sensate tissue suitable for the plantar surface, while minimizing donor site morbidity.

Under general anesthesia, surgical planning included mapping the flap on the instep area of the right foot (Figure 3A). Dissection was performed carefully to isolate the perforator and sensory branch, and the flap was raised successfully (Figure 3B). After debridement of the recipient site (Figure 4A), the flap was inserted into the left forefoot and microvascular anastomosis was completed (Figure 4B). Microvascular anastomosis was performed to the posterior tibial vessels, and neural coaptation was achieved with the tibial nerve to support sensory recovery. Subsequently, the donor site was covered with a skin graft from right upper thigh. The immediate postoperative appearance showed good flap perfusion and positioning (Figure 4C).

At six-week follow-up, both feet had healed well (Figure 4D). The flap had integrated successfully, with no complications. The patient had resumed weight-bearing and showed signs of regaining protective sensation, confirmed by bedside pin-prick testing and patient-reported tactile and pain perception. He was able to walk comfortably, and no ulceration was noted at follow-up. A longer follow-up period is planned, but current results should be regarded as early postoperative findings.

Figure 2: Preoperative photograph of the left foot showing the skin graft (yellow outline) with an ulcer (white outline).

Figure 3: Surgical marking of the medial plantar perforator flap on the right foot (A) and subsequent dissection and raising of the flap (B)

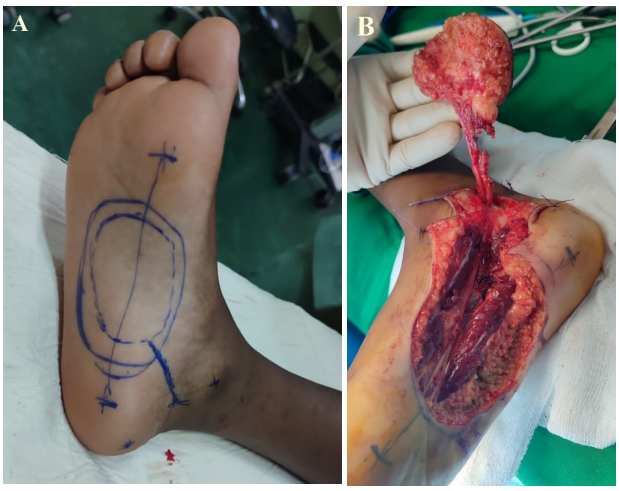

Figure 4: The defect on the left foot after debridement (A). Flap insertion with vascular anastomosis (B). Immediate post-operative appearance of the left foot after flap insertion (C). Appearance of both feet six weeks post-operatively (D)

DISCUSSION

This case underscores a rare but important intersection between neonatal systemic illness and later reconstructive surgery. Neonatal sepsis is a life-threatening condition that can result in extensive peripheral gangrene. Although rare, survivors may later require complex limb salvage procedures (7). In this case, the original amputation and skin graft

were sufficient for early management, but long-term mechanical demands led to recurrent breakdown an increasingly recognized issue in paediatric amputation stumps.

The uniqueness of this case lies not only in the post-sepsis aetiology but also in the decision to use a free sensate flap, specifically the medial plantar artery flap from the contralateral foot. While this flap is well established in adult heel reconstruction (8,9), its use in children, and especially as a free flap, is sparsely reported. The paediatric foot presents technical challenges due to smaller vessel calibre and the long-term implications of donor site morbidity (1).

Fortunately, the MPAF offers several advantages: it provides thick, glabrous, and sensate tissue; matches the plantar surface well; and can be harvested with minimal disruption to foot mechanics (2). In our case, the child regained pain-free, unrestricted ambulation, a significant outcome in paediatric reconstruction. Importantly, no donor site dysfunction was observed.

While some studies have explored free MPAF use in the hand (6), and others in adult cross-foot reconstruction (5), there is limited literature on its use in paediatrics. Yet, such patients are not rare—many suffer plantar skin loss from burns, trauma, infection, or as in this case, systemic illness. As such, more reports of successful paediatric reconstructions are urgently needed to guide future care.

This case also raises an important consideration: that early skin grafts may not remain functionally viable as children grow. Durable, sensate reconstruction may be necessary, even years after the original event. Free flaps—though more complex—offer a long-term solution in select cases, particularly when the goal is lifelong function, pain-free mobility, and prevention of re-ulceration. While the current follow-up period is limited to six weeks, this represents an early postoperative outcome. Future reviews at three to six months will be necessary to confirm the durability of these results.

CONCLUSION

In this case, a free medial plantar artery flap was used to reconstruct a chronic plantar defect in a child with a history of neonatal sepsis. The result was a stable, durable, and sensate reconstruction with no donor site morbidity and full return to activity. The case highlights the value of free sensate MPAF in paediatric limb salvage and encourages its consideration in similar scenarios. While the current report reflects six-week results, longer-term reviews are planned to assess durability. More paediatric cases should be documented to guide long-term outcomes and improve reconstructive options in this underserved group.

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