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Clinical case of treatment of a patient with a gunshot wound and a massive osteo-soft tissue defect of the calcaneal region

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Abstract. *Introduction.* Injuries of the heel region associated with combined bone and soft-tissue defects represent a significant challenge in reconstructive surgery due to the high risk of infectious complications and loss of the limb's weight-bearing function.

Aim. We present a clinical case of staged treatment of a military patient with a gunshot injury to the left foot, a comminuted calcaneal fracture, and a massive bone and soft-tissue defect.

Materials and Methods. During the first stage, surgical debridement of the wound, eradication of the infectious focus, and implantation of a gentamicin-loaded polymethylmethacrylate (PMMA) spacer were performed to achieve local infection control and preserve the volume of the bone defect. Following stabilization of the local wound condition, soft-tissue reconstruction was carried out using a reverse sural flap, with subsequent closure of the donor site using a split-thickness skin graft.

Results. The treatment resulted in complete coverage of the defect, preservation of flap viability, and creation of favorable conditions for subsequent bone reconstruction.

Conclusions. This case demonstrates the effectiveness of a staged reconstructive approach combining a PMMA spacer and a reverse sural flap for the management of complex traumatic heel defects and preparation of the patient for the next stage of bone defect reconstruction.

Keywords: gunshot wound, bone and soft tissue defect, calcaneal fracture, sural flap, gentamicin-loaded PMMA spacer.

Introduction

Injuries of the distal parts of the lower limb, particularly the calcaneal region, represent a significant challenge in modern reconstructive surgery, as they most commonly result from high-energy trauma such as blast and gunshot injuries and are accompanied by combined defects of soft tissues and bony structures, which are associated with a high risk of infectious complications, prolonged treatment, and loss of the limb's weight-bearing function. The complexity of such injuries, especially in the calcaneal region, is caused by limited availability of well-vascularized local tissues, high mechanical load, and wound contamination, which complicate healing and predispose to osteomyelitis [1]. In the presented case, a particular challenge was the massive bone and soft tissue defect with bone exposure and purulent process, which required a staged approach with an antibiotic-loaded spacer for infection control prior to reconstruction [2]. Equally important is the selection of an optimal reconstructive method, as the limited local tissue availability and the need to restore adequate blood supply necessitate the use of reliable plastic techniques—the reverse sural fasciocutaneous flap is an effective option for coverage of complex defects [3]; however, its application in combined bone and soft tissue injuries using a cement spacer remains insufficiently described. This clinical case demonstrates the effectiveness of staged surgical treatment using a sural flap to cover a massive calcaneal defect following implantation of an antibiotic-loaded cement spacer, highlighting the significance of this technique for subsequent restoration of the anatomical integrity and function of the lower limb [4,5].

Aim

To demonstrate the feasibility of soft tissue defect coverage of the calcaneal region and the creation of favorable conditions for subsequent reconstruction of anatomical integrity and weight-bearing function of the lower limb in a patient with post-traumatic bone and soft tissue injury through the use of a reverse sural fasciocutaneous flap, with evaluation of the clinical feasibility and effectiveness of this reconstructive method.

Materials and Methods

Description of a clinical case of a patient with a gunshot injury to the heel region. Clinical, radiographic, bacteriological, ultrasonographic, and thermographic methods were used in the study. Staged surgical treatment was performed, including placement of a gentamicin-loaded PMMA spacer and reconstruction of the defect using a reverse sural flap. The study was conducted in accordance with bioethical principles.

Clinical Case Description

Patient P., 42-year-old military serviceman. Admitted on 06.01.2026 to the Municipal Non-Commercial Enterprise "Sviato-Mykhailivska Clinical Hospital, Kyiv" by medical evacuation train with the diagnosis: "Combat trauma (05.01.2026). Gunshot wound of the left foot with a comminuted calcaneal fracture and a massive bone and soft-tissue defect." The injury was sustained after stepping on a PMF-1 "Lepestok" mine. The patient reported a massive soft-tissue and bone defect in the calcaneal region, pain at the injury site, and general weakness.

