

# Role of Sliding Transposition Flap in Coverage of Soft Tissue Defects of Leg: An Experience of 50 Cases

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## Abstract

**Introduction:** Lower limb defects are frequently the result of trauma, tumors, or chronic illnesses. The small defects can even become problematic in leg because of thin and nonexpendable soft tissue requiring reconstruction in the form of flap cover. The procedure selected should be simple, easily performed in short duration by esthetic way and leave minimum donor site morbidity. The sliding transposition flap is selected for providing soft tissue cover for the leg defects in this study.

**Aims:** The aim of this article is to study the usefulness of sliding transposition flap in the soft tissue defects of upper, middle, and lower 1/3<sup>rd</sup> of the leg.

**Materials and Methods:** A retrospective study was conducted on 50 patients between Jan 2015 and Dec 2019 having leg defects as a result of trauma, electric burns, implant exposure, or chronic osteomyelitis. Etiology, site and size of defect were recorded. Patients underwent sliding transposition flap. Post-operatively patients were followed for any flap-related complication till the wound cover became stable.

**Results:** The aetiology was trauma in 90%, osteomyelitis in 6% and electric burns in 4% patients. In 24 % of patients, implant was exposed. 56% patients had soft-tissue defect in the lower 1/3<sup>rd</sup> and all of them required inferiorly based sliding transposition flap cover. Flaps survived well in all the patients. Donor sites healed well.

**Conclusion:** The sliding transposition flap is a very easy and safe option for covering small leg defects.

**Key words:** Leg defects, Reconstruction, Sliding transposition flap, Trauma

## INTRODUCTION

Lower limb trauma requiring soft tissue coverage comprises a significant proportion of these injuries worldwide. Reconstruction of the soft tissues overlying fractures is essential for bone union.<sup>[1]</sup> Due to limited mobility and a paucity of overlying skin, even small defects of the lower limb generally need flap coverage.<sup>[2]</sup>

Nowadays with so many options available in the form of numerous local as well as free flaps, reconstruction of a lower limb defect may not be difficult however making

choice which method to be used is difficult. A flap that is perfect in a particular situation may prove to be the worst for another situation. The size, site and the type of defect, condition of the surrounding tissues, age, and general condition of the patient are the deciding factors for flap selection along with the experience, education, and resources of the operating surgeon.<sup>[3]</sup>

Sliding transposition flap for leg defects was first of all described by Harrison and Saad.<sup>[4]</sup> A basic but neglected factor that has been responsible for the large percentage of failed flaps in the legs is convexity of its surface. Therefore the standard transposition flap across the convex surface of the leg results in transverse tension across the pedicle and embarrassment of its blood supply. Use of sliding transposition flap in the leg obviates the transverse tension.<sup>[5]</sup>

This paper presents our study conducted retrospectively with sliding transposition flaps while managing the leg

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defects due to trauma, electric burns, or as a result of osteomyelitis.

### Aims

The aim of this article is to study the usefulness of sliding transposition flap in the defects of upper, middle, and lower 1/3<sup>rd</sup> of the leg.

## MATERIALS AND METHODS

After taking approval from the institutional ethical committee (Vide letter no GMC/IEC/21/SS/46 Dated 3/11/2021), a retrospective study was conducted on 50 patients, operated during the period of Jan 2015 to Dec 2019 in a tertiary care hospital in Punjab. The records of all these patients were reviewed in detail. The patients included in the study had soft tissue defects of the leg in the form of exposed bone or fracture site as a result of trauma, electric burn or osteomyelitis, and exposed implant. The soft tissue defects of 3–5 cm size were included in the study. The larger defects and those with degloving or crushing of the surrounding skin were not included in the study. The defects were divided into three categories, upper 1/3<sup>rd</sup>, middle 1/3<sup>rd</sup>, and lower 1/3<sup>rd</sup> of the leg. All patients after thorough examination had undergone routine and special investigations if any (CBC, RFTs, LFTs, and viral markers). The surgery was done under spinal anesthesia in all these cases.

In all patients, the sliding transposition flap<sup>[5]</sup> was marked on the medial or lateral side, based inferiorly or superiorly depending on the location of the defect. The Posterior Tibial or Peroneal artery perforators were incorporated in the flap base wherever possible by marking the flap over the expected location of perforators. The width of the flap was marked equal to the length of the defect.

In all the patients the dissection of the flap had been done in the sub-fascial plane. The length: breadth ratio was from 2:1 to 3:1. In all the patients the donor area was grafted with a split skin graft harvested from the thigh. The primary dressing was done on 5<sup>th</sup> post-operative day. Sutures and staplers were removed after 7 days [Figures 1-3]. All patients were followed biweekly for 3 weeks. The record was maintained till the soft tissue cover became stable. Fracture healing or bony union was not a part of this study.

## RESULTS

Out of total 50 patients, 46 (92%) were male and 4 (8%) were female. The age ranged from 18 to 78 years with an average of 44.5 years. Tibia was the involved bone in all

the patients. The etiology was trauma in 45 patients (90%), osteomyelitis in 3 patients (6%), and electric burns in 2 patients (4%). The 32 patients (64%) had exposed fracture site of the tibia, 6 (12%) had exposed non-fractured tibia and in 12 patients (24%) implant was exposed. The size of defect ranged from 3 cm to 5 cm. The upper 1/3<sup>rd</sup> of the tibia was involved in 8 (16%), middle 1/3<sup>rd</sup> in 14 (28%), and lower 1/3<sup>rd</sup> in 28 patients (56%). The flap was raised from the medial side in 28 (56%) and from the lateral side in 22 patients (44%). The flap was superiorly based in 19 (38%) and inferiorly based in 31 patients (62%) [Figures 4 and 5].

