PROXIMALLY BASED SUPERFICIAL SURAL ARTERY FLAP UTILITY AND COMPLICATION

Qazi Amjad Ali[1], Nasir Hayat Khan[1], Waqas Hayat[1], Shahzad Ahmad[1], Mansoor Khan[1], Zarak Khan[1]

Abstract

Background: Most of the patients presenting with such injuries belong to the low socio-economic class, where the whole family is dependent upon the earning of a one single person. Due to the critical role of knee in mobility, its coverage is of critical importance in order for the patient to achieve ambulation.

Objectives*:* To determine the uses and frequency of complications for proximally based superficial sural artery flaps in a tertiary care center.

Settings*:* This descriptive cross-sectional study was performed at Burns & plastic surgery, Peshawar and Burns & Plastic Surgery, Peshawar from June 2020 to March 2024.

Methodology*:* Patients were included in the study after informed consent. After clinical history and examination, the patient was optimized for surgical procedure. Per-operatively the defect size, location and exposed structures were identified and documented. Follow-up was done for 1 month for any complications. The data was organized and analyzed with the help of Statistical Package for Social Sciences (SPSS) and presented in the form of tables and figures.

Results*:* A total of 12 patients were included in this study. The mean age of the patients was 33.7 ± 15.2 years. Most of the patients (91.7%) were male. Most common mechanism of injury was road traffic accident (RTA) as shown in table 1. Flap delay was done in one (7.7%) patient. Two patients had partial necrosis.

Conclusion*:* Sural artery flap is a good reconstructive option for defects of distal thigh, knee and proximal leg. It can cover large defects and the donor site morbidity is low.

Keywords: Knee, Reconstruction, Sural artery flap, Lower limb trauma, Lower limb reconstruction

Introduction:

Over the years, several reconstructive options have been tried for the defects around the distal thigh, knee and proximal leg area coverage. Due to the critical role of knee in mobility, its coverage is of critical importance in order for the patient to achieve ambulation. [1, 2]

Soft tissue injuries of the knee can seriously impact upon the quality of life of the patient. [3, 4] Most of the patients presenting with such injuries belong to the low socio-economic class, where the whole family is dependent upon the earning of a one single person. This population cannot afford prolonged hospital stays associated with more complex procedures. [5] For this patient population, the primary aim of treatment is to return to work as soon as possible. Prolonged hospital stay can cause psychological problems in these patients. [3]

Each reconstructive option presents with its own set of problems.[6-8] The reconstructive options described involve both free tissue transfer and local pedicle flaps. Free tissue transfer is a large procedure, requires recourses and can only be performed in large centers. After the procedure, the patient remains admitted in high depending units (HDU) or intensive care unit (ICU) for flap monitoring. Local pedicled flaps are easy to do,

1. Burn and Plastic Surgery Center Hayatabad Medical Complex, Peshawar

Corresponding Author
Nasir Hayat Khan
Burn and Plastic Surgery Center Hayatabad Medical Complex, Peshawar
nasir_hayat_khan@yahoo.com

are less time consuming and donor site morbidity is less.[9] In local flaps, patient recovery is quick and there is no need for prolonged hospital stay. It also suits patients who come from far flung areas where the means of transport are few and expensive and frequent follow-ups are not economically viable for the patients. Local flap coverage is also preferable in old patients with multiple co-morbids.

Proximally based sural flap is a fasciocutaneous flap that can be used for coverage of the distal knee. Muscle flaps were used previously for such defects to provide robust healing due to good blood supply. Now fasciocutanoeus flaps are also used for such defects. By conducting this study, we will examine the outcomes and complication rate of proximally based sural flap.The aim of this study is to determine the uses and frequency of complications for proximally based superficial sural artery flap in a tertiary care center to determine the uses and frequency of complications for proximally based superficial sural artery flap in a tertiary care center.

Material and Methods:

This descriptive cross-sectional study was performed in the Burns & Plastic Surgery, Peshawar, from June 2020 to March 2024. After informed consent, all the patients with small to medium size defects with exposed vital structures on the lower 1/3 of thigh, knee and proximal half of the anterior leg were included in the study irrespective of the age and gender. The patients with co-morbidities like diabetes, collagen vascular diseases and high energy trauma and burns were excluded. After clinical history and examination, the patient was optimized for surgical procedure. Per-operatively the defect size, location and exposed structures were identified and documented. The defects were classified based on the largest dimension of the defect into small medium and large. Small defects were <6cm, medium defects were 6-10 cm and large defects were >10 cm. The surgery was performed under tourniquet control in prone position after reverse mapping of the defect and designing the flap. The donor site was covered with split thickness skin graft and the limb was splinted for immobilization and keeping the flap off-pressure. Post-operatively the flap was monitored clinically and examined periodically till 1 month for any complications i.e., necrosis, congestion, hematoma or surgical site infection. The data were organized and analyzed with the help of Statistical Package for Social Sciences (SPSS) and presented in the form of tables and figures.

