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Research Article

EFFICACY OF REVERSE FLOW SURAL ARTERY FLAP IN COVERAGE OF SOFT TISSUE DEFECT IN LOWER ONE THIRD OF LEG AND HEEL

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Abstract:

Summary Objective: This study presents to determine the efficacy of reverse flow sural artery flap in coverage of soft tissue defect in lower one third of leg and heel.

Background: Soft tissues reconstruction can be achieved by skin grafts, local flaps, distant flaps and free flaps, but their usage is limited and problems exists in these regions. This flap is a good option in the coverage of lower 1/3rd of leg and heel due to its good functional outcome and decrease donor area mobility.

Methods: A descriptive case series study was conducted on 43 subjects with soft tissue defects of the lower 1/3 of the leg and heel were assessed [30 males, 13 females, 10-50years, mean (SD) age=25.03(8.71) years] who had reverse flow sural artery flap surgery for the coverage of soft tissue defects in lower one third of leg and heel during one-year period.

Results: Out of 43 subjects major flap loss 5(11.7) were treated by local wound care. While the one flap (2.3%) that underwent total flaps failure was managed STSG on 5th post-operative day, wounds in 40(92%) of the patients were completely covered by reverse sural flap used in study while in 3(8%) patients wounds were not completely covered by the flap used in present study.

Conclusion: Results showed that this is one of the most successful and easy technique to cover the multitude of lower limb defects especially involving lower 1/3rd and heel as in Pakistan extensive wound of lower limb are common.

Keywords: Distally based (reverse) flow sural fasciocutaneous flap, lower limb trauma, lower limb reconstruction.

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INTRODUCTION:

The reconstruction of a soft tissue defect in the lower leg and ankle has been one of the challenging tasks that are often encountered by plastic surgeons in terms of seeking a better and safer option with less donor area morbidity. Soft tissue reconstruction can be achieved by one of the different options available to plastic surgeons that include skin grafting, local flaps, regional flaps and free flaps. However, their application and usage as a reconstructive tool is limited as problems exist in these regions.

The advent of improved techniques in the field of Anesthesiology during the past decade has allowed for the coverage of soft tissue defects in the lower leg often by employing by use of free flap. However, there are major disadvantages in the use of free flaps. As this technique requires a remote donor site, increased operative time, use of a major vessel to the leg and microsurgical skills. Besides these, trauma in the lower limb often causes damage to a major vessel of the leg, so the use of free flaps in these patients may be related to a higher incidence of complications; also associated pathologies, like diabetes and vascular pathology, can increase the incidence of complications when a free flap is utilized.

In all such cases where factors don't weigh in for free flap as a reconstructive option for coverage of lower limb defect, local fasciocutaneous flaps, like the sural reverse flap can be used. Because of their easy and short time harvesting, it can be a very good alternative to free flaps. The distally based sural artery flap, first described by Masquelet et al. in 1992 is believed to be a reliable option for reconstruction of lower leg, ankle and foot reconstruction. Superficial sural artery flap is a adipofasciocutaneous flap that is based on the vascular axis of the sural nerve, which gets its blood supply by reverse blood flow through communication with the perforating branch of the peroneal artery, which is situated in the lateral malleolar area. As a more recent modification of this flap a cuff of gastrocnemius muscle is usually taken along with the sural nerve. This has been reported to be useful in those cases where resurfacing of large soft tissue defects of foot is required in addition to extension of pedicle length. So the objective of present study is to determine the efficacy of reverse flow Sural Artery

Flap in coverage of soft tissue defects in lower one third of Leg and heel.

