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Reverse Sural Artery Flap Cover in Management of Foot And Ankle Defects

KEYWORDS: post traumatic defect, Sural artery, flap, soft tissue cover, Foot and ankle

Dr.Srinivasan Rajappa
MS(Orth) DNB(Orth), Department of Orthopedics Sri Ramachandra medical college and research institute1, Ramachandra nagar, Porur, Chennai 600116, Tamil Nadu

Dr.P.Gopinath Menon
MS(Orth) D.(Orth), Department of Orthopedics Sri Ramachandra medical college and research institute1, Ramachandra nagar, Porur, Chennai 600116, Tamil Nadu

Dr.M.Mohan Kumar
MS(Orth) DNB(Orth), Department of Orthopedics Sri Ramachandra medical college and research institute 1, Ramachandra nagar, Porur, Chennai 600116, Tamil Nadu

Dr.R.Dorai Kumar
MS(Orth), Department of Orthopedics Sri Ramachandra medical college and research institute 1, Ramachandra nagar, Porur, Chennai 600116, Tamil Nadu

ABSTRACT *Post traumatic defects of the foot and ankle are very common. It is a challenge to provide robust soft tissue cover for these defects. Microsurgical reconstruction requires time, expertise and finances which are not universally available. The reverse sural artery flap is a simple and efficient way of producing soft tissue cover to defects in the distal third of leg, ankle and forefoot. We describe our experience with 23 reverse sural flaps which were used to cover defects in the ankle and foot. All flaps were performed by a single surgeon under loupe magnification. 18(78%) of these flaps survived fully. Five flaps developed distal necrosis which required subsequent cover with STSG in three cases. The remaining two cases healed by secondary intention. All patients had decreased sensation in the lateral border of the affected foot. The reverse sural artery flap is a very useful flap for covering soft tissue defects in the foot and ankle and can be performed in circumstances where microsurgical expertise is unavailable.*

Introduction:
Post traumatic soft tissue defects of the distal third of leg, foot and ankle are very common. The relatively less amount of muscle and the nature of the vascularity of this area produces a difficult challenge for the surgeon to provide soft tissue cover. Although free microvascular tissue transfer has become the gold standard for covering these defects(1,2), expertise and infrastructure to perform these operations are not available widely. Local non-axial skin flaps although easy to perform are unreliable(3). The reverse sural artery flap was described by Masquelet et al in 1992(4). This is based on the vascular axis of the sural nerve. The performance of this flap is simple and does not require a complex set up like microvascular surgery

Materials and methods:
All patients who underwent soft tissue coverage of the foot and ankle region with reverse sural artery flap were included in the study. Patients with defects produced due to causes like infection or tumor resection were excluded from the study.

All patients underwent the procedure under spinal anasthesia. The lateral position was used in cases where the primary defect was on the anterior part of the foot and ankle and in prone position for posterior defects. The entire procedure was performed as suggested by Sauerbier et al(5). Under loupe magnification, the primary defect was debrided. Planning in reverse was done by first cutting out shape of the defect in lint cloth. The axis of the flap was marked next between two points. The proximal point was the midpoint of the calf and the distal point was the midpoint between the lateral malleolus and the tendo Achilles. This is the vascular axis of the flap. The distal extent of the flap was three finger breadth proximal to the tip of the lateral malleolus. The proximal extent of the flap was 20cm proximal to the tip of the lateral malleolus. The lint cloth was placed centered on the vascular axis with its distal border on the proximal limit of the flap dissection. The planned incision was marked on the skin. The skin was incised along with the fascia on this drawing. The fascia was tagged to the skin to prevent its separation. The sural nerve was sharply incised and allowed to retract. The short saphenous vein was divided and ligated. The pedicle was dissected along with a bridge of skin to prevent pressure as well as to increase the venous drainage. Once the flap was elevated, The tourniquet was released to check for circulation. The flap was inset into the defect with 3'0 nylon sutures. The secondary defect was covered with skin graft taken from the opposite thigh.

The leg was immobilized in an external fixator or a slab depending on the individual case. The flap was monitored for 72 hours following the surgery. The skin graft over the secondary defect was inspected on the 5th post operative day. All sutures were removed at two weeks from the day of surgery.

Parameters which were recorded were presence of flap necrosis, infection, loss of skin graft and donor site morbidity

Results:
23 patients were included in the study. The mean age was 28.8 years (11 – 54 years). All patients denied history of smoking. None of the patients were diabetics. The mean size of the defect was 6cm x 8cm. 14 defects were over the anterior aspect of the distal third of leg, ankle or forefoot. Nine defects were on the posterior part of the hind

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foot. There was partial necrosis of the flap in five flaps. The largest area of necrosis was about 50 percent and the smallest area of necrosis was 10 percent. Of the five flaps which had necrosis three had to undergo repeat skin grafting and two healed by secondary intention. There were no cases of infection. All patients had decreased sensation In the lateral border of the foot. All skin grafts had 100 percent take. There were no donor side complications.

Discussion:

The options for covering skin defects in the distal third of leg and forefoot is limited to few flaps(6,7,8). The lateral supramalleolar flap and the Posterior Tibial artery perforator flap become unreliable because the pedicle or the relevant perforator could be in the area of injury. The cross leg flap although reliable in terms of blood supply requires multiple stages and difficult positioning of legs.

Chai et al(9) reported on 15 sural fasciocutaneous flaps for coverage of leg, ankle and foot defects. 13 flaps survived and two had partial necrosis. The authors concluded that the sural artery flap covers defects in the distal third of leg to forefoot satisfactorily. Schannen et al (10) compared the results of sural versus perforator flaps for defects in the medial side of the leg. The study was retrospective and included seven patients in each group. All seven sural artery flaps and six of the perforator flaps survived. In our study, out of the 23 flaps, 18 healed without any problems and five flaps had partial necrosis of the distal part. The area of necrosis ranged from 10 percent to 50 percent. The main risk factor for necrosis was extent of the wound beyond the mid-tarsal joints. All flaps which had necrosis had this common factor. This could have resulted in stretching and necrosis.

Our study had some strong points. This was conducted on a prospective basis and had a good number of patients. All flaps were done by single surgeon. However, the lack of comparative group to categorically claim superiority of this flap was absent.

In conclusion, the reverse sural artery flap can satisfactorily provide soft tissue cover for defects in the distal third, ankle and forefoot. It is not reliable in coverage of defects distal to the mid-tarsal joints

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