# **Case Series**

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# Lateral genicular artery flap for reconstruction of defects around the knee: a series of 5 cases

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## **ABSTRACT**

The lateral genicular artery flap is a fasciocutaneous flap used for knee reconstruction with low donor site morbidity. It is raised from the lower lateral thigh and is based upon the cutaneous termination of superior lateral genicular artery. This flap showed constant anatomy and is reliable for coverage of defects at superior and lateral portions of the knee and the proximal part of the lower leg. The study period was from January 2016 to June 2017 where we operated on 5 patients, 3 for post-traumatic and 2 were post burn contracture excision. The flap was used as a pedicled fasciocutanous and was based on the superior lateral genicular artery. Five cases underwent lateral genicular artery flap of which 4 were males and 1 was a female. Mean defect size was  $12 \text{ cm} \times 10 \text{ cm}$ . All the donor sites were closed with a split skin graft. One patient had distal necrosis which was managed conservatively. The lateral genicular artery flap is a thin, versatile, reliable and easy to harvest flap for reconstructing defects around the knee, with good cosmetic and functional outcome.

Keywords: Fasciocutaneous, Knee defects, Reconstruction, Superior lateral genicular artery

## **INTRODUCTION**

Reconstruction of defects around the knee has always been a challenge for the reconstructive surgeon. The aetiology of soft tissue defects around the can be post-burn contracture, post-traumatic or post-infective. Many local and free flaps have been described for such reconstruction but have disadvantages such as limited pedicle length and flap size and, in free flaps, difficult micro vascular anastomosis due to deep recipient vessels. However, a local flap is preferred as it simple and less morbid, but the use of a local cutaneous flap is limited because the pedicle length is short for reaching the upper third of the leg. Hayashi and Maruyama described the fasciocutaneous flap of the superior lateral genicular artery (SLGA) for reconstruction of defects around the knee, popliteal region, lower third of the thigh, and upper third of the leg. This

flap is based upon the skin perforators of the SLGA from the right branch of the popliteal artery.<sup>3,4</sup> Here, we present five cases of soft tissue defects around the knee which were covered using pedicled lateral genicular artery flaps with good functional and aesthetic outcome.

## **CASE SERIES**

This is a prospective study of 5 cases who underwent lateral genicular artery flap between January 2016 and June 2017. Cases included 3 post traumatic and 2 were post-burn contracture excision. The skin island was designed to fit the resultant defect and was based on the superior lateral genicular artery vascular pedicle in all cases and all the donor sites were closed with split skin graft. All cases were followed up post-operatively from a minimum of 8 months to a maximum of 14 months. The

skin island was designed on the lateral aspect of the lower thigh when the patient standing (Figure 1). The distal end of the flap must cover the skin over the lateral condyle of the femur, to include the emergence of the cutaneous perforator of the SLGA. The proximal end of the flap can be safely extended to the midpoint between the greater trochanter and the lateral condyle of the femur. The patient was placed in a lateral decubitus position and the incision is started from the proximal end of the flap with the plane of dissection on the loose areolar layer over the deep fascia. Distal to the point 10 cm above the knee joint, the dissection should be carried down to the iliotibial tract for the safe dissection of the intermuscular septum between the vastus lateralis and short head of the biceps femoris. After division, the vascular pedicle can be identified just above the lateral condyle of the femur (Figure 2). This island lateral genicular artery flap is then elevated and transferred to the defect (Figure 3). The flap arc of rotation reaches the distal third of the thigh, knee, and popliteal fossa, and the proximal third of the lower leg.



Figure 1: Flap marking.



Figure 2: Vascular pedicle (black arrow).



Figure 3: Flap over the defect.