Local status (Fig. 1): On the left foot, in the region of the calcaneal tuberosity, a massive, irregularly shaped soft-tissue defect is observed, extending to the posteroinferior aspect of the calcaneal region. The wound is contaminated, with uneven, lacerated, and partially necrotic edges. The surrounding skin is hyperemic and edematous, with signs of traumatic and inflammatory involvement, and a local increase in temperature of the surrounding tissues **is noted**. The wound bed consists of damaged soft tissues with fibrinonecrotic deposits and multiple bone fragments of the calcaneus; in some areas, exposed bone structures are visible. On palpation, moderate bleeding of the tissues is present, indicating partial preservation of vascularisation. Purulent yellowish-green exudate with a characteristic odour is discharged from the wound, suggesting an infectious-inflammatory process. The weight-bearing function of the left lower limb is severely impaired; independent loading of the calcaneal region is impossible due to pronounced pain and structural insufficiency of the hindfoot. The overall local status is consistent with a severe traumatic bone and soft-tissue defect of the calcaneal region, with signs of tissue necrosis, infection, and disruption of the structural and functional integrity of the foot.

For the purpose of assessing the nature and extent of traumatic injury to the bony structures, on 06.01.2026 (day 1 after injury), the patient underwent radiographic examination of the left foot in the sagittal projection. According to the radiographic findings, in the projection of the calcaneus, pronounced signs of traumatic injury were observed, manifested by the presence of a defect in the calcaneal bone tissue with disruption of its anatomical integrity and structure. Multiple bone fragments of irregular shape and varying sizes are identified within the defect zone, with signs of fragmentation and displacement, corresponding to a comminuted calcaneal fracture. The detected changes are consistent with severe traumatic injury of the calcaneus with formation of a bone defect and the presence of free bone fragments (Fig. 2). Considering the anatomical role of the calcaneus as the primary weight-bearing structure of

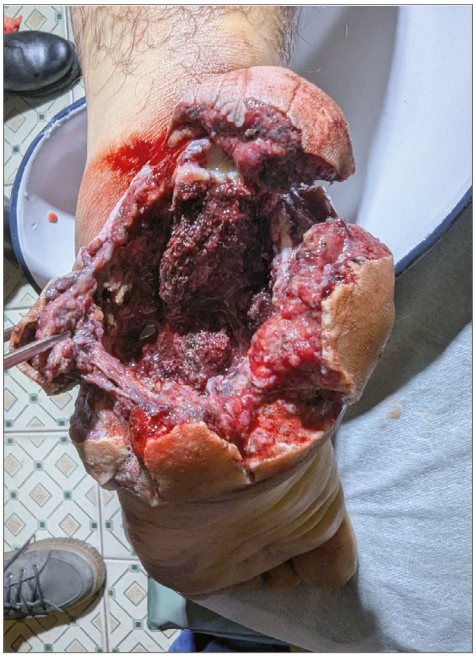

Fig. 1. Primary wound (05.01.2026)

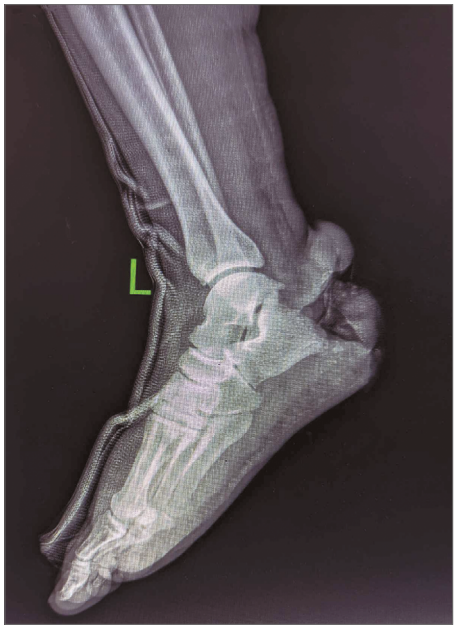

Fig. 2. Targeted radiograph: calcaneal bone defect with the presence of bone fragments (06.01.2026)

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the hindfoot, the presence of a bone defect necessitates further staged reconstructive treatment.

