

Lateral Calcaneal Artery Island Flap

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Date of Submission: 23-06-2020

Date of Acceptance: 11-07-2020

I. Introduction

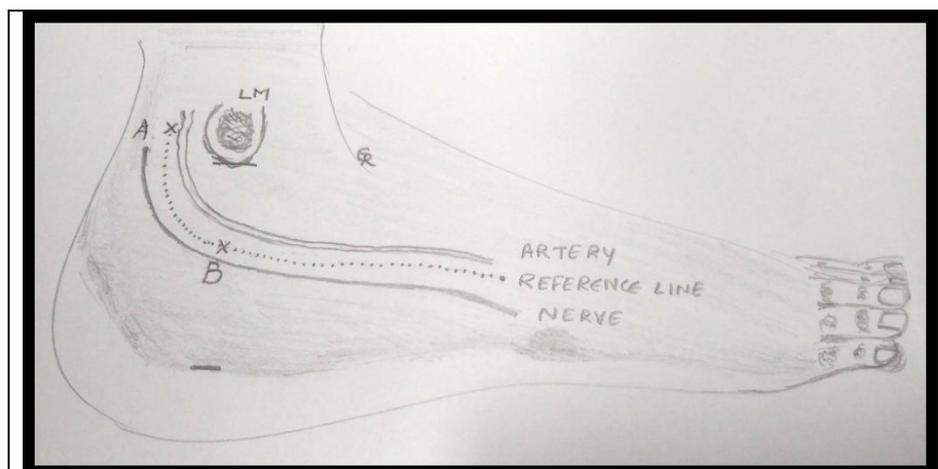
Defects over tendo Achilles, heel, lateral and medial malleoli, annoys the surgeon, especially if they are small due to difficulty in reconstruction. As the dimensions of the defects are such that, considering flaps from calf or foot would be too much for the given defect. For such kind of defects, lateral calcaneal artery (LCA) 'island' flap is one of the options to be considered, in bringing robust, thin, sensate skin with reliable blood supply. Being an 'island' flap, with average pedicle length of 6 cm, it will reach distal one fifth of fibula, lateral malleolus, posterior aspect of heel, tendo Achilles, and medial malleolus comfortably.

II. Methods & Material

Surgical Anatomy: Lateral calcaneal artery is the terminal branch of peroneal artery. Peroneal artery is the lateral compartment artery. It provides innumerable number of perforators, supplying peroneal muscles, fibula, overlying skin and then becomes sub cutaneous at the level of lateral malleolus to continue as Lateral calcaneal artery over dorsum foot to anastomoses with the lateral tarsal artery and branches of lateral plantar artery at the level of base of fifth metatarsal bone. The course of the artery from lateral malleolus is suprafascial running in the sub cutaneous fat.

Surface land marks: 1. Midpoint 'A' is marked between lateral malleolus and tendo Achilles. 2. Another midpoint 'B' marked between tip of lateral malleolus and demarcation line of normal skin - glabrous skin (skin junction line) of foot. 3. A reference line joining these two mid points, following the anatomical curvature of lateral malleolus, extending distally parallel to the skin junction line, up to base of fifth metatarsal bone, was drawn. 4. Parallel line drawn 0.5 to 1.0 cm above to this reference line indicates the course of lateral calcaneal artery. 5. Similarly another parallel line drawn 0.5 to 1.0 cm beneath the reference line indicates sural nerve. (Fig.1)

Fig.1: Schematic picture showing surface land marks for the LCA artery and Sural nerve



III. Material

From 2018-2020, in Department of Plastic Surgery, Government General Hospital, Vijayawada, Sri Ramadevi Super speciality Hospital, Tirupati, lateral calcaneal artery (LCA) 'island' flap was applied for various defects, in and around the ankle in total six cases. 5 were males, one was female. The average age group was between 45 -55 years. Four over tendo Achilles (TA) region, following suture line disruption of primary repair of TA. One over distal fibula with exposed plate and screw and one for exposed lateral malleolus. The average dimension of the flap was 5 X 2.5 cms. For all the defects, LCA 'island' was applied in the described manner.

Surgical technique:

All the cases were done under spinal anesthesia. No prior Doppler study was done to locate the vessel in any case. All the cases were done under tourniquet control. Patient was kept in full prone or semi prone position accordingly. After preparation of the foot, flap planning was marked over dorsum of foot, along the course of artery, as required by performing 'planning in reverse'. Distal incision was made initially which was deepened subcutaneously, to identify artery first, following vein and nerve-which have been divided and ligated. At this point, one can notice peroneal tendons covered with common tenosynovial sheath - care should be taken to preserve paratenon. Then rest of the incision completed, raising subcutaneous flaps leaving at least two layers of fat globules with skin over pedicle area. Dissection continued from distal to proximal, checking the reach of the flap to the defect intermittently. The intervening tissue between the defect and pedicle was incised to avoid tension over pedicle. Flap was insetted, by keeping a drain underneath. Before flap insetting, tourniquet was released and flap was assessed for satisfactory perfusion. Plain 2% Lignocaine was used routinely over the pedicle to minimize arterial spasm. Pedicle site was closed primarily by reposing the flaps back. Donor site was covered with split thickness skin grafting harvested from calf region. Dressing applied with POP slab on the ventral side for two weeks. Suture removal was done in 3rd week in all the cases.

IV. Results

All the flaps were survived. In one case there was superficial epidermal necrosis, which was managed conservatively. Donor site healed well. In follow up, physiotherapy was allowed after six weeks, for those cases with TA repair and sent back to orthopedic department- the cases with fracture fibula. (Fig.2 and Fig.3)

Fig.2: Picture showing exposed plate and screws over distal fibula with marked flap, following debridement, post op result



Fig.3: Picture showing pre operative defect, flap planning, harvested flap ready to transfer, and final result.



V. Discussion

Grabb and Argenta (1981), have described the lateral calcaneal artery (LCA) pedicle flap (9 cases), for the first time with detailed anatomy. The present 'island' component is over the original long (horizontal) component of the artery; which was described them as risky with vascular compromise. Since then sporadic reports appeared in literature, regarding LCA 'island' flap.

J Holmes and C R W Rayner (1984) mentioned their modification over lateral calcaneal artery (LCA) pedicle flap to 'island' flap in 13 cases with their failure in three cases with good outcome in rest 10 cases. They made the defect into circular and then harvested the circular 'island' flap in their series for which, the rationality was not described.

In our series of six cases, we have not encountered complications like distal, partial and or total necrosis of the flap. In all the cases procedure was done as described. Identification of the artery is easier than assumed. Both lateral calcaneal artery and sural nerve are clearly visible in the deeper layers of sub cutaneous tissue. In fact identification of short saphenous vein is relatively difficult, probably because of small caliber. Tracing the artery while elevating the flap appears to be the key to success as damage to the artery is impossible under vision. Sural nerve is included in all the cases, as mentioned by Holmes and Rayner, that exclusion of the nerve is technically difficult than inclusion, holds well in our series too. We have designed the 'island' flap as per the defect, rather making it circular, in a free style manner harvested and transposed flap uneventfully. The average surgical procedure time is also short. It has all the advantages of an island flap. Being an innervated flap provides reasonable sensate skin. Donor site morbidity is acceptable, except that two patients were complained about, parasthesia in the area of nerve distribution, which was managed conservatively. As atheromatous changes in the Lateral calcaneal artery are lesser (Grabb and Argenta), when compared with any other peripheral vessels this flap can be utilized safely in patients with peripheral vascular disease. The only limiting factor appears to be its dimension. Hence for bigger defects other alternatives are to be considered.

In conclusion, we advise to consider lateral calcaneal artery (LCA) 'island' flap as first choice rather than lateral calcaneal artery (LCA) pedicle flap, with all its advantages for the defects within the reach around the ankle, provided the defect dimension is enough to accommodate the flap.

References

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Dr B Jyothsna, et. al. "Lateral Calcaneal Artery Island Flap." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(7), 2020, pp. 01-04.