

Success of Reverse Suralfasciocutaneous Flap for Coverage of Soft Tissue Defect of Distal Limb: our experience

FARHATULANN TAYYABA¹, MOHAMMAD MUGHEES AMIN², ABDUL MUNAF SAUD³

ABSTRACT

Background: Provision of coverage for soft-tissue defects of the distal leg is a challenge, particularly in patients with multiple trauma and peripheral vascular disease. The fasciocutaneous flap has constant septocutaneous perforators, ensuring perfusion of the flap.

Aim: To review the success of reverse sural artery flap for dislatticeal, ankle and heel defects in our setup.

Methods: Total 21 patients of soft tissue defect involving lower third of leg were included. Patients with peripheral vascular disease, neuropathic ulcers and trophic ulcers were excluded. Reverse suralfasciocutaneous flap was designed on posterior aspect of affected leg based upon septocutaneous perforator vessels, placed over defect anchored with vicryl 4/0 and half buried mattress suture. Patients were discharge on 3rd post op day in case of uneventful recovery and followed up on 5th, 15th day and then monthly till 4th month and outcome was measured in terms of flap survival and any major complications.

Results: Mean age was 33.33±18.78 years. Male were 76% and female were 24% with male to female ratio of 3.2:1. Road traffic accident was the main cause (62%) of defect with heal was involved in 44% cases. Success (absence of necrosis and 100% coverage of the defect) of perforator based sural flap for coverage of distal limb was seen in 38% patients. Out of the 13 patients with complications, partial flap necrosis was seen in 6% patients, wound dehiscence in 25% and superficial wound infection in 33.33% patients.

Conclusion: This study concluded that success of the perforator based sural flap for coverage of soft tissue defect of distal limb is higher.

Keywords: Double J stenting, Indications, obstructive uropathy, complications rate.

INTRODUCTION

Patients with soft tissue defect of lower limb and foot are most common presented patients to reconstructive surgeons due to increased incidence of high velocity trauma¹. Reconstruction of soft tissue here is more challenging due to composite tissue defect, inadequate & tight local tissue and poor circulation². There is frequent exposure of tendons, bones and hardware requiring flap coverage with reliable vascularity and good skin texture. We also prefer flap that is easy to dissect with minimal donor site morbidity.³ Free tissue transfer is considered to be goal standard for lower limb and foot reconstruction but it require stable patient, long operative time, technical expertise and specialized centers⁴. Local neurovenocutaneous flap was introduced by Ponten for coverage of lower leg and ankle defect⁵. Later Masquelet in 1992 elaborated skin island neurocutaneous flaps for

coverage of lower limb, ankle and foot defect⁶, so it became an attractive option due to simplicity and cost effectiveness. In our study we reviewed the success of reverse sural artery flap for distal tibial, ankle and heel defects in our setup.

MATERIAL & METHODS

This prospective study was done in plastic and reconstructive unit of Bahawal Victoria Hospital Bahawalpur. From January 2011 to December 2014, 21 patients of soft tissue defect involving lower third of leg, Achilles tendon, malleoli, dorsum of foot and heel were included. Detail history regarding age sex of patient's cause of wound long with comorbidity like diabetes mellitus, smoking, peripheral vascular disease, chronicostiomylitis were noted. Patients were examined thoroughly along with documentation of site and size of defect, exposed bones and tendons, fractures and their wound were photographed. Patients with peripheral vascular disease and in whom wound or scaring is present in posterior calf and pedicle site were excluded. Patients with neuropathic ulcers and trophic ulcers are also excluded.

^{1,2}Department of Plastic and Reconstructive Surgery, Quid-e-Azam Medical College, Bahawal Victoria Hospital Bahawalpur.