MATERIAL AND METHODS:

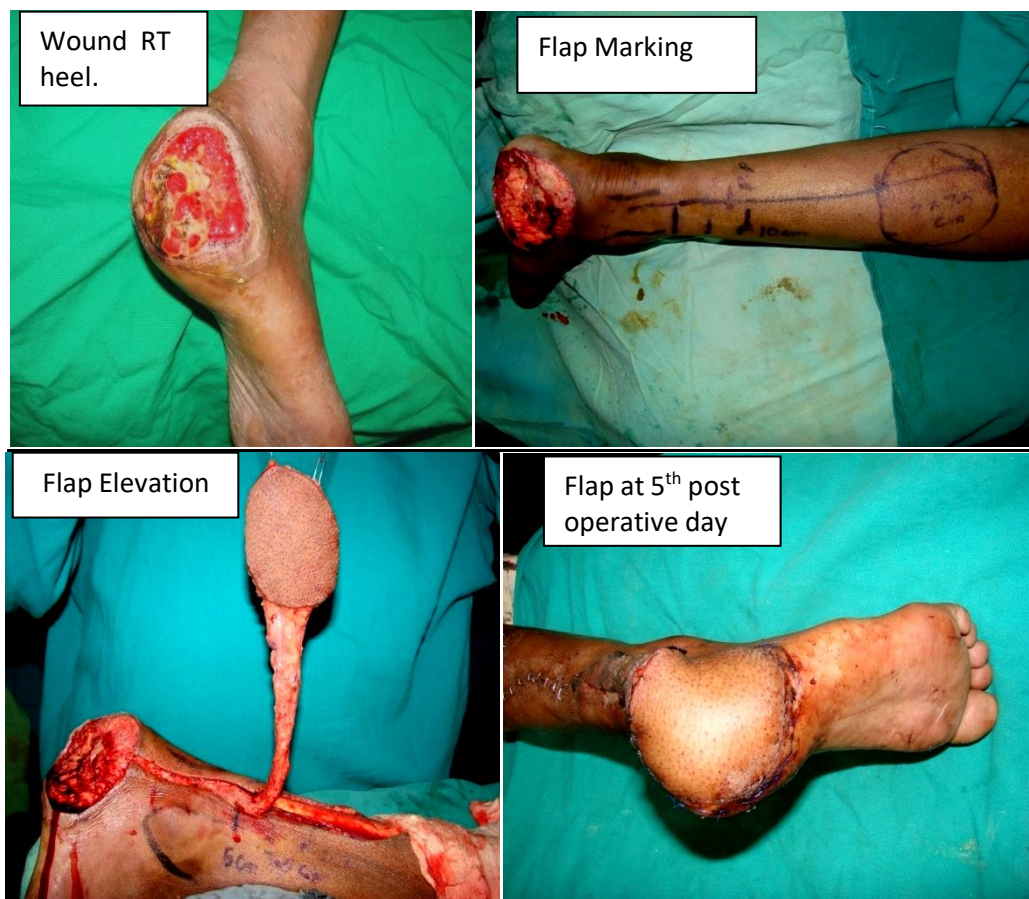
A descriptive case series study was conducted on 43 subjects with soft tissue defects of the lower 1/3 of the leg and heel were assessed [30 males, 13 females, 10-50years, mean (SD) age=25.03(8.71) years] who had reverse flow sural artery flap surgery for the coverage of soft tissue defects in lower one third of leg and heel during one year period. Only the patients having the soft tissue defects of lower 1/3rd of the leg and heel measuring not less than 3x3cm and not more than 10x10 cm within 1 month of sustaining the injury/wound were included in the study.

Surgical Procedure:

A straight line is drawn connecting a point 1.5cm posterior to the lateral malleolus and the cleft formed by the gastrocnemius muscle. This is the longitudinal axis of the sural nerve and the vascular pedicle. Further, a transverse line is marked 5cm proximal to the lateral malleolus.

The line marks the most distal point to which the pedicle may be mobilized. This flap can be located anywhere in the lower two-thirds of the posterior aspect of the leg according to need of pedicle length. This flap is then outlined and centered over the vascular pedicle drawn earlier according to the defect size.

