

ORIGINAL RESEARCH

CLINICAL STUDY OF THE LATERAL PREMALLEOLAR FLAP

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ABSTRACT:

Background: Lateral premalleolar flap that is a reliable, study, and very useful to cover soft tissue defects of the distal leg, ankle, and foot but still remains underutilized and under-reported in the literature.

Aims: To study the dimensions of the Lateral Premalleolar Flap that can be harvested with safety and its uses for the defects around the ankle.

Materials and methods: This retrospective study is conducted for 3 years included 12 patients irrespective of sex and age between 5-70 years with soft tissue defects around the ankle joint. Various dimensions were assessed and studied.

Results: A lateral premalleolar flap was performed in 12 patients in our study, all of whom were male (100 percent). The participants ranged in age from 15 to 70 years old, with a median age of 40.5 years. The defect was caused by trauma in 11 cases (91%), and electrical burns in one patient (9 percent). The defect was seen in the anterior lower leg in seven patients (58%) and the medial malleolus in two patients (17%), the dorsum of the foot in one patient (8%), and the Achilles tendon in two patients (17 percent). Eight flaps (66%) survived entirely, while four patients (34%) had partial necrosis, requiring revision and reinsertion in two patients (17%) and debridement and skin grafting in the other two (17%).

Conclusions: Because of its reliable blood supply, short operating time, minimal equipment, and ease of execution under regional anesthesia with minimal blood loss and without sacrificing any major vessels, the lateral Premalleolar flap is a good option for lower third leg, dorsum of foot, and posterior ankle defects.

Keywords: Lateral Premalleolar Flap, posterior ankle defects, Debridement, Skin grafting

INTRODUCTION:

Compound defects on the lower third of leg, ankle and foot are common. The addressal of the problem through free flaps has stood the test of time. Centres which are not able to perform free flaps on a regular basis got a boom in the form of “Reverse Sural Artery Flap”, which has been able to answer the provision of skin cover on the lower third of leg, ankle and heel. This flap involved loss of short saphanous vein and sural nerve. An alternative for smaller defects without leading to the losses involved in Reverse Sural Artery, has been the Lateral Premalleolar Flap.^{1,2}

The lateral Premalleolar flap is raised on the lateral aspect of the lower leg and is useful for covering the defects involving the lower leg, ankle and foot. The distally based flap has a wide range that includes the dorsum of the foot, the medial and lateral arches and the heel (not advocated for weight bearing area of heel). The best indication for its use are defects of the posterior aspect of the heel and resurfacing of the stump resulting from trans-metatarsal amputation.^{3,4} The lateral Premalleolar flap can be used as sensory flap by suturing the superficial peroneal nerve to the nerve at the recipient site. We studied the dimensions of the Lateral Premalleolar Flap that can be harvested with safety and its uses for the defects around the ankle.

MATERIALS AND METHODS:

This retrospective study is conducted from August 2012 to July 2015, at Gandhi Medical College, Hyderabad. This study included 12 patients irrespective of sex and age between 5-70 years with soft tissue defects around the ankle joint. Various dimensions were assessed and studied.

Loupe magnification was used in all cases. Preoperative Hand- held Doppler was used to identify the site of perforator and its intensity of flow. All benefits and disadvantages of the operation were discussed in detail with the patients before operation.

Flap is marked with boundaries as depicted in figure 2. Incision is given over the distal border of the flap and extended along the tibial crest (anterior border) and fibula (posterior border). Incision is deepened including the deep fascia. Flap is elevated in subfascial plane. Superficial peroneal nerve is identified and included in the flap. Dissection is stopped 1-2cms proximal to the emergence of peroneal artery perforator. Hemostasis is secured after removing tourniquet. Flap is transferred to cover the defect and inset is given after placing a corrugated drain. Donor defect and the raw area of bridging segment of flap is covered with split-thickness skin graft. Flap is monitored and daily dressing is changed.