³Senior Registrar, Department of Orthopedic Surgery, Civil Hospital, Bahawalpur

Correspondence to Dr. Farhatulann Tayyaba, Senior Registrar
Email: surgeon.786@hotmail.com, Cell: 03006802213

Surgical technique:In prone position and under general anesthesia, a line was marked from midpoint of lateral malleolus and tendoachlles to the midline at junction of proximal and middle third of legwhich correspond middle of two heads of gasrocnemius. The pivotal point was marked at least 5 to 6 cm above the superior margin of lateral mallelus.We designed template by measuring the defect area. Skin island on the middle to proximal third of the lower leg was marked by using that template in a tear drop shape. The flap was incised on its proximal border throughthe deep fascia. The lesser saphenous vein andsural neurovascular bundle were identified and ligated proximally in the midaxis of the flap. The flapand pedicle of at least 4 cmwide was raised down to the pivot point. Care should be taken to ensure that short sephenous vein should be included as it diverges from sural nerve medially towardsAchilles tendon. The flap was then transposed or tunneled to reach the defect andinset under minimal tension. Donor sites wereclosed in a linear fashion or, more often, coveredwith a split-thickness skin graft.In two cases we delayed the flap by incising superior and lateral portions of the flap through the fascia. Thelesser saphenous vein and sural vessels were dividedand ligated.

Patients were discharge on 3rd post op day in case of uneventful recovery and followed up on 5th, 15th day and then monthly till 4th month and outcome was measured in terms of flap survival without need of other reconstructive procedure for coverage of defect, any major complication like complete or partial necrosis after 4 months. Whole data was analyzed in SPSS version 16.

RESULTS

Total 50 cases were included in this study. Age range in our study was from 4 to 62 years with mean age of 33.33±18.78 years. Male were 38(76%) and female were 12(24%) with male to female ratio of 3.2:1. Cause of defect was road traffic accidents (RTA) in 31(62%) cases, followed by wheel spoke injury in 12(24%) and gun shot in 7(14%) cases. Heal and tendon Achilles was involved in 22(44%) cases, distal tibia was in 19(38%), medial maleolar and paramaleolar was in 9(18%) cases. Success (absence of necrosis (black discoloration of flap, and discharge of pus) and 100% (no part of defect visible) coverage of the defect) perforator based sural flap for coverage of soft tissue defect of distal limb was seen in 26 (52%) patients while remaining 24(48%) had shown no success. Out of these 12 patients with complications, partial flap necrosis was seen in 02(16.67%) patients, marginal necrosis in 02(25%),

wound dehiscence in 3(25%) and superficial wound infection in 4(33.33%) patients (Table I).

Table I: Patient characteristics and complications

	n	%age
Male	38	76
Female	12	24
Cause of Injury		
Road Traffic accidents	31	62
Wheel spoke injury	12	24
Gunshot injury	07	14
Site of Injury		
Heal and tendon Achilles	22	44
Distal tibia	19	38
Medial maleolar¶maleolar	09	18
Success		
Yes	47	94
No	03	6
Major complications		
Partial flap necrosis	03	60
Minor complications		
Marginal necrosis	03	25.00
Wound dehiscence	03	25.00
Superficial wound infection	04	33.33

Case 1:15 years old child with wheel spoke injury; loss of heal pad.



Case 1 (b):Peroperative flap inset



Case 1 (c): Immediate post-operative results after 7 days.



Case 2 (a): 30 years old male with RTA having open fracture distal tibia.



Case 2 (b): Post-operative results after inset of reverse sural artery flap.



DISCUSSION

Provision of coverage for soft-tissue defects of the distal leg is a challenge, particularly in patients with multiple trauma and peripheral vascular disease. The fasciocutaneous flap has constant septocutaneous perforators, ensuring perfusion of the flap⁷. It has low complication and flap failure rates. It can be used to cover soft-tissue defects of the distal leg, ankle, heel, and dorsum of the foot secondary to trauma, tumour or infection, from paediatric to elderly patients. The flap is durable enough even for heel coverage⁸. It has also been successful in treating ulcers in limbs with poor circulation, such as diabetic ulcers and chronic venous ulcers^{9,10} and even for salvage of a failed free tissue transfer⁹.

