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RECONSTRUCTION OF TWO LEG DEFECTS WITH TRANSVERSE UPPER GRACILIS FLAP

Plastic Surgery

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ABSTRACT

Irregular leg defects sometimes present a challenging predicament for the reconstructive surgeon. Defects lying in perpendicular axes demand multiple flap options to cover all defects. This paper presents a patient for whom a free Transverse Upper Gracilis (TUG) flap was done to cover two defects in different axes. A TUG musculocutaneous flap from left thigh was utilized to reconstruct the soft tissue defects on the right leg, which involved exposed tibia on the medial side and exposed lateral malleolus. The paper discusses the planning, surgical procedure and outcomes of the reconstruction.

KEYWORDS

Leg defect, TUG flap, Lower limb reconstruction, Gracilis muscle

INTRODUCTION:

Every year a number of patients present to the emergency departments with musculoskeletal injuries especially involving the lower limbs in India due to road traffic accidents. There is an increase in demand for suitable donor flap options which provides a good closure of defect with aesthetically acceptable and hidden donor site scar[1].

A variety of free tissue flaps have been described for lower limb reconstruction. Although the transverse upper gracilis (TUG) flap has been in use as a versatile flap for breast reconstruction, its use in lower limb reconstruction is not found so often in literature. Despite that it can be used for small thin defects in lower limb without donor site morbidity where the need of tissue is not great in extent or other donor sites are not available. This musculocutaneous flap has the advantage of an easy dissection, allowing the harvest of tissue from the medial thigh area with the patient supine and a hidden donor site. The authors hereby present the free TUG flap which was used for two concurrent lower limb defects. This alternative allows harvesting both the skin and muscle from the medial thigh, while providing an easier donor site closure with the patient in supine position. In this paper the authors discuss the use of free TUG flap for two lower limb defects.

Case Report:

A 46 year old male sustained right compound grade III b distal tibia and fibula fracture due to road traffic accident as he was hit by a tractor while he was driving a two wheeler. He was treated at a primary health care center by wound dressings and 17 days later brought to the casualty of our hospital. Under the care of orthopaedic surgeons he underwent fracture reduction and debridement and external fixator application for the distal 1/3rd tibia & fibula fractures and was referred to us for soft tissue coverage. Arterial & venous Doppler of right lower limb and digital subtraction angiography (DSA) of right lower limb was normal.

Soft tissue coverage was needed for two defects on the right leg - one was on the medial side along the long axis of tibia and one on the lateral malleolus lying in a plane perpendicular to the axis of the other defect. The soft tissue defect on the medial side of right leg was about 15 cm x 3 cm x 2 cm (Craniocaudal x Mediolateral x Depth) with 6 cm x 4 cm of tibia bone exposure and the soft tissue defect on the lateral side was about 6 cm x 5 cm x 1 cm (Craniocaudal x Medio lateral x Depth) with an exposed lateral malleolus of about 2 cm x 1 cm (Figure 1). For the coverage of these two defects, a TUG flap from the left thigh was planned. There was also a raw area on the the dorsum of the right foot on the medial side which was about 8 cm x 2 cm (Anterio posterior x Mediolateral) in size with no exposed vital structures.

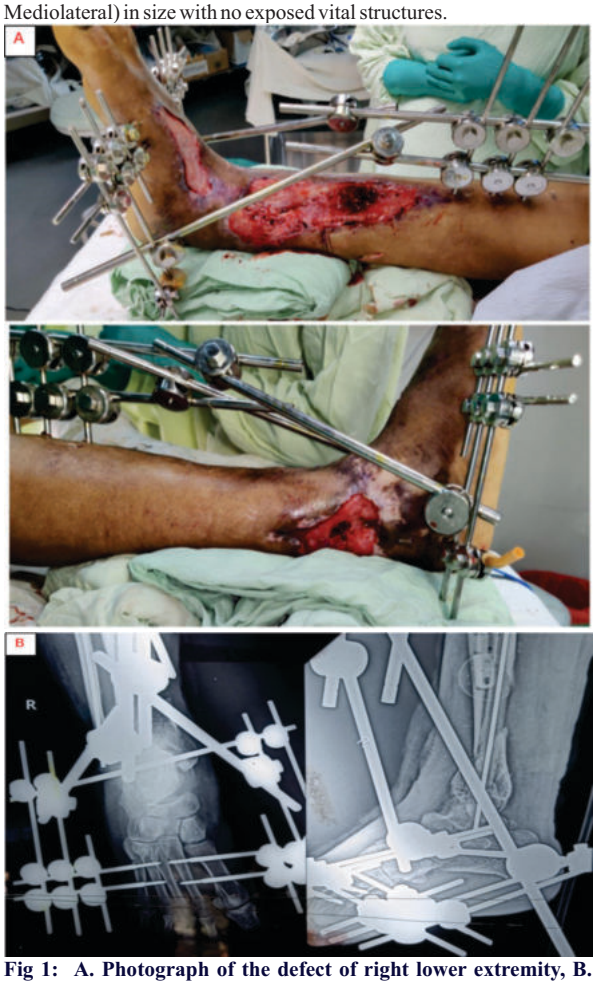

Fig 1: A. Photograph of the defect of right lower extremity, B. Antero-posterior & Lateral view radiograph of right lower extremity.