RESULTS:

12 cases were performed in our department over a period of three years. Interval between injury and flap cover ranged from 15 days to 4 years. Pre-operative Hand-held Doppler was used to locate the perforator and intensity of flow in all cases. Tourniquet was used routinely. Pivot point of all the flaps raised was 1 – 3 cms above the lateral malleolus.

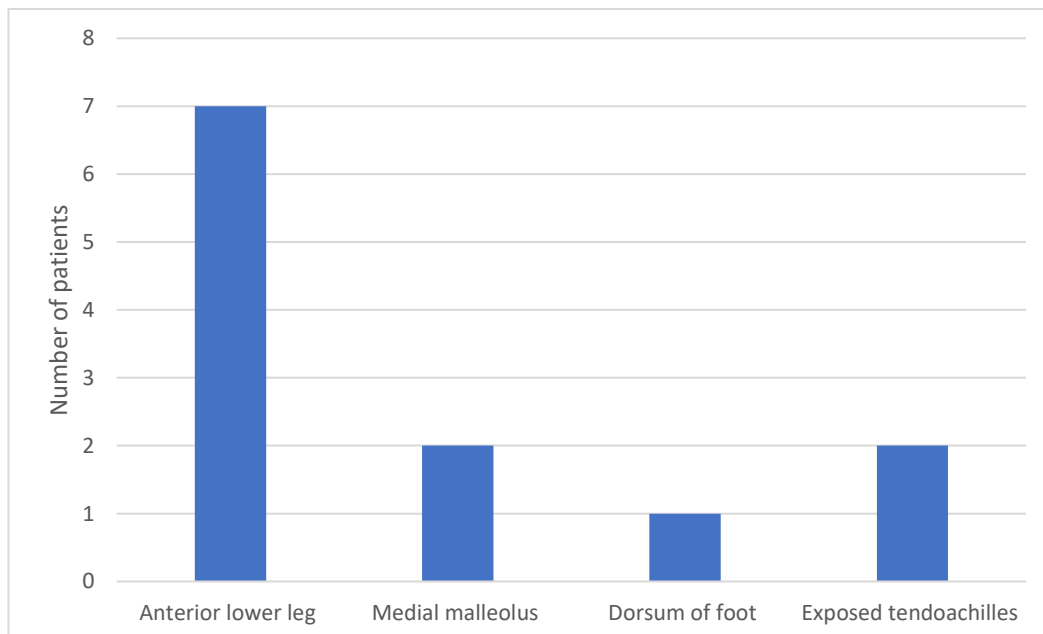
Table-1: Demographic distribution in study

Age group in years	No. of patients	Percentage
15-35	6	50

35-55	3	25
55-75	3	25
Sex		
Male	12	100
Female	0	0
Mode of injury		
Trauma	11	91
Electrical burns	1	9
Co-morbid condition		
Anaemia	4	32
Hypertension, Asthma, Tuberculosis	1	8
Psychiatric illness	1	8

Patient age in our study ranged from 15 – 70 years, with mean age of 40.5years. All the patients were male (12 cases, 100%). Trauma following road traffic accident was the most common etiological factor (11 cases, 91%) requiring flap cover in our study. One case (9%) of post burn ulcer is covered with this flap cover. Co-morbid conditions in our study were psychiatric illness in one patient (8%) and hypertension, asthma, Tuberculosis in one (8%) patient