Five cases underwent lateral genicular artery flap between January 2016 and June 2017 of which 4 were males and 1 was a female. The age group varied from 30 to 59 years with a mean age of 42 years. The flap dimensions varied from 9×9 cm to 17×11 cm with a mean of 12×10 cm. The mean harvesting time was 80 minutes (range 55-95 minutes). There was complete flap survival in all patients with 1 patient having marginal necrosis which settled conservatively. There was flap edema for the initial 2 to 3 days which later resolved with no flap congestion. The donor areas of all the patients healed well with no restriction in knee joint mobility. The average hospital stay ranged from 5 to 9 days. The photographs of the cases done are described below (Figure 4-7).

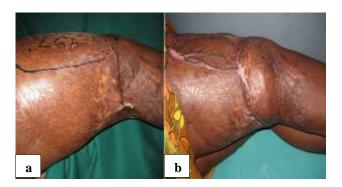


Figure 4: Patient 1 (a) Pre-operative and (b) postoperative photographs of patient with post burn contracture.

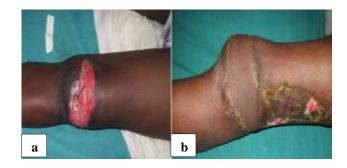


Figure 5: Patient 2 (a) Pre-operative (b) postoperative photographs of patient with post burn contracture.



Figure 6: Patient 3 (a) Pre-operative and (b) postoperative photographs of patient with post traumatic wound and knee in full flexion.



Figure 7: Patient 4 (a) Pre-operative and (b) post-operative photographs of patient with chronic post traumatic wound and marginal flap necrosis.

### DISCUSSION

Several muscular and musculocutaneous flaps such as the gastrocnemius, vastus medialis, vastus lateralis and sartorius muscle flaps, but these flaps have a limited arc of rotation, cause functional deficits on the long run and are cosmetically disfiguring, especially at the donor sites.<sup>5-8</sup> The SLGA described by Hayashi and Maruyama is a local fasciocutaneous flap for reconstruction of injuries affecting the knee and the proximal third of the leg.<sup>2</sup> The SLGA usually originates from the popliteal artery. It courses superolaterally, giving off branches to the vastus lateralis, biceps femoris, and the knee joint. After travelling in the triangular intermuscular space between the vastus lateralis and the short head of the biceps femoris, the SLGA pierces the deep fascia just proximal to the lateral condyle of the femur.<sup>3,4</sup> The point at which the cutaneous perforator of the SLGA penetrates the deep fascia is about 5 cm from the plane of the knee joint. 9 The cutaneous perforator of the SLGA terminates in small cutaneous branches that follow a radial pattern. These branches anastomoses freely with the rete patellae, the lateral perforator of the profunda femoris artery, the musculocutaneous perforators from the popliteal artery, and the musculocutaneous or septocutaneous perforators or both from the descending branch of the lateral circumflex femoral artery.3,4 Among these anastomoses, the communication between the SLGA and the lateral perforators of the profunda femoris artery are predominant, this arterial communication is well developed in the mid-layer of the subcutaneous adipose tissue.<sup>2</sup> Removal of this vessel has no adverse effect on the musculature and primary closure of the donor site is possible if the flap size is less than 10 cm. However, it is not indicated for reconstruction of medial defects of the skin. In an anatomic study by Zumiotti et al the skin perforator of the SLGA was identified in all specimens at a mean distance up to the lateral condyle of the femur of 7.40±2.77 cm, thus confirming the constant location of the pedicle.<sup>10</sup> Hayashi and Maruyama described the diameter of the skin perforator of the SLGA and suggested the

microvascular surgery of this flap.<sup>2</sup> In the study by Zumiotti et al they used the histomorphometric evaluation of arteries for increasing the precision of diameter measurements and their findings (diameter of 1.161±0.012 mm) allowed the use the flap by means of microsurgery transfer.<sup>10</sup> The flap colour and texture are similar to those of the knee area and account for a better quality aesthetic appearance, as compared to muscular or musculocutaneous flaps and caused no issues in knee joint mobility.

### **CONCLUSION**

The lateral genicular artery flap is a single stage axial pattern flap which provides a durable and a thin pliable skin cover for defects around the knee with good cosmesis and no functional or sensory deficit.

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