Considering the presence of necrotic tissues, bone fragments, and signs of infection, during the first stage of treatment on 07.01.2026 (day 2 after injury), a bacterial culture was obtained, and secondary surgical wound debridement was performed in accordance with the principles of damage control surgery, which included meticulous removal of nonviable soft tissues, removal of bone fragments, and irrigation of the wound (Fig. 3).According to the results of the bacteriological examination of the wound exudate, Klebsiella pneumoniae sensitive to meropenem and colistin was identified. The infectious process was predominantly localized and manifested by purulent wound discharge, necrotic tissue changes, and local signs of inflammation. No clinical signs of systemic infection or sepsis were observed at the time antimicrobial therapy was initiated. Based on the antibiotic susceptibility testing results, the patient was prescribed systemic antimicrobial therapy with meropenem at a dose of 1 g intravenously every 12 hours in combination with colistin administered at a therapeutic dose adjusted according to body weight, renal function, and current clinical guidelines. The duration of antimicrobial therapy was 10 days. Clinical monitoring of the wound condition and laboratory inflammatory markers was performed throughout the treatment course, and antimicrobial therapy was adjusted when necessary according to the progression of the wound process and microbiological monitoring results.

During the second stage of treatment on January 12, 2026, following partial wound debridement and with the aim of achieving local infection control, preserving the volume of the bone defect, and preparing for subsequent bone reconstruction, three metal Kirschner wires were inserted into the remaining calcaneus, and a gentamicin-loaded polymethylmethacrylate (PMMA) cement spacer was fixed onto them (Figure 3). This stage was considered the first phase of reconstruction according to the principles of the Masquelet induced membrane technique, as placement of the PMMA spacer provides not only local antibacterial activity and temporary preservation of the defect volume but also creates favorable conditions for the formation of an induced membrane around the spacer. Following stabilization of the soft-tissue coverage and successful control of the infectious process, the second stage of reconstruction is planned. This will involve removal of the spacer while preserving the induced membrane, followed by reconstruction of the bone defect using either a structural bone graft or a bone scaffold.

After successful control of the infectious process and stabilization of the local wound condition, a reconstructive procedure was performed on January 15, 2026 (10 days after injury). The procedure consisted of transfer of a reverse sural fasciocutaneous flap to provide soft-tissue coverage of the calcaneal defect and the previously implanted PMMA spacer. The soft-tissue defect measured 8 × 6 cm. To achieve adequate coverage, a flap measuring 12 × 7 cm was designed and elevated on a vascular pedicle approximately 20 cm in length (Figure 4). Preoperative planning included duplex ultrasonography to identify the peroneal artery perforator and determine the pivot