Figure-1: Location of defect

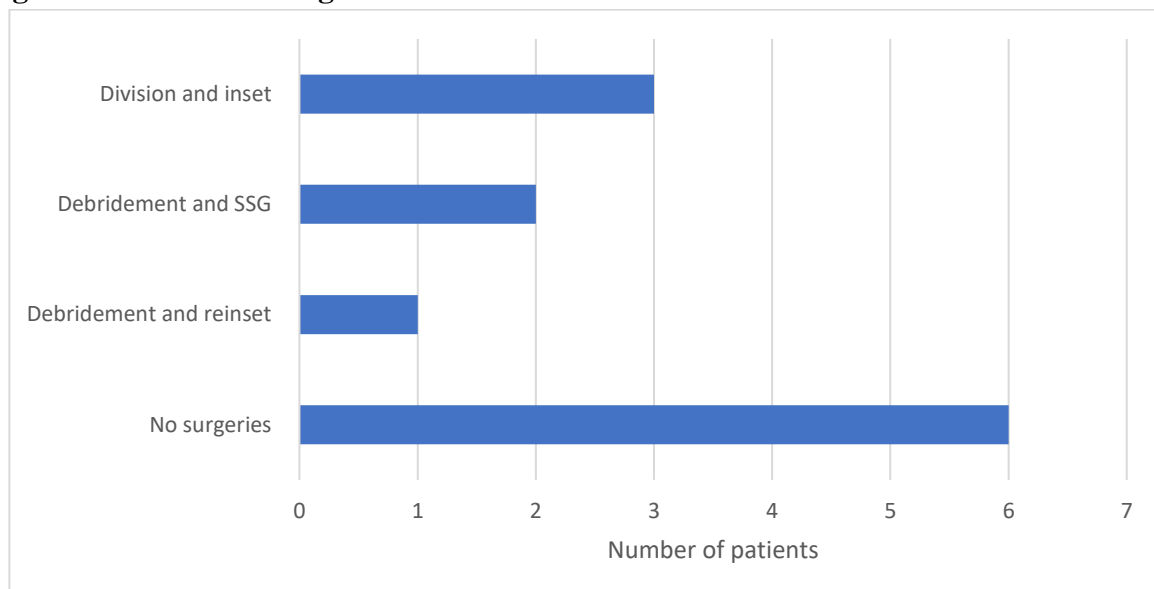


Anterior lower leg (7 cases, 58%) constituted the most common site of the defects requiring flap cover. The other sites include medial malleolus (2 cases, 17%), dorsum of foot (1 case, 8%) and exposed Achilles tendon (2 cases, 17%).

Table-2: Complications

Complications	No. of patients	Percentage
Complete Flap necrosis	0	0
Partial flap necrosis	3	25
Epithelial loss	3	25
Sub-flap collections	4	32
Loss of sensations over superficial peroneal nerve distribution	11	91

Donor site of flap and under surface of flap over bridging segment of the flap were covered with split skin thickness graft. No complication was reported. Flap dimensions ranged from a minimum of 10 x 5 to maximum of 18 x 6 cms. Flaps were transferred to the defect site as interpolation flaps in 3 cases (25%) and as transposition flap in 9 cases (75%). The pedicles were divided at four weeks - five weeks duration and bridging segment was returned to the donor site. Pre operative Flap delay was done in 2 cases (16%).

Figure-2: Associated surgeries

Marginal flap necrosis was found in 4 cases (32%), which were debrided and re-inset was given in 2 cases (16%). Two patients (16%) had partial loss of 3 cms of flap loss and flap was debrided and grafted.

One patient (8%) had defects on both the ankle, for which Lateral premalleolar flap was done on both sides. Superficial peroneal nerve was preserved in one patient (8%), in which sensations were retained but there was a flap loss of distal 3 cms. Flap was partially debrided and split skin grafted. Venous congestion was identified to be the most common cause in 3 cases (25%) for flap marginal necrosis. During follow up period of 3 months, no flap or no donor site complications were noted and all flaps settled well.

Two patients (17%) left the study and follow up was done.

DISCUSSIONS:

A study conducted by Syed Kamran Ahmed et al.⁵, in which Premalleolar flap was conducted in 25 patients, in whom 8 patients were given preoperative delay 6 male and 2 female with average age of 31.25 years ranging from 5-52. The reason for delaying lateral premalleolar flap were larger flap dimension in four (50%), absent peroneal artery perforator in three (37.5%) and one patient (12.5%) had poor circulation.

