

ROLE OF GASTRONEMIUS MUSCLE AND MYOCUTANEOUS FLAP IN TREATING TRAUMATIC SOFT TISSUE DEFECTS OF UPPER 2/3RD OF LEG AND KNEE – RETROSPECTIVE STUDY IN A TERTIARY CARE HOSPITAL

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Abstract

Background: Compound defects of upper 2/3rd leg (i.e., upper 1/3rd of leg and junction of upper 1/3rd and middle 1/3rd of leg) & around knee is a challenging problem in reconstructive surgery. Available options are cross leg flap and free, which are two poles apart, with cross leg flap being an age old method and free requires time and expertise. **Materials and Methods:** All the patients included in the study were admitted to the trauma ward under the care of the attending orthopedician and received first aid, and after resuscitation and primary wound care and application of external fixators whenever necessary, patients with grade IIIB defects were referred to the Department of plastic surgery for management of defects. Study is started after obtaining institutional ethics committee approval. **Results:** In this study 40 cases of posttraumatic upper 2/3rd leg, knee defects were studied. The percentage of male and female patients who took part in the study was 75% (30 patients) and 25% (10 patients) respectively. The male: female Ratio was 3:1. **Conclusion:** Post-traumatic large defects of leg extending in upper and middle third were easily covered with the help of regional gastrocnemius myocutaneous flap with excellent outcome and aesthetically acceptable coverage of skin without any major complications or long term morbidity.

INTRODUCTION

Compound defects of upper 2/3rd leg (i.e., upper 1/3rd of leg and junction of upper 1/3rd and middle 1/3rd of leg) & around knee is a challenging problem in reconstructive surgery.

Various reconstructive choices for coverage of compound defects of upper 2/3rd leg & around knee are available depending on the location, size & depth of the defect.

Available options like crossleg flap over and free flap, are both poles apart, with crossleg flap being an age-old method while free flap still lacks available expertise.

Available options are cross leg flap and free, which are two poles apart, with cross leg flap being an age old method and free requires time and expertise.

Despite severe trauma over anterior aspect of leg, the posterior region of leg is usually spared and thus, gastrocnemius myocutaneous flap is an excellent and versatile option available for a large defect because of its reliable anatomy and vigorous

blood supply.^[1,2] Gastrocnemius myocutaneous flap was originally described in 1977^[3].

We want to study if gastrocnemius flap is useful to treat soft tissue defects of upper 2/3rd leg or over the knee joint.

MATERIALS AND METHODS

This is a Retrospective hospital based study done at a tertiary care teaching hospital.

All the patients included in the study were admitted to the trauma ward under the care of the attending orthopedician and received first aid, and after resuscitation and primary wound care and application of external fixators whenever necessary, patients with grade IIIB defects were referred to the Department of plastic surgery for management of defects. Study is started after obtaining institutional ethics committee approval. Approval number: IEC/GMC-OGL/200/2024

Detailed history was taken on the mechanism of injury, the time since injury and personal/family history.

Then all the patients were subjected to general and local clinical examination to rule out other coexisting injuries and to assess the site and size of the defect, the degree of wound contamination and the condition of surrounding skin.

Laboratory investigations were done. X-rays and Doppler studies of lower leg were done to rule out vascular injury.

Wound swabs were sent for culture and sensitivity as per need.

Systemic antimicrobials were used according to culture and sensitivity to control the wound infection. Wounds were dressed daily with a saline dressing. Once the wounds were free of infection the soft tissue cover was planned.

The site of the defects were grouped into involving knee, upper one third of leg and junction of upper and middle third of leg.

The appropriate reconstructive technique was selected for every patient according to the site, size and type of the defect, such as gastrocnemius muscle flap for defect involving knee, upper 1/3rd of leg and gastrocnemius myocutaneous flap for defects involving junction of upper and middle 1/3rd of leg.

Distal margin of medial gastrocnemius myocutaneous flap was taken as per defect site tailored to each case and was extended maximally to 5cm to 7cm from level of medial malleolus.

All the patients received postoperative care including proper antibiotic therapy, analgesics in the post-operative period, elevation of the limb to prevent edema and monitoring of the flap color, temperature.

First Look dressing of the skin graft over donor flap area in case gastrocnemius myocutaneous flap was done on the 5th postoperative day. Patient was asked for regular follow-ups at regular interval of 3 weeks, 6 weeks, 3 months and 6 months.

Data was collected in the form of a proforma which included epidemiological data, clinical data, wound area measurements and operative surgical information. The data so obtained was subjected to simple statistical analysis to determine and analyze the various reconstructive options used.

RESULTS

In this study 40 cases of posttraumatic upper 2/3rd leg, knee defects were studied at the Department of Plastic and Reconstructive Surgery RIMS college, Ongole from February 2022 to December 2023.

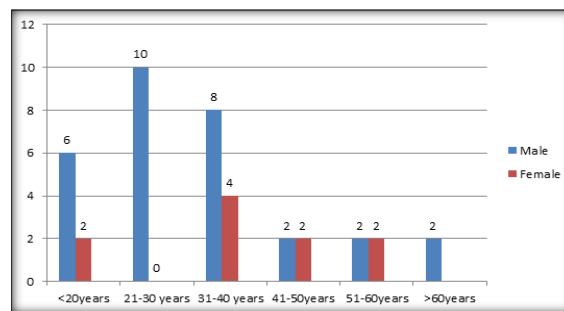


Figure 1: Age and sex distribution of the study population

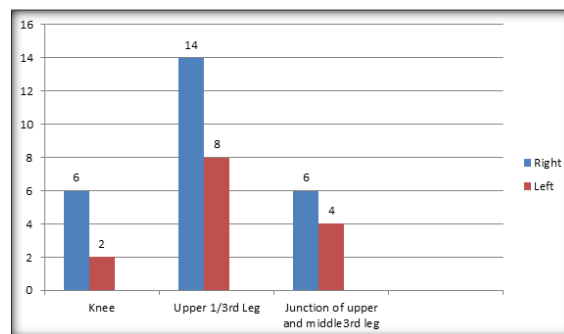


Figure 2: Side and Site Distribution

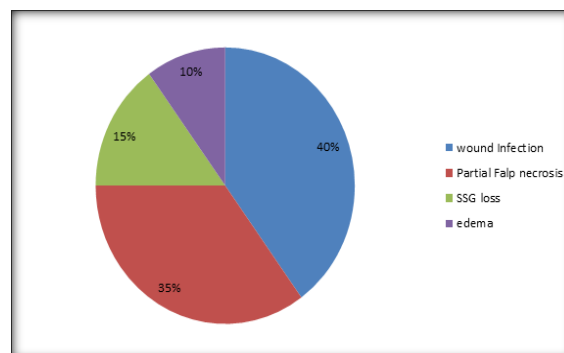


Figure 3: Complications

In this study 30% (12 patients) were between 31 to 40 yrs and 25% (10 patients) were between 21 to 30 yrs (Figure 1). The percentage of male and female patients who took part in the study was 75% (30 patients) and 25% (10 patients) respectively. The male:female Ratio was 3:1. [Figure 1]

As seen in the chart above 65% (26 patients) had involvement of the right leg, 35% (14 patients) had left leg involvement and the most commonly involved region was the upper 1/3rd of the leg. The defects of the upper 2/3rd of leg i.e., upper 1/3rd and junction of upper and middle 1/3rd of leg amounted to 55% (22 patients) and 25% (10 patients) respectively. About 20% i.e., 8 patients had defects involving knee. [Figure 2]

The defects were classified based on the size into small, medium and large defects. Small defects included defects less than 10cm², medium sized defects were between 11 to 20cm² and large defects were more than 20cm². Analyzing the study group based on the size of the defect revealed that 55% (22

patients) had small defects, 35% (14 patients) had moderate sized defects and 10% (4 patients) had large defects.

The reconstructive options utilized for the reconstruction of the defects was formulated as seen below. Gastrocnemius muscle flap was done in 75% cases (30 patients) of which most of cases having proximal 1/3rd leg defect and Gastrocnemius myocutaneous flap was done in 25% (10 patients) cases.

In this study Gastrocnemius muscle flap was done in 30 patients of which medial gastrocnemius muscle flap was done in 14 patients, of which 4 patients having knee defect and 11 patients having upper 1/3rd leg defects and lateral gastrocnemius muscle flap was done in 1 patient having knee defect. Medial Gastrocnemius myocutaneous flap was done in 5 patients having defect involving junction of upper and middle 1/3rd of leg.

65% (26 patients) of accounting small defects were given Gastrocnemius muscle flap, 25% (10 patients) having moderate size defect were given Gastrocnemius myocutaneous flap cover as well as 10% (4 patients) with large size defects.

Among the patients suffered from complications, the commonest complication was wound infection 40% (16 patients) followed by partial flap necrosis in 35% (14 patients) and SSG loss was seen in 15% (6 patients) and edema in 10% (4 patients). [Figure 3]

DISCUSSION

Our study was a prospective study which studied 40 patients who underwent reconstruction during our study period. Majority of the patients in the study were male with a male to female ratio of 3:1 and 55% of the patients were in the age group of 20 to 40 yrs. which is along the national trends in road traffic accident mortality and Morbidity. Hence there constructive needs are most for the most productive age group of the population and early return to work and a restoration of near normal functionality should be aim of any reconstruction of the lower extremity. Skin and soft tissue defect of leg after trauma is commonly encountered for which early and precise management of the patients may improve the overall outcome aesthetically and functionally. There are many options for upper and middle third of leg defect separately, but the large defect involving area between upper and middle third or transition zone between two has very limited options like cross leg flap, gastrocnemius flap and free flap. Cross leg flap is rarely used now since it leads to long term morbidity and discomfort to the patients due their cumbersome position.^[5]

In era of microsurgery, free flap is the most commonly employed flap for coverage of any defect, but free flap leads to donor site morbidity and requires expertize. Moreover intensive post-operative monitoring, requirement of healthy recipient vessel and chances of re exploration are

the areas of concern with free flap. Use of cross leg flap and free flap for upper and middle third of leg can be obviated by gastrocnemius myocutaneous flap. The flap has a reliable vascular pedicle along with a large skin paddle as per need.^[5]

Advantage of gastrocnemius myocutaneous flap is that the flap can cover the defect up to middle third of leg successfully without any complications. In our study, functional loss was not seen in any patient and the contour deformity was acceptable. This result is similar to that found in the study of Kroll et al. who have concluded that functional and aesthetic outcome is acceptable when only one flap is raised.⁶ Scar can be avoided by tunneling of the flap beneath skin-bridge.

Bashir et al. in their study described gastrocnemius tenocutaneous island flap at the lower end of the muscle.^[7] In our study, using skin paddle, detaching their origin, multiple scoring of the muscle and oblique placement of flap were used to improve the reach of flap. In order to stretch the flap distally, the pedicle was skeletonized and the fascia over the proximal muscle was removed. The rate of complications encountered in our study are comparable to other large studies, with only minor complications seen.^[8] Complete flap necrosis did not occur in any case in our study, although it was seen in the study of Chung et al. which they had attributed to inadequate tunnelling of flap.^[9]

In the era of microsurgery, the gastrocnemius myocutaneous flap for reconstruction of defect involving the upper and middle third of the leg is very attractive and versatile option for plastic surgeon. It is a simple technique allowing rapid, durable and reliable coverage of these defects without sacrificing a nerve or a major vessel to the foot. No donor site morbidity as functional deformity was noted in any patient.

CONCLUSION

Post-traumatic large defects of leg extending in upper and middle third were easily covered with the help of regional gastrocnemius myocutaneous flap with excellent outcome and aesthetically acceptable coverage of skin without any major complications or long term morbidity.

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