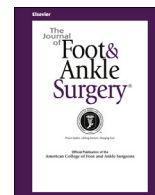


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Case Reports and Series

Negative Pressure Wound Therapy Followed by Basic Fibroblast Growth Factor Spray as a Recovery Technique in Partial Necrosis of Distally Based Sural Flap for Calcaneal Osteomyelitis: A Case Report

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ABSTRACT

The distally based sural flap is regarded as the first choice for reconstruction in the distal part of the lower leg because the flap is easy to raise, reliable in its blood supply, and prone to only a few complications. Limited data have investigated the details of treatment in cases of failure of distally based sural flaps. We report a case of calcaneal osteomyelitis in which a successful outcome was finally obtained with a partially necrosed, distally based sural flap using negative pressure wound therapy with basic fibroblast growth factor spray. The 2-year follow-up examination was uneventful. Moreover, the patient was able to walk freely with an ankle-foot orthosis in her house. This technique can be considered as a useful and effective option to recover unfavorable results of distally based sural flaps.

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In Japan, just as in Europe and the United States, the number of patients with intractable ulcers in the lower legs or feet has been increasing. The Japanese society is aging rapidly, with an increase in the rates of lifestyle-related diseases such as diabetes mellitus, arteriosclerosis, and hyperlipidemia. This type of ulcer often interferes with activities of daily life, worsening the quality of life, and sometimes threatening life, despite intensive treatment.

Although the first aim of the treatment of ulcers in the foot and lower leg is to save the patient's life and preserve the limb, the prevention of recurrence and preservation of the quality of life should also be considered. The external appearance after treatment can be an important factor for the patient's quality of life and preservation of function. The distally based sural flap is considered the first choice for reconstruction in the distal part of the lower leg and calcaneal region because of its ease of dissection and low complication rate. However, few reports have reported the treatment of patients with distally based sural flap failure.

We encountered a case of left calcaneal osteomyelitis due to intractable ulcer in the ipsilateral heel. The patient was elderly and lived alone. Although a relatively large area of skin and subcutaneous tissue was affected by necrosis of the distally based sural flap, conservative therapy using negative pressure wound therapy (NPWT) with basic fibroblast growth factor (bFGF) spray led to a good outcome. The treatment we performed can be considered very effective for partial necrosis of a distally based sural flap.

Case Report

The patient was a 96-year-old female whose first visit was for a consultation regarding intractable erosion in the left heel. Scratch wounds on the left heel had worsened gradually over 1 month. The patient provided written informed consent for the report of her case and all accompanying images. She had a history of diabetes that was well controlled by diet modification and chronic heart failure, controlled with 20 mg of oral furosemide daily. The patient's family history was unremarkable. Her current medications also included an antihypertensive drug (200 mg of oral diltiazem hydrochloride daily). Her general condition was good; she walked unaided and lived alone, although she had come for the consultation with her daughter-in-law. A 6-cm by 4-cm area of erosion with an ulcer in the center was observed in the left heel. The keratin of the stratum corneum was

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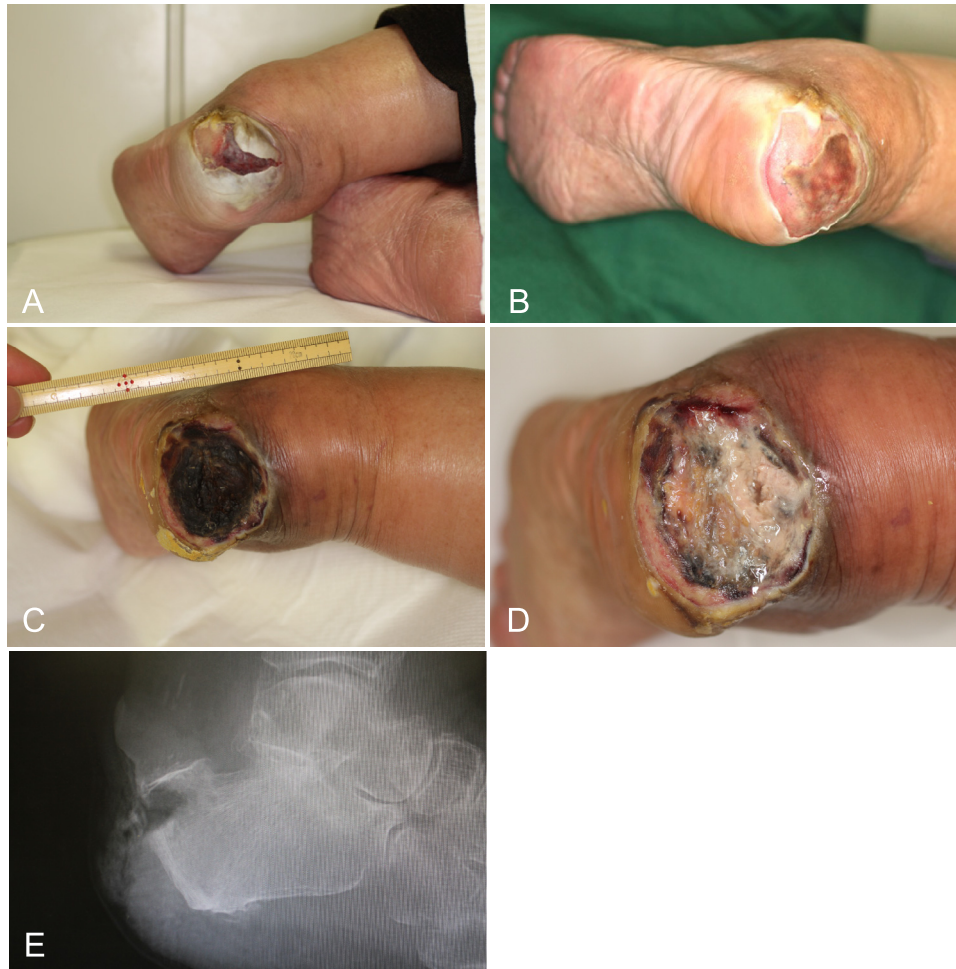


