Case Report

Reverse sural flap for anteromedial ankle and dorsal foot soft-tissue defect following an injury: A case report

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ABSTRACT

Introduction and importance: Foot and ankle soft-tissue defects constitute a real challenge to reconstructive surgeons because of restricted local soft tissue availability. We report a 28 years old male with a significant soft-tissue defect on the left anteromedial ankle and dorsal foot.

Case presentation: A 28 years old male with soft-tissue necrosis on the left anteromedial ankle and dorsal foot, as well as second - fourth metatarsal fractures with gangrene of the first - third phalanx, presented to our hospital 14 days after a traffic accident. He underwent debridement and amputation of the gangrenous fingers. In the second operation, a pin fixation of the metatarsal fractures and the reverse sural flap was performed. The donor site was covered with a split-thickness skin graft. The wounds began to improve significantly on the tenth day after the surgery, and his wounds were gone entirely in the third week. The pins were removed eight weeks after the surgery with the fractures healed.

Clinical discussion: Skin grafts are easy and quick to cover open wounds but cannot be applied to cover bare tendons or bone. Local flaps of the distal third of the lower extremity have a limited range of motion and arc of rotation. Free flaps are an acceptable but complex reconstructive surgery that requires long operative time, special instruments, and microsurgical training and are expensive.

Conclusion: The reverse sural flap was considered feasible in reconstructing patients with soft-tissue defects of the distal leg, ankle, and foot, especially in resource constraint scenarios.

1. Introduction

The distal part of the lower extremity has a special significance in human function and structural form, which maintains the body’s upright posture. Because of its limited availability and mobility of soft tissue around the foot and ankle, this body region is highly susceptible to injury and disease [1]. Foot and ankle soft-tissue defects frequently occur due to road traffic accidents, gunshots, bomb blast injuries, and infections that may expose the bone, tendon, and neurovascular structures. These cases commonly constitute a real challenge to reconstructive surgeons because of restricted local soft-tissue availability [2].

There are many techniques such as skin grafts, local flaps, cross-leg flaps, and free flaps to reconstruct such defects on the distal region of the leg and foot, but a reverse-flow sural flap was considered a viable option [3]. Potent expressed the sural fasciocutaneous flap in 1981 [4]. In 1983, Donski and Fogdestam described the distally based sural flap [5]. The reverse sural flap has an advantage and has been the only accessible soft-tissue reconstruction technique for the distal lower extremity around the ankle and foot [3].

In this study, we report a 28 years old male with a significant soft-tissue defect on the left anteromedial ankle and dorsal foot. This case study has been reported in line with the SCARE 2020 criteria [6].

2. Case report

A 28 years old male was admitted to the Orthopedic and Traumatology Department of Mogadishu Somali Turkey Recep Tayyip Erdogan Training and Research Hospital in Mogadishu, Somalia. The patient had soft-tissue necrosis on the left anteromedial ankle and dorsal foot, as well as second - fourth metatarsal fractures with gangrene of the first - third phalanx due to a traffic accident 14 days before the presentation. (Fig. 1A and B). The patient had stable vitals and good medical history.
on examination. He was admitted to the orthopedic and traumatology clinics. He underwent debridement and amputation of the first - third fingers (Fig. 1C). A reverse sural flap was planned to cover the soft-tissue defect.

The patient was put in a prone position, and Doppler ultrasonography was used to mark the perforating arteries of the peroneal artery. In the first step, the wound was thoroughly debrided, and pin fixation of the metatarsal fractures was done. Wound size and the distance between the wound and rotation point were measured to demonstrate the pedicle’s size. The upper margin of the flap was incised, and the subcutaneous area was dissected from proximal to distal. The medial sural nerve and the minor saphenous vein were ligated, and the flap was rotated to cover the defect on the anteromedial ankle and dorsal foot. The donor site was covered with a split-thickness skin graft (Fig. 2). The wounds began to improve significantly on the tenth day after the surgery, and his wounds were completely gone on the third week. The pins were removed eight weeks after the surgery, with the fractures healed (Fig. 3).

3. Discussion

Coverage for soft-tissue defects of the lower one-third of the leg, ankle, dorsum of the foot, and heel poses a significant challenge to orthopedic surgeons. Skin grafts are easy and quick to cover open wounds but cannot be applied to cover bare tendons or bone. Likewise, local flaps of the distal third of the lower extremity have a limited range of motion and arc of rotation [3,7,8]. Free flaps are an acceptable but complex reconstructive option [1]. Free flaps require long operative time, special instruments, and microsurgical training and are costly. These factors need consideration while choosing reconstructive options at many centers, especially in developing countries with limited health infrastructure [7,9].

Reverse-flow sural flap has been proved a valuable tool for reconstructing these problematic defects. This flap earns favorable judgment in the international literature. It is recommended for many soft-tissue defects of the distal third of the leg, ankle, and dorsal foot [10,11]. The main advantage of this distally based flap is the preservation of the primary vascular axis and its well-defined surface with an independent length-width ratio [8]. Therefore, the reverse-flow sural flap provides an easy reconstruction option in our settings. The reverse sural fasciocutaneous flap, based on peroneal perforating arteries, is a quick, adaptable, and non-challenging technique, eliminating the need for microvascular surgery [7].

The main complication of the reverse-flow sural flap is venous congestion due to the lack of elasticity in the skin over the roof of the tunnel of the flap pedicle [8]. Uemura et al. reported that one patient among 5 cases suffered from partial necrosis due to venous congestion [12]. Our patient who underwent this procedure recovered, and there were no subsequent complications of the flap encountered during the follow-up. The reverse-flow sural flap is a favorable procedure for handling the soft-tissue defects of the distal third of the leg, ankle, and foot, especially where a strong microsurgery team is unavailable.

4. Conclusion

The reverse sural flap was considered feasible in reconstructing patients with soft-tissue defects of the distal leg, ankle, and foot, especially in resource constraint scenarios.

Ethical approval

Ethical approval was not needed for writing a case report in our settings.

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Author contribution

Concept design and preparation of the manuscript: Abdullahi Yusuf Mohamed and Hüseyin TAŞKOPARAN.

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Registration of research studies

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Fig. 1. (A) Clinical picture Showing skin necrosis of the dorsal foot; (B) X-ray shows 2nd–4th metatarsal fractures as the red arrow indicates; (C) Amputated 1st–3rd fingers. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)
Guarantor
Abdullahi Yusuf Mohamed.

Consent
Written informed consent was obtained from the patient for the publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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All authors declare no conflicts of interest.

Fig. 2. (A) Soft-tissue defect covered with a reverse sural flap; (B) Donor site covered with a split-thickness skin graft; (C) Pin fixation of the metatarsal fractures.

Fig. 3. 8 weeks post-operative follow-up (A) Sural flap; (B) Donor site skin graft; (C) Healed metatarsal fractures.

Appendix A. Supplementary data
Supplementary data to this article can be found online at https://doi.org/10.1016/j.amsu.2022.104935.

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