



Original Article

Soft tissue reconstruction of foot and ankle defects with reverse sural fasciocutaneous flaps[☆]



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ABSTRACT

Objective: This study presents the results of 25 consecutive patients and evaluates the success of reverse sural fasciocutaneous flap (RSFF) on coverage of the foot and ankle region.

Methods: A total of 25 patients with soft tissue defects in the lower leg, foot, or ankle were treated with RSFF, from January 2010 to January 2017. In the evaluation of patients, the form prepared by the clinic was used and the following data were collected: age, follow-up, gender, etiology, defect size, complications, and patient satisfaction rates.

Results: Mean follow up time was 18 months. In all patients, the defects were fully covered. Three patients developed partial necrosis due to venous congestion. There was no complete flap loss in any of the patients. Patient satisfaction was excellent in all cases.

Conclusion: RSFF is quick, versatile, and easy to apply; it also provides safe soft tissue coverage, requires no microvascular repair, and provides an alternative to microsurgical reconstruction.

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Reconstrução do tecido mole de defeitos do pé e do tornozelo com retalhos fasciocutâneos surais de fluxo reverso

RESUMO

Objetivo: Este estudo apresenta os resultados de 25 pacientes consecutivos e avalia o sucesso do retalho fasciocutâneo sural de fluxo reverso (RFSR) na cobertura da região do pé e tornozelo.

Palavras-chave:

Lesões no tornozelo

Lesões nos pés

[☆] The study was conducted in Katip Celebi University, Izmir Atatürk Training and Research Hospital, Department of Orthopaedics and Traumatology, Izmir, Turkey.

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Procedimentos cirúrgicos
reconstrutivos
Satisfação do paciente
Resultado do tratamento

Métodos: Foram analisados 25 pacientes com defeitos de partes moles na parte inferior da perna, pé ou tornozelo com RFSR, de janeiro de 2010 a janeiro de 2017. Na avaliação dos pacientes, o formulário preparado pela clínica foi utilizado e os seguintes dados foram coletados: idade, seguimento, sexo, etiologia, tamanho do defeito, complicações e grau de satisfação do paciente.

Resultados: O tempo médio de seguimento foi de 18 meses. Em todos os pacientes, os defeitos foram totalmente cobertos. Três pacientes desenvolveram necrose parcial devido à congestão venosa. Não houve perda total do retalho em nenhum dos pacientes. O grau de satisfação dos pacientes foi excelente em todos os casos.

Conclusão: O retalho fasciocutâneo sural reverso é rápido, versátil e fácil de aplicar. Além disso, fornece uma cobertura de tecidos moles segura, não requer reparo microvascular e é uma alternativa à reconstrução microcirúrgica.

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Introduction

Reconstruction of the foot and ankle soft tissue defects remains a challenging problem for reconstructive surgeons due to thin coverage tissues and poor blood supply.¹ Thus, among the options for reconstructing of defects around the ankle or the foot, direct closure or skin grafting may not be applicable in many cases.

Free flap transfer, has often been accepted as the operation of choice in cases where the local tissues of the foot and ankle were severely compromised.² Further progress in the studies of the microsurgery, especially the concept of angiosomes,^{3,4} neurovascular flap technique and neuro-adipo-fascial pedicled flaps⁵ has been alternative popular solutions. Moreover, the reverse sural fasciocutaneous flap Reverse Sural Fasciocutaneous Flap (RSFF) has been described by Masquelet et al.⁶ in 1992 and has been accepted as a possible alternative for mentioned defects. In the literature, successful results of RSFF have been reported.^{7,8}

The aim of our study was to present the results of our 25 consecutive patients and evaluate the success of RSFF on coverage of foot and ankle region.

Patients and methods

Each author certifies that his or her institution approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

A total of 25 patients with soft tissue defects in the lower leg (Fig. 1), foot (Fig. 2) or ankle were treated with RSFF, from January 2010 to January 2017. Of the 25 patients, 21 (84%) were males and four (16%) were females. The average age was 44 (13-83). In 8 (32%) patients skin defects were due to traffic accidents, fall from height in four (16%) patients, gunshot injury in three (12%) patients, previous Achilles tendon surgery in three (12%) patients, crush injury in three (12%) patients, infection/cellulites in two (8%) patients, tumor resection in one (4%) patient and chronic osteomyelitis in one (4%) patient.



Fig. 1 – Sural Fl, preoperative and early postoperative photographs of a patient with cruris distal third defect.

