

Microsurgical Reconstruction of Traumatic Lower Extremity Defects in Pediatric Patients: Is Fasciocutaneous Flap A Versatile Tool to Replace Musculocutaneous Flap?

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ABSTRACT

The purpose of this report is to evaluate the outcome of microsurgical reconstruction of traumatic lower extremity defects in children and compare fasciocutaneous flaps with muscle and musculocutaneous flaps. At Al-Azhar University Hospitals (Al-Hussien and Sayed Galal Hospitals) in the last two years. 50 free tissue transfers had been performed in 50 children. Patients ranged in age from 3 to 16 years old. The defect location included the dorsum of foot in 24 cases, medial aspect of foot in 4 cases, lateral aspect of foot in one case, forefoot in 2 cases, heel in 5 cases, ankle in one case, upper third of leg in 3 cases, middle third of leg in 6 cases, lower third of leg in 4 cases and the knee in 2 cases. Flaps used in this study were myocutaneous and muscle flaps (L.D and R.F) in 38 cases, fasciocutaneous flaps (A.L.T) in 7 cases, and chimeric flap (L.D+S.A) in 5 cases. Hospital stay was ranged from 5 days to 14 days with an average of 8.8 days. The recipient's vessels were anterior tibial vessels in 38 cases, posterior tibial vessels in 7 cases, femoral vessels in 2 cases, dorsalis pedis vessels in 2 cases, and popliteal vessels in one case. The postoperative complications were seen in 13 patients in the form of venous congestion in three cases, superficial infection in five patients, delayed wound healing in three patients, partial necrosis in one case, graft loss in one case, with total flap loss in three cases. One could conclude from our report that a free fasciocutaneous flap is an excellent option for lower extremity reconstruction. Our data indicate that it can be successfully used in all clinical settings, without outcomes equivalent to the more traditional muscle flap.

Key Words: Lower extremity reconstruction – Anterolateral thigh flap – Free flap in children – Pediatric microsurgery – Muscle flap.

INTRODUCTION

Free-tissue transfers gain increasing popularity for reconstruction of various defects, as a result of continuing advances in microsurgical technique [2].

Microsurgical lower extremity reconstruction of traumatic defects is the most challenging tasks in pediatric microsurgery [8].

The major advantage of free tissue transfer in children is the ability to reconstruct defects in a single stage [1].

With present-day technology, we advocate for using the “reconstructive elevator” and bypass more traditional techniques for the benefits of free tissue transfer in children, allowing for single-stage reconstruction and in many cases primary closure of the donor site [6].

PATIENTS AND METHODS

A retrospective review was conducted of all pediatric patients underwent microsurgical free tissue transfer for post-traumatic lower limb reconstruction (patients younger than 17 years of age) at the Al-Azhar University Hospitals (Al-Hussien and Said Galal Hospitals) from July 2015 to June 2017. Free flaps performed for conditions other than trauma were excluded. Demographic data of the patients including age, sex, defect location, flap and flap type, recipient vessels, use of vein graft, operative time in minutes, length of hospital stay in days and complications, flaps used were collected in the Table (1).

Table (1): Choice of flap type.

Flap type	No. of patients
<i>Muscle:</i>	
Latissimus Dorsi	37
Chiemic (L.D+S.A)	5
Rectus femoris	1
<i>Fasciocutaneous:</i>	
Anterolateral thigh	7

RESULTS

Over a period of two years, 50 free flaps were used for reconstruction of post-traumatic defects in the lower limb of 50 patients, the study included 17 females and 37 males, Patient's age ranged between 3 and 16 years old with average 9.46. The mechanisms of injury were a motor car accident, lawnmower, falling from a height and crushing injury.

The defect location included the dorsum of foot in 24 cases, medial aspect of foot in 4 cases, lateral aspect of foot in one case, forefoot in 2 cases, heel in 5 cases, ankle in one case, upper third of leg in 3 cases, middle third of leg in 6 cases, lower third of leg in 4 cases and the knee in 2 cases. Flaps used in this study were myocutaneous and muscle flaps (L.D and R.F) in 38 cases, fasciocutaneous flaps (A.L.T) in 7 cases, and chimeric flap (L.D+S.A) in 5 cases.

The recipient's vessels were anterior tibial vessels in 38 cases, posterior tibial vessels in 7 cases, femoral vessels in 2 cases, dorsalis pedis vessels in 2 cases, and popliteal vessels in one case.