Fig. 1. Clinical findings before admission. (A) Posterior aspects of the calcaneal region at the first visit. (B) Local findings 1 week after the first visit. (C) Local findings 4 weeks after the first visit. Black necrotic tissue was observed on the surface of the lesion. (D) Local status after removal of the necrotic tissue. The surface of the calcaneal bone could be seen on the cranial side of the ulcer. (E) Plain radiograph (lateral view) of the left calcaneus just before admission. The outer cortex of the left calcaneus had been destroyed.

macerated, with an unclear margin of redness; however, neither pain nor local heat was present (Fig. 1A). The macerated keratin of the stratum corneum was immediately removed in the patient consultation room, and the patient was instructed to keep the wound clean by washing and applying a povidone-iodine sugar paste once a day at home for 1 week. The lesion improved with this treatment (Fig. 1B). However, after the initial improvement, black necrotic tissue covered almost the entire lesion 1 month after the first visit (Fig. 1C). The patient's body temperature had been elevated at 38°C for a couple of days. Purulent discharge and bone exposure was observed during debridement (Fig. 1D). Because osteomyelitis due to exacerbation of the ulcer was suspected, plain radiographs were taken, which showed a pathologic fracture of the calcaneus (Fig. 1E). The serum C-reactive protein and white blood cell count were elevated to 20.9 mg/dL and 14,000/ μ L, respectively. After emergency hospitalization, the patient's blood glucose was checked 4 times daily, and rapid-acting insulin was administered according to a sliding scale. In addition, 2 g/day of cefazolin was administered for 7 days as empirical therapy until the results of bacterial culture of the purulent discharge had returned. The wound was also treated with iodine-sugar paste daily until surgical therapy.

One week after admission, surgical therapy was considered because the patient's general condition had improved. The serum C-reactive

protein and white blood cell count had improved to 1.09 mg/dL and 5800/ μ L, respectively. Computed tomography angiography showed patency of the posterior tibial and peroneal arteries, although both were narrow (Fig. 2). Subtotal calcanectomy, debridement of the wound, and coverage with a distally based sural flap were planned and performed, because the patient hoped to conserve the foot to be able to live by herself again. The donor site of the flap was covered by skin grafting, and artificial dermis (Pelnac®; Smith & Nephew Wound Management KK, Tokyo, Japan) was applied to the raw surface of the flap's pedicle. A suction drain was inserted into the dead space beneath the flap (Fig. 3; Supplemental Fig. S1). However, severe swelling and congestion were observed at the distal portion of the flap the next day (Fig. 4). Immediately, reoperation was performed with the patient under local anesthesia. A large volume of normal saline was used to remove a large hematoma found under the thickened, congested, and swollen flap. The distally based sural flap was resutured with a Penrose drain (Fuji Systems, Tokyo, Japan) in place, instead of the suction drain, to prevent bending of the flap by negative pressure.

A few days later, the color of the flap had almost recovered, although the distal half of the flap showed necrosis. Finally, a large area of skin defect remained after debridement of necrotic tissue. Next, NPWT using a V.A.C.® Advanced Therapy System (KCI KK, Tokyo, Japan) was applied for 3 weeks after debridement (Fig. 5; Supplemental

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