An incision is made on the upper border of the flap, where the sural nerve as well as the vessels are identified at the midline, ligated, divided and included with the flap. Incision the deep fascia superiorly, the dissection is performed in the subfascial plane, including the deep fascia with the flap. At this point one encounters musculocutaneous perforating vessels from the underlying gastrocnemius muscle. These are coagulated with fine bipolar cautery. At midcalf, the lazy-S incision is made and vessels are identified, taking care not to skeletalize these structures. An ample amount of periareolar tissue, including the deep fascia, is left along with the pedicle. Now the tourniquet is deflated and the flap visibly attains color. The raised flap is then rotated to the defect to be reconstructed and sutured to the borders with tension free sutures. The donor site defect may be closed primarily.



Statistical Analysis:

The study was carried out in the Department of Plastic Surgery/ Burn unit, Nishtar Hospital Multan on 43 patients admitted through Out Patient Department.

There were 30 (70%) males and 13 (30%) females in the study population. The Mean age was 25.03 years. Size of the smallest wound was 3x3 cm and maximum was 10x10cm. The mean size of the wound being 54.8cm². 27 patients had wound over lower 1/3rd of leg (63%) and 16 patients presented with wounds over heel (37). As far as exposure of the underlying bone goes 39 patients had underlying bone exposure (91%) as compared to only 4 patients (9%) in which underlying bone was not exposed. Survival of the flap was assessed on 5th post-operative day and it showed that 37 (86%) fascio-cutaneous reverse flow sural flaps survived completely while 5 (11.6%) showed major flap loss and 1 (2.3%) showed total flap failure in this series of patients. At 5th post-operative day assessment of the wound showed that wounds of 40 patients (92%) had complete coverage of the wound while only 3 patients (8%) had partial wound coverage of the wound.

On 2nd postoperative week follow up showed that 37 (86%) fascio-cutaneous reverse flow sural flaps survived completely while 5(11.6%) showed major flap loss and 1(2.3%) showed total flap failure in this series of patients.

At 2nd post-operative week assessment of the wound showed that wounds of 40 patients (92%) had complete coverage of the wound while only 3 patients (8%) had partial wound coverage of the wound. Out of these 3 patients 2 patients recovered and had complete coverage of wound by dressing while in 1 patient split thickness skin graft was required. Follow up at 6 week showed that 37 (86%) fascio-cutaneous reverse flow sural flaps survived completely while 5(11.6%) showed major flap loss and 1(2.3%) showed total flap failure in this series of patients. At 6th week follow up wounds of 40 patients (92%) had complete coverage of the wound while only 3 patients (8%) had partial wound coverage of the wound.

DISCUSSION:

In present study major flap loss 5(11.7) were treated

by local wound care and wounds healed spontaneously with dressing by a week follow up and graft was not required. While the one flap (2.3%) that underwent total flaps failure was managed by local wound care in the form of negative pressure dressings and was later covered by split thickness skin graft on appearance of healthy granulation tissue to achieve wound closure.

Another important factor that determines the success of a flap is the adequate wound coverage. As for the wound coverage statistics of my study concern, on 5th post-operative day, wounds in 40(92%) of the patients were completely covered by reverse sural flap used in study while in 3(8%) patients wounds were not completely covered by the flap used in present study.

Patients in which wound was not completely covered, wound was managed by local wound care in the form of dressings and on appearance of granulation tissue remaining area was grafted by split thickness skin graft. It is similar to the study of (Chen et al., 2006), in which 8 patients (89%) had complete coverage of wound, while 1 patient (11%) suffered from partial necrosis of the flap, which was successfully covered with a split skin graft, afterwards.

CONCLUSION:

It has been observed that this is one of the most successful and easy technique to cover the multitude of lower limb defects especially involving lower 1/3rd and heel as in Pakistan extensive wound of lower limb are common. So to deal with such wounds use of reverse flow sural artery flap surgery for the coverage of soft tissue defects is an effective technique with the advantage of minimal complications and It does not involve the sacrifice of major vessels of lower limb which may already have been damaged in severe trauma to the limb.

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