Surgical procedure:
Preoperative markings for TUG flap were done in supine position. The femoral artery which is 2 cm inferolateral to pubic tubercle was palpated and the anterior border of the TUG flap was drawn medial to it. The posterior border of the flap was the posterior midline of the inferior buttock fold. The superior horizontal skin marking was drawn approximately 2 cm below the inguinal crease on the anterior side and the inferior gluteal fold on the posterior side. The skin ellipse was estimated by pinching the skin to determine the amount of skin that can be closed without undue tension. With this skin mark drawn on the medial thigh, the inferior horizontal skin marking was made so as to connect the anterior and posterior limits of the flap as a curved line.

Under general anesthesia, in supine position, under tourniquet control, debridement of the wounds and de-epithelization of the bridging skin between the two defects was done. Split thickness skin grafting was done to cover the raw area over dorsum of right foot by one team. Harvesting of the TUG flap was done by second team . With minimal flexion and abduction at hip and with knee joint flexed, TUG flap from the left thigh was planned (Figure 2) of size 19 x 7 cm skin flap with around 16 cm muscle (Figure 3) with an aim to orient the skin paddle for longitudinal defect of leg while keeping the muscle in medio lateral direction on right leg to reach the lateral malleolar defect. Superficial dissection of the subcutaneous tissue was performed from the anterior aspect of the thigh until the saphenous vein and lymphatic collectors were located. Later full thickness of adipose tissue was recruited after deep dissection. The fascia was incised and the soft tissue elevated off the semimembranosus and semitendinosus muscle until the adductor magnus muscle and the gracilis muscle was visible. The vascular pedicle to the gracilis muscle was identified and traced to the medial circumflex femoral artery. Clipping of the side branches to the adductor longus muscle was done. The gracilis muscle was cut as distally as possible. Minor vascular pedicles were coagulated. Once the TUG flap was elevated and harvested two suction drains were inserted and the donor site closure was achieved in three layers[1,6]. After partial flap inset (fig.4) to right leg defect, micro vascular anastomosis was done to anastomose the medial circumflex femoral artery of the flap to the posterior tibial artery of right leg in an end to side fashion and Venae commitantes of the flap to venae commitantes of the posterior tibial artery in an end to end fashion. The flap inset was completed.

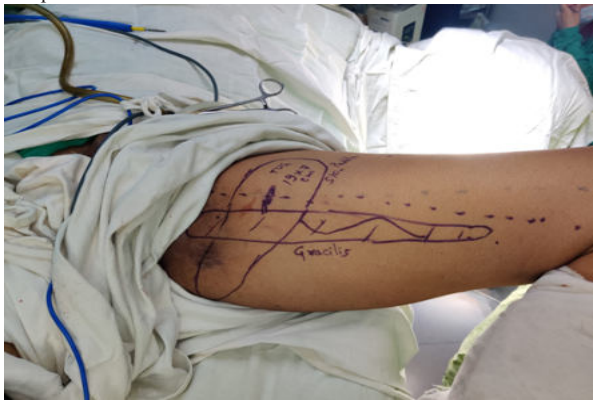

Fig 2: Planning of free TUG musculocutaneous flap from left thigh

Fig 3: Harvested TUG flap

Fig. 4: Medial and lateral view of right leg with flap inset

Outcome:
Two months later the external fixator was removed and non-weight bearing mobilization on the limb was continued. The flap was well settled with good donor aesthetics at three months follow up (Figure 5).

Fig 5: Photograph after 2 months of the TUG flap surgery

DISCUSSION:
Gracilis is an important reconstructive option because of hidden donor site and it is good for longitudinally oriented thin defects.[2] Traditionally the longitudinal skin paddle has been used which is placed in the upper third of the gracilis.[3,4]Transverse skin paddle of the gracilis flap has been in use since it provides good bulk by recruiting the fat from the upper part of medial thigh and it has got various advantages.[5]The reliable anatomy of the nutrient pedicle, the medial circumflex artery, and supine patient position allow for a safe and straight-forward two-team approach. For tibial defect along with lateral malleolar defect the first plan of reconstruction is to use a free flap for the longitudinal tibial defect along with inferiorly based fasciocutaneous flap for the lateral malleolus. Combining the two techniques seems to be a useful option in patients with defects in perpendicular axes. Over the limbs the available tissue may be less for the two local flap options. In such areas the TUG flap provides a chance to cover both the defects comfortably with a single free flap. The intervening skin present between the defects may be de- epithelized to achieve 100% inset of the flap. This is not a new technique, just a rethinking of two pre- existing techniques to achieve optimum reconstruction with defects lying in different axes.

Even if not perpendicular, the angle between the skin paddle and muscle can be made more acute converting it into a Diagonal upper gracilis flap (DUG).[1,7] Thus, we see that free gracilis muscle can be used along with a transversely or diagonally placed skin paddle in the upper third of the thigh to achieve primary closure of the donor site as well as coverage of the defects lying in separate axes.

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