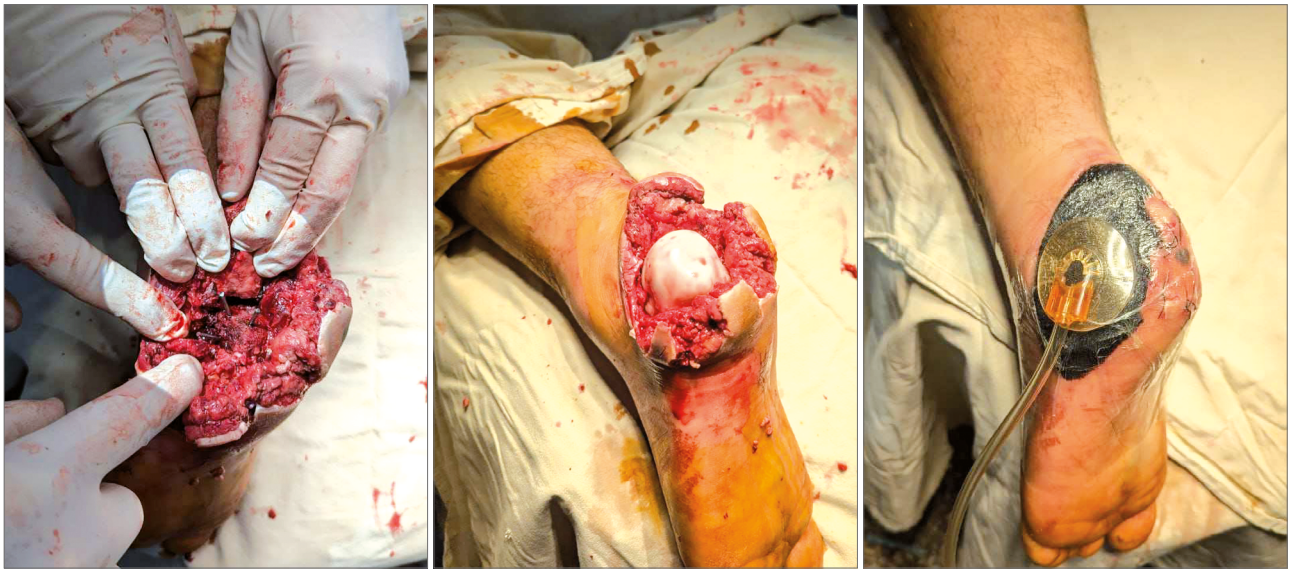

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Fig. 3. Secondary surgical wound debridement (1), closure of the left calcaneal defect with a gentamicin-loaded PMMA spacer (2), application of negative pressure wound therapy (3) (operation 07.01.2026)

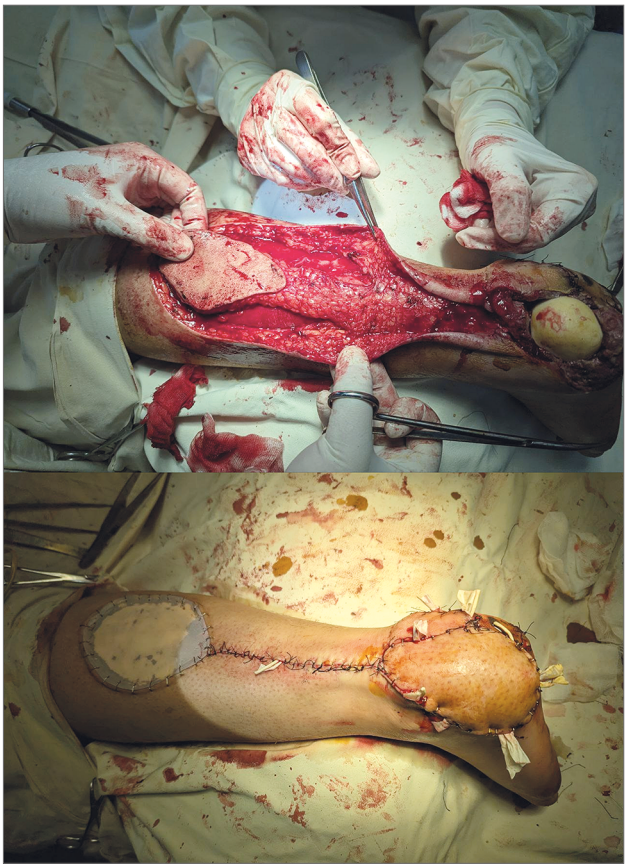

Fig. 4. Transfer of the sural fasciocutaneous flap (operation 15.01.2026)

point of the flap, which was located at the junction of the middle and distal thirds of the leg. During flap elevation, the vascular pedicle and surrounding soft tissues were carefully preserved to maintain adequate arterial inflow and venous drainage. The flap was transferred using an open technique without subcutaneous tunneling, thereby minimizing the risk of pedicle compression. Following mobilization, the flap was reversed into the defect without excessive torsion or tissue tension and secured with interrupted sutures.

The donor site was temporarily covered with an artificial skin substitute. Subsequently, on January 23, 2026 (18 days after injury), eight days after flap harvest, once a healthy granulation tissue bed had developed, the donor site was reconstructed with a split-thickness skin graft.

