

Distally Based Posterior Tibial Artery Perforator Flap for Lower One Third of leg Wound Coverage in Pediatric Population

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ABSTRACT

Background: In third world countries pediatric trauma has always been a burning issue because of lack of safety protocols in community and poor services for management. Like adult lower limb reconstruction in pediatric population is also difficult task because of less number of viable reconstructive options.

Methods: We conducted a study at Children's Hospital Pediatric Plastic Surgery unit to know reliability of posterior tibial artery perforator flap in patient's visiting emergency unit for lower one third of leg trauma. This study was conducted from 1st January 2016 till 31st December 2018.

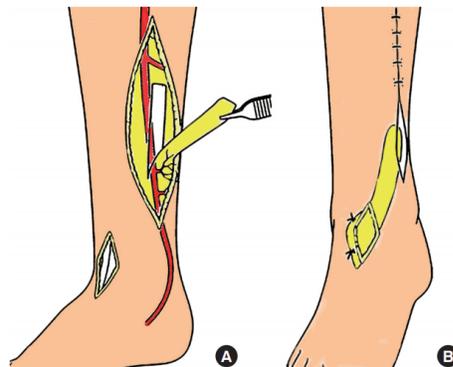
Results: 11 patients were included having age range from 3 to 16 years. 8 patients were male and 3 female. Out of eleven ten flap survived completely, one patient had partial distal necrosis that was managed conservatively.

Conclusion: Distally based posterior artery perforator flap for lower one third of wound coverage is a versatile and reliable local flap with minimum donor site morbidity.

Keywords: Distal Posterior Tibial Artery Perforator Flap, Pediatric Lower Extremity Wounds, Local Flaps, Perforator Flap.

INTRODUCTION

A successful soft tissue reconstruction depends upon the stability of vascular supply. The lower limb wounds are always challenging in management due to poor wound healing, limited coverage options and paucity of overlying skin. Like all soft tissue reconstruction lower leg reconstruction can be carried out with local, regional, and free tissue transfer^{1,2}. Free tissue transfer is consider modality of choice in lower third of limb reconstruction however it more time consuming and requires microsurgical expertise⁷⁻⁹. In emergency department having huge burden of patient flow local flaps are always considered superior. Among local options, perforator flap are always better choice because there is no sacrifice of major vessel. A perforator flap³ is defined an island flap which reaches recipient site through axial rotation, it is supplied by perforator vessels that arise from deep vascular system⁴. These propeller flaps can be rotated from 90° to 180°⁵. Posterior tibial artery is continuation of popliteal artery. It supplies skin, muscles and bones of lower third of leg via multiple branching networks¹⁰. Multiple perforators arise from posterior tibia artery along its course at approximately 3-5cm distance¹¹⁻¹². The caliber of perforator is largest in distal one third of leg. Few studies suggests distal limit of perforator flap as 8cm above medial malleolus. Our article depicts our experience on eleven pediatric patients with lower third of wounds presenting in emergency department. These patients under went surgical reconstruction with distal posterior tibial artery perforator flaps¹³⁻¹⁴. All studies conducted till now are in adult population.



METHODS

This study was conducted from 1st January 2016 till 31st December 2018. Patients were selected from surgical emergency floor of Children's hospital. 11 patients were included having age range from 3 to 16 years. 8 patients were males and 3 females with a mean age of 6.5 year. Among these patients 8 had trauma due to wheel spoke injury while 3 had run over injury. Soft tissue defect was located on lower tibia in 3 cases, calcaneal 4 cases and 4 had malleolar area. Tibia fractures were present in 3 cases that were stabilized by orthopedic department before soft tissue reconstruction. Patients with mangled ankle joint were excluded from study. Defect sizes ranged from 5-12cm. Out of eleven 10 flap survived completely, one had partial distal necrosis that was managed conservatively.

Preoperative assessment included detailed history, examination, base line labs and radiographs. Hand held Doppler used to mark perforators of posterior tibia artery. Debridement was performed in all cases and wound washed afterward. Template was made according to defect size. Flap harvesting started with incision from the trailing edge of flap. Dissection was performed through intermus-

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cular septa of tibialis posterior and soleus muscle. Posterior tibial artery identified and perforators were marked. Locations of perforators were measured to add to literature. Flap was rotated to defect according to defect location and size. Donor site was grafted with split thickness skin graft in all cases. Post operative elevation and splintage was applied. All patients were monitored for 3-5 days.



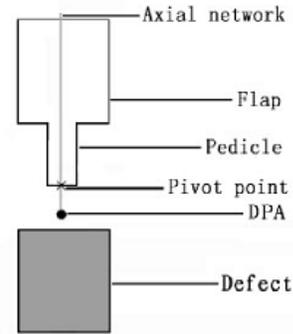
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RESULTS

In three years total eleven patients underwent soft tissue reconstruction with posterior tibial artery perforator flaps. All patients were having post traumatic wounds. Average time of surgery was 59 minutes. The maximum size of flap was 40cm². Ten flaps survived completely, one patient had partial distal necrosis that was managed conservatively. The average stay in the plastic surgery department was 13 days. Follow up ranged from 6 to 18 months with an average of 10 months. The median angle of rotation of flap on perforator axis was 170 degrees. The functional and aesthetic results were satisfactory.

DISCUSSION

Lower limb are challenging for reconstruction due to poor wound healing, limited coverage options, and paucity of skin. In Urban population road side accidents is major cause of limb trauma. In most of the cases we need to address these patients in emergency settings. Among all patients pediatric wheel spoke injury is the most common cause of lower limb trauma. This type of injury is mostly associated with exposure of tendon and bone that required soft tissue for management. Free tissue transfer may be an answer to this, as it can provide soft tissue for large wounds and can fill dead space. But it needs technical expertise, ample time and Microvascular equipments⁷⁻⁹. So Local options should be considered first¹⁴⁻¹⁶. Sural flap is also one of good option but has higher chances of venous congestions that can end up with need of turbocharging. Hemisoleus muscle flap initially used for reconstruction but now its use has been limited to middle third of leg only.



Posterior tibial artery perforator flap is one of attractive faciocutaneous option for small to medium size wound in lower third of leg¹⁷. This artery is largest terminal branch of popliteal artery that supplies foot. During its course this vessels give several perforators at 3-5 cm that can be used for flap harvesting. Flap can be distally or proximally based and rotated at 90 to 180 degree. In short it can cover either way distal tibia, tendoachilles, medial malleolus and calcaneal region. It has further advantage of short surgical time, does not compromise any major vessel or require sophisticated equipments or expertise. It also allows compact bed for secondary surgical interventions. Ioannis A et al confirms reliability of posterior artery perforator flap equal to 100% in one of his study. According to him it provides better cosmetic outcome with disturbing local vascular network. Xiaqing yang et al shows 82% success rate and 100% results if total flap failure considered standard. The results of most of study shows survival of this flap more than 95% in total. In our study it is 90.9 % total flap survival and with minor secondary procedure it's almost 100%. We found male children have high ratio of wheel spoke injury 72.7% compared to 28.2 % in female children's. The location of perforator was also consistent at medial malleolus and within 5cm proximal to medial malleolus. The average patient stay was 5 days. So it can be concluded that in pediatrics age group this faciocutaneous can be used for small to medium size wound in lower third of leg with full reliability²⁰⁻²².



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CONCLUSION

Distally based posterior artery perforator flap for lower one third of wound coverage is a versatile and reliable local flap with minimum donor site morbidity.

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