In all the patients of lower 1/3<sup>rd</sup> defects inferiorly based flap was done. The operative time ranged from 30 min to 45 min with a mean of 38 min.



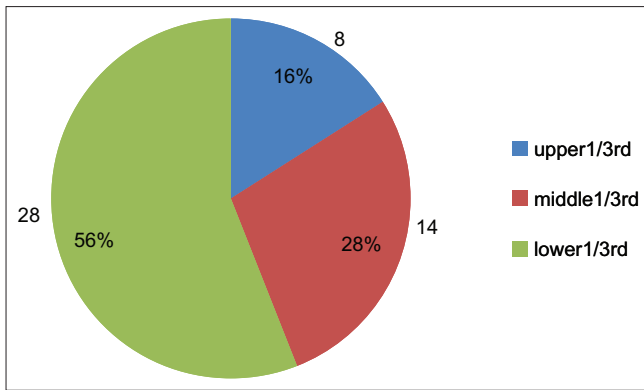
**Figure 1: A case of posttraumatic soft tissue defect middle 1/3<sup>rd</sup> of leg covered with medial inferiorly based sliding transposition flap (a) pre-operative (b) post-operative day 7**



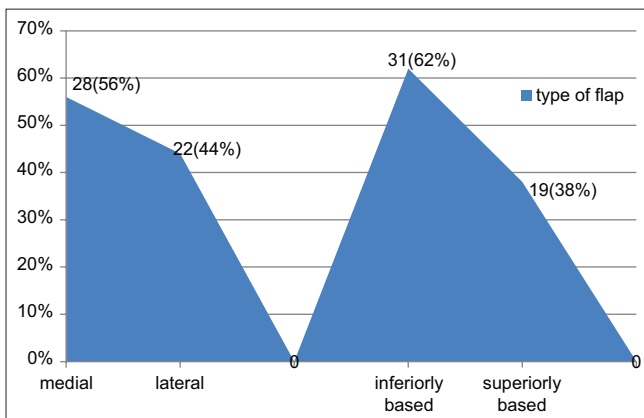
**Figure 2: A case of post osteomyelitis soft tissue defect upper 1/3<sup>rd</sup> leg covered with lateral superiorly based sliding transposition flap (a) pre-operative (b) post-operative day 7**



**Figure 3: A case of exposed implant lower 1/3<sup>rd</sup> leg covered with medial inferiorly based sliding transposition flap (a) pre-operative (b) post-operative day 7 (c) post-operative day 21**



**Figure 4.** distribution of patients with respect to the site of the defect



**Figure 5:** Distribution of patients with respect to the type of flap

All the flaps healed well. There was no necrosis or graft loss seen in any of the patients. There was no donor area morbidity in any of the patients.

## DISCUSSION

There is a wide variety of flaps available for the reconstruction of soft tissue defects overlying the tibia. The leg is divided into proximal third, middle third, and lower third for the purpose of selection of the type of reconstruction procedure required. The type of reconstruction required depends on the site, size as well as condition of the surrounding skin. The large defects with extensive surrounding crushing can no doubt be managed by free flap tissue transfer only but a large proportion of the rest is successfully managed by local muscle, fasciocutaneous, or cross leg flaps. The local fasciocutaneous flaps have the advantage of low donor site morbidity when used for the coverage of lower limb defects. The fasciocutaneous flaps for the leg were first of all described by Ponten.<sup>[6]</sup> The inclusion of fascia in the flap increased its blood supply via direct cutaneous, musculocutaneous, and septocutaneous perforators thus making the flap more viable along with

improving the length breadth ratio of the flap. With the incorporation of 2–3 sizable perforators in the pedicle of the flap a nonconventional long flap can be designed with safety.<sup>[7]</sup> Plastic surgery armamentarium for leg defect reconstruction is full of innumerable fasciocutaneous flaps. In addition to the traditional fasciocutaneous flaps there is bipedicle flap,<sup>[8]</sup> keystone flap,<sup>[9]</sup> v-y advancement flap<sup>[10]</sup> and other perforator based flaps.<sup>[11]</sup>

In their earlier studies, Harrison and Saad did not include fascia in the sliding transposition flap described by them and it was included in their later series after the description of fasciocutaneous flap by Ponten in 1981. In our findings, 50 sliding transposition flaps were raised covering all regions of the leg. Fascia was included in all the flaps. The decision of raising the flap on the medial or lateral side had been based on skin condition, skin laxity, and a preference to include perforators of Posterior Tibial and Peroneal artery in the flap base. Out of inferiorly based or superiorly based whichever flap seemed more feasible was harvested. In the lower 1/3<sup>rd</sup>, all the flaps harvested were inferiorly based because of the anatomical shape of the leg. Success was defined as ability to transpose flaps to cover defects without tension. None of our patients had even marginal necrosis.

We included small defects up to 5 cm only in our study. However, sliding transposition flap can cover bigger defects also if we divide the defect into two parts and plan to raise two small flaps from each side of the leg. Patients with degloving injuries were not included in the study. The presence of degloving or crushing around the wound will need other options for wound coverage.

## CONCLUSION

The sliding transposition flap is a very easy and safe option for covering the small leg defects.

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