In the postoperative period, dynamic clinical monitoring of flap viability was performed using thermographic control (Fig. 5), which included assessment of color, temperature, tissue turgor, capillary refill, and the absence of signs of venous congestion or ischemia. Monitoring of the wound healing process, prevention of infectious complications, and ensuring optimal conditions for wound healing were also carried out. As a result of the

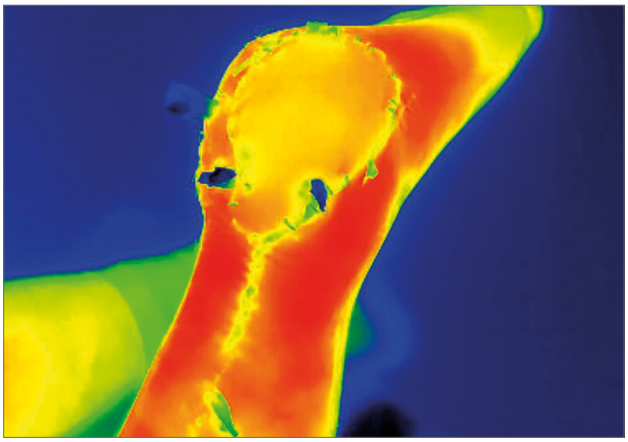

Fig. 5. Thermographic image: viable flap (23.01.2026)

treatment, complete coverage of the soft-tissue defect and restoration of skin integrity were achieved. To confirm this, follow-up targeted radiography of the lower limb was performed (Fig. 6). The prognosis in this case is relatively favorable, provided that further staged reconstructive treatment is continued. The PMMA spacer is planned to remain in the defect area for approximately 2–3 months, which is necessary for complete control of the infectious process, stabilization of the soft-tissue coverage, and formation of an induced membrane around the spacer. The next stage involves its removal followed by replacement of the calcaneal bone defect with a structural bone graft or bone scaffold (vascularised or non-vascularised) in order to restore the anatomical shape of the calcaneal tuberosity. After stabilization of the graft, restoration of the Achilles tendon insertion is planned by its

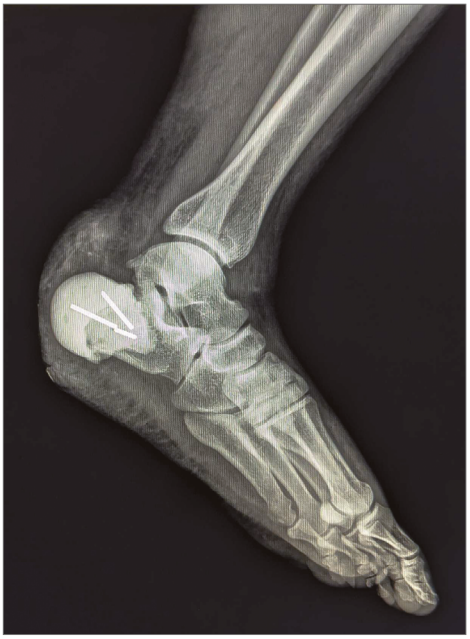

Fig. 6. Targeted radiograph in the sagittal projection: calcaneal bone defect covered (23.01.2026)

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refixation to the reconstructed calcaneus to restore the function of the hindfoot. Further rehabilitation will include a period of immobilisation and unloading of the limb for 6–8 weeks, followed by gradual increase in axial loading and restoration of gait. The overall duration of functional recovery in such cases is typically 6–9 months, depending on graft integration and individual characteristics of tissue regeneration. The presented approach corresponds to modern principles of staged reconstructive treatment of complex bone and soft-tissue defects of the lower limb and is aimed at limb salvage and maximal restoration of its weight-bearing function [2].

Discussion

The problem of reconstructing extensive bone and soft tissue defects of the calcaneal region remains a significant challenge in reconstructive surgery, especially in the context of combat trauma. According to current studies, foot injuries account for up to 8–10% of all combat-related limb injuries, while injuries of the hindfoot, particularly the calcaneus, are associated with significant bone loss and soft tissue defects [4]. In such cases, restoration of the anatomical structure of the calcaneal region is essential for re-establishing anatomical integrity, biomechanical properties, and the weight-bearing function of the lower limb. After achieving control of the infectious process, the next step is coverage of the cement spacer and closure of the soft tissue defect. In this case, a reverse sural fasciocutaneous flap was used. However