A study conducted by Ehab Fouad Zayed et al⁶, in which premalleolar flap was conducted in 25 patients, in whom there were 22 male and 3 female and age ranged from 7-74 years. The cause of the defect as trauma. Site of the defect were lower fourth leg and ankle in 14 patients (56%), Achilles tendon in 4 patients (16%), dorsolateral aspect of foot in 7 patients (28%). Twenty patients (80%) survived completely. Five flaps (20%) showed partial necrosis in which 2 patients required revision and resuturing.

In our study, lateral premalleolar flap was conducted in 12 patients, in which all patients were male (100%). Age ranged from 15 – 70 years with mean age of 40.5 years. The causes of the defect were trauma in 11 patients (91%) and electrical burns in 1 patient (9%). Sites of the defect were anterior lower leg in 7 patients (58%), medial malleolus in 2 patients (17%), dorsum of foot in 1 patient (8%), and Achilles tendon in 2 patients (17%). Eight flaps (66%) survived completely, 4 patients (34%) had partial necrosis in which two patients (17%) required revision and reinsert and other 2 patients (17%) required debridement and skin grafting. Flap was used as transposition in 9 patients (75%) and as interpolation flap in 3 patients (25%), who required subsequent surgery (Division and inset).

Hamdi and Klifi⁷ used the lateral supramalleolar flap to reconstruct soft tissue defects around the ankle joint in children and concluded that this flap is a better alternative to the reverse sural flap when used in children. They also inferred that venous congestion is a special complication from a distally based flap in the lower limb and is common with the lateral supramalleolar flap.

Lee and Chung⁸ made modifications in the lateral supramalleolar flap were based on the extensive cadaveric studies on its vascular supply. As the flap receives its blood supply from both the peroneal and anterior tibial system through their perforators, studies were conducted on the contribution from both these systems.

Rong et al⁹ studied about the vascular contribution of the anterior tibial artery to the lateral supramalleolar flap and concluded that there is a definite anastomosis between the perforating branch of the peroneal artery and the anterior lateral malleolar artery around the tibiotalar joint. They also found that there was a collateral inferolateral artery arising from the anterior tibial artery and communicating with the perforating branch of the peroneal artery at the inferior tibiofibular angle and forming an arterial arch.

G. I. Nambi et al concluded that lateral supramalleolar flap is a very useful flap in the regional soft tissue reconstruction around the ankle except in the tendocalcaneal region.

Defects over the lower one fourth of the leg, ankle and over the dorsum of the foot have always been difficult to cover. Several local and loco-regional flaps have been described during the past two decades; however, some are too small to cover defects over the leg (e.g., muscle flaps from the flexors or the extensors of the toes), or the defect is too distal to be reached. Random-pattern flaps can be raised, but they have a high incidence of failure. Free flaps, requiring teams of highly experienced surgeons and paramedical personnel and proper

equipments hold a prominent place in the treatment of these defects, especially when they are extensive (large skin defects, extensive chronic ulcers).

The advantages of the lateral supramalleolar flap are the rapid and reliable procedure provides an excellent alternative to a free flap in many instances. The principle disadvantages are the division of the superficial peroneal nerve and the scar resulting from skin grafting on the lateral aspect of the leg. Usually, the donor site is quite acceptable by the patients in this study.

CONCLUSIONS:

Lateral Premalleolar flap is a good option for lower third leg, dorsum of foot and posterior ankle defects by virtue of its reliable blood supply, short operating time, minimal equipment, easy to execute under regional anesthesia with minimal blood loss and without sacrificing any major vessel.

Reliability of “Lateral Premalleolar flap” is well established when used for soft tissue reconstruction defects around the ankle joint. Extension of flap elevation to middle third of leg and posterior ankle by doing prior delay has no increased complication rates and increased the flap dimensions for larger defects. Cases for which early flap cover was given are very good with no flap necrosis. Donor site morbidity is minimal except for cosmetic deformity in the anterolateral aspect of lower leg.

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