In our study, success (absence of necrosis and 100% coverage of the defect) perforator based sural flap for coverage of soft tissue defect of distal limb was seen in 26(52%) patients while remaining 24(48%) had shown complications. In a series of 70 sural flaps used for soft-tissue coverage of the distal leg, the overall success rate was 86% for the flap alone or combined with a skin graft. However, the partial or complete flap necrosis rate was 36%, which

was unfavourable.¹¹ Risk factors included patient age of more than 40 years, peripheral artery disease, venous insufficiency, and diabetes mellitus. Tobacco use, chronic alcoholism, and minimal family support are secondary risk factors for flap failure¹¹. In high-risk patients requiring a large flap, a delayed sural flap procedure has been recommended¹²⁻¹⁴.

The distally based suralfasciocutaneous flap is a versatile and reliable procedure useful in reconstruction of the lower limb. This flap remains a good choice for reconstructive surgery of calcaneal and malleolar areas. Ali MA et al¹⁵ in his study of the 22 patients, 15(68.1%) had uneventful recovery with almost complete take of flaps. Five patients (22.7%) initially showed marginal necrosis, they later on healed by secondary intention without requiring any secondary graft coverage. The rest 2(9.1%) had significant loss of flap in the peripheral part and required secondary graft coverage. Kalam MA et al¹⁶ described this technique for coverage of the exposed TA and showed that out of 30, 26(86.67%) flaps taken off without any complication, 4(13.33%) developed flap oedema and marginal necrosis were seen in 3(10%) cases. One patient (3.33%) developed infection which was controlled by antibiotics and later required split skin graft for coverage of the flap.

Jeng SF et al¹⁷ used this technique to cover exposed Achilles tendons and soft tissue defects of the ankle and the heel. Of the 22 patients described, 20(90.91%) had complete success with two minor complications that were treated uneventfully. Heisinga SF et al¹⁸ used this flap on 15 patients for soft tissue coverage in the lower leg, malleolar, and heel regions. Twelve flaps (80%) survived, 2(13.33%) partially survived, and one (6.67%) flap failed due to persistent infection. Jeng SF et al¹⁹ reported their experience with the use of the distally-based sural artery flap for salvage of the distal foot. In seven (87.5%) out of eight patients, the flaps survived completely and only one patient had a partial necrosis of the flap.

The results of the 39 cases in the study of Park JS et al²⁰ had a success rate of 100% with 39 complete recoveries. Nine cases suffered complications: partial necrosis (10.26%), wound dehiscence without necrosis (7.69%), hematoma (2.56%), and infection (2.56%). A similar analysis was conducted by Baumeister et al¹¹ of complications was 36%. Complications included partial necrosis, wound dehiscence, hematoma, and infection, and this high rate of occurrence is considered to have a close relationship with the morbidity state of chronic disease. The complication rate reported was 59% (41 of 70 flaps), partial necrosis was noted in 17% and complete necrosis in 19% flaps.

A meta-analysis of 50 articles that report the use of 720 distally based sural flaps, suggested 82% success rate of the flap. Complete flap necrosis was reported in 3.3%, and partial or marginal flap necrosis in 11%.²¹ Similarly, a detailed retrospective analysis of sural flap complication rate was recently performed on a series of 70 consecutive flaps. Akhtar S et al²² in his study of 84 patients observed flap survival in 78.5%, partial necrosis in 16.5% and complete necrosis in 9.5%.

CONCLUSION

This study concluded that success of the perforator based sural flap for coverage of soft tissue defect of distal limb is higher. So, we recommend that perforator based sural flap should be used as a first line therapy for coverage of soft tissue defect of distal limb in order to improve the social life, emotional well-being and leisure activities of these particular patients.

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