We used the A-V loop as a vein graft in three cases, the operative time ranged from 6 hours to 8.6 hours with an average of 7.23 hours. The length of hospital stay ranged from 5 days to 14 days with an average of 8.8 days.

The postoperative complications were seen in 13 patients in the form of venous congestion in three cases, superficial infection in five patients, delayed wound healing in three patients, partial necrosis in one case, graft loss in one case, with total flap loss in three cases.

Case (1)



Fig. (1): Case of a female patient 9 years old presented with a traumatic defect on the dorsum of the right foot.



Fig. (2): Harvesting and inseting of the L.D myocutaneous flap.



Fig. (3): A Few months later after complete healing of the flap and the child could walk.

Case (2)



Fig. (4): The case of a male patient 15 years old presented with post-traumatic eschar on the dorsum of the right foot.

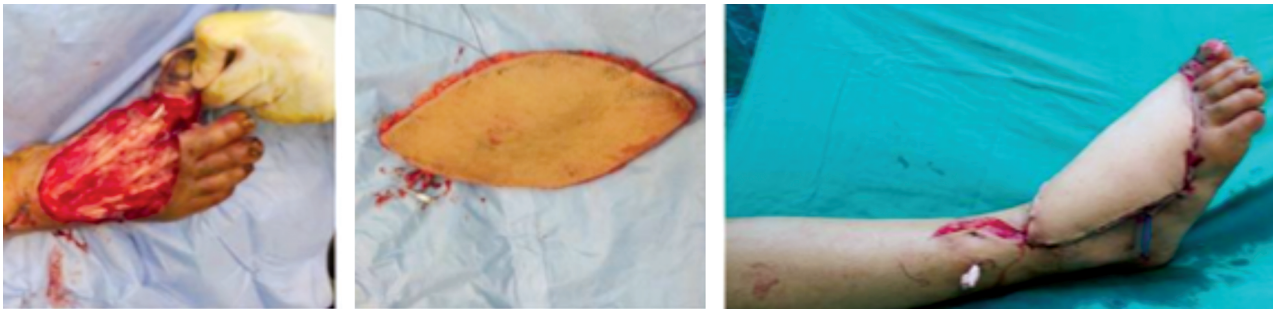


Fig. (5): Harvesting and inseting of the A.L.T flap.



Fig. (6): A Few months later after complete recovery and during physiotherapy.

DISCUSSION

Reconstruction of the lower extremity can be a challenging task. The technical aspects of free tissue transfer can be further complicated by available donor site vessels (which may have been injured in the initial trauma), gravitational forces, complex underlying bony fractures, need for weight-bearing, and the contour of the defect on a cylindrical limb. Size and location of the defect, as well as donor site morbidity, must be taken into consideration when planning a reconstruction [15].

There are certain benefits to muscle flaps that can easily obliterate dead space and can conform well to the unique contour of the lower extremity. The pliability of the anterolateral thigh flap can make draping more difficult in certain lower extremity wounds [15].

The treatment choice for soft tissue defects of the lower extremity depends on the size and location of the wound, besides its cause. When a functional transfer is desirable, a muscle flap is the only reasonable reconstruction. Conversely, in the presence of osteomyelitis, exposed hardware, or open fracture, both fasciocutaneous and muscle flap are feasible options [14].

Early in this series the L.D muscle or myocutaneous flap was our main choice in reconstruction

of pediatric lower limb defects, either as a single or as a chimeric with serratus muscle flap, the muscle flap carries the advantage of long pedicle, larger vessel diameter and its popularity with a short learning curve, later in the study, we started to harvest the A.L.T flap as our best choice in pediatric lower limb reconstruction, it offers the advantage of being less bulky with more cosmetic outcome, and less donor site morbidity.

Elgammal et al., reported 42 children with traumatic ankle and foot defects that reconstructed by A.L.T fasciocutaneous flap. Also, Namdar et al reported 14 children with lower limb defect after the trauma that reconstructed by L.D muscle flap.

Notably, there was no difference in major or minor complication rate between flap type chosen in our series.

Conclusion:

A free fasciocutaneous flap is an excellent option for lower extremity reconstruction. Our data indicate that it can be successfully used in all clinical settings, without outcomes equivalent to the more traditional muscle flap.

Finally, in our series, we conclude that fasciocutaneous flap (A.L.T) is a versatile tool as well as a musculocutaneous flap (L.D) in pediatric lower extremity reconstruction.

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