Results

A total of 12 patients were included in this study. The mean age of the patients was 33.7 ± 15.2 years, ranging from 9 - 55 years. Eleven patients (91.7%) were males while 1 (8.3%) was female. Most common mechanism of injury was road traffic accident (RTA) as shown in Table 1. Location of the defect is shown in Table 2. Most of the patients had large defect sizes (Table 3). The average age of patients with RTA is 30.42 years while the average age of patients presenting with malignancy is 41.67 years. Defect size was not significantly related with the complications (p-value 0.24). Flap delay was done in one (8.3%) patient. Two patients had partial necrosis. One patient had significant partial necrosis and debridement was done. The other patient has insignificant partial necrosis and was managed conservatively. Three (25%) patients developed post-operative congestion. It resolved without any significant deterioration in two cases, however complication rate can significantly rise in patients who get venous congestion in the sural flap (p-value = 0.001).

Table 1: Mechanism of injury

	Frequency	Percent	Average age in years
Road traffic accident	7	58.3	30.42
Firearm injury	1	8.3	42
Burns	1	8.3	25
Malignancy	3	25.0	41.67
Total	12	100.0	

Table 2: Site of Defect

	Frequency	Percent
distal thigh	2	16.7
knee	6	50.0
Proximal leg	4	33.3
Total	12	100.0

Figure 1: a, Knee defect with exposed knee joint. B, marking of fasciocutanoeus sural flap. C, Flap dissection. D, Flap inset at the defect site.

Figure 3: a, Defect involving proximal third of the leg. Exposed tibia visible in the wound. B, Fasciocutaneousante grade sural flap done to cover the defect.

Table 3: Defect Size

	Frequency	Percent
Small	1	8.3
Medium	4	33.3
Large	7	58.3
Total	12	100.0

Discussion

The average age of our patients is 33.7 years. According to the literature, most patients presenting with soft tissue injuries of the lower limb fall are young, with average age falling in the third decade of life. [5, 9, 10] This is because the most common etiology of these defects is road traffic accidents. Young male population has greater exposure to outside environment and hence the working adult male population gets these injuries more commonly. [4, 10] Malignancy was a common etiology of these defects in the higher age group. This age distribution is also shown in other studies.[8, 11]

We classified the defects into small, medium and large due to the defect size. Although small defects can mostly be closed with local options without much hassle, defects over the knee require abundant supple tissue for good wound healing and to achieve early mobility. [12]

There were no complete failures in our patient population. Similar results are also shown by Suri et al.[1] they also had one case of distal necrosis that had to undergo debridement. If proper dissection is done, and neuro-cutaneous and venocutaneous perforators are taken along the flap carefully, the complications can be avoided to a great extent.[11, 13, 14] Most defect sizes can be easily managed with a pedicled flap except for very large defects. In these patients with no viable local options, free tissue transfer is needed. [15]

Other option for knee defect is gastrocnemius flap but it has significant donor site morbidity.[16-19] A fasciocutanoeus flap coverage significantly reduces the donor site morbidity.[13] However, a graft is put on the donor site in most cases, but in terms of functionality there is very little loss as compared to a gastrocnemius flap.[20] Innocenti et al [21] has described a chimeric gastrocnemius myocutanoeus flap for very large defects of the flap. This flap is good if the defect is too large for sural flap to cover without tension.[19] Other options for a knee and distal thigh defects are the perforator flaps based on the genicular arteries and these flaps feed off the genicular plexus. In some patients, the genicular plexus falls in the zone of injury and is unreliable while in other patients, the defect size is too large for genicular perforator flaps to cover. However, they are ideal for small to medium defects.

The limitation of this study is that data was collected from patient records and it is a descriptive study. The number of variables studied is limited and the number of patients is also small. A large patient population can be useful in terms of studying the flap reliability.

Conclusion

Sural artery flap is a good reconstructive option for defects of distal thigh, knee and proximal leg. It can cover large defects and the donor site morbidity is low. It can easily be done in low resource setups.

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