Defect areas were, lower one third of cruris in 12 (48%) patients, Achilles tendon in three (12%) patients, dorsal surface of foot in 6 (24%) patients, calcaneal area in three (12%) patients and medial area of foot in one (4%) patient. There was no concomitant fracture in seven (28%) patients and the other patients have either closed or open fractures. The smallest defect was 3 cm × 3 cm at medial malleolar area due to chronic osteomyelitis and the largest skin defect was 6 cm × 8 cm at lower third of cruris due to surgery for tibia pilon fracture.

In the evaluation of patients, the form prepared by our clinic was used: Age, follow-up, gender, etiology, defect size, complications, patient satisfaction rates (Between 0 and 10 points – 0 = Not satisfied, 10 = Very satisfied – that is, 0-2 points were evaluated as poor, 3-5 points were moderate, 6-8 points were good and 9-10 points were excellent).

Results

Mean follow up time was 18 months (2-35). In all patients, the defects were fully covered. Three patients developed



Fig. 2 – Reverse sural fasciocutaneous flap, preoperative and postoperative 2nd year photographs of a patient with skin defect on Achilles tendon.

partial necrosis due to venous congestion. These patients were treated with serial debridement, vacuum assisted closure, split thickness skin graft and medical leech application. There was no complete flap loss in any of the patients. A donor site complication has occurred in one patient. This patient was treated by local rotational flap coverage. We applied a debulking surgery due to bulky flap on medial malleolar area for one patient. Patient satisfaction was excellent in all cases.

Discussion

Reconstruction of defects on the ankle and foot remains a demanding task for reconstructive surgeons. Trauma and other deforming processes can involve soft tissue, underlying bone, ligamentous structures and cause defects that expose the tendon and bone directly. The heel is a weight bearing area and can be traumatized frequently. In addition, the skin over weight bearing areas is tight and has poor circulation. There are many possible reconstructive options exist including skin grafts local flaps and distant flaps but their usage is limited.⁹ Skin grafts cannot be used to cover the exposed tendon and bones. A local flap may not be possible either because of inadequate tissue available to be moved from areas adjacent to the defect or because of limited flap mobilization. Absence of peripheral pulses, diabetes and peripheral vascular thromboses are relative contraindications to local flap surgery.¹⁰ RSFF for foot and ankle reconstruction has gradually increased in popularity over the last decade. The major advantage of this flap is the relatively large size that can be harvested with little donor-site deformity or morbidity. Also, dissection of the flap is relatively easy and blood loss during the operation is minimal. Venous congestion is the most important complication that may cause flap loss.¹¹ In our series partial necrosis due to venous congestion was occurred at three flaps. Our rate of

partial necrosis was similar to literature. Microvascular anastomosis is not required, and operative time is short. This is a one-stage procedure. RSFF has a wide arc of rotation on its pedicle at approximately 5 cm superior to the lateral malleolus and is useful for reconstruction of defects on heel, malleoli, ankle and foot.

Quirino and Viegas¹² have a series of sural flaps. They showed that the commonest complication was epidermolysis seen at 8 of 22 flaps. Two of them (one sural and one lateral supramalleolar) had a partial necrosis. We have seen epidermolysis at two patients which had partial necrosis but not seen at the other flaps.

Dhamangaonkar and Patankar⁸ described a utility of the RSFF with a cutaneous pedicle. The advantage of this utility is that the skin over the pedicle prevents any chance of torsion of the pedicle which could lead to flap failure. Flap survival was 89.21% in his series. Also, preserving a skin paddle demands using an open bridge technique without tunneling the skin between the donor area and the wound. We applied open tunneling technique for sural flaps.

One of the disadvantages of this flap is an unacceptable donor-site scar especially in women. We have seen a donor site graft loss in one patient and treated with serial debridement. The sensibility of the lateral foot and leg is lost as a result of sacrificing the sural nerve. Some authors suggested that the sural nerve must not be taken with the flap.^{13,14} We took sural nerve with flap in order to increase vascularity of flap and to prevent damage to vascular structures.

Venous congestion is a special complication in the distally based flaps from the lower extremity and this complication also occurs with RSFF. Venous congestion seems to be related to compression of the pedicle by a hematoma or a lack of elasticity in the skin over the roof of the tunnel. According to Nakajima et al.¹⁴ the mechanism of venous congestion is valvular incompetency. The major complication of our series is venous congestion.

Conclusion

RSFF is quick, versatile and easy to apply, also it provides safe soft tissue coverage and requires no microvascular repair and provides alternation to microsurgical reconstruction.

Conflicts of interest

The authors declare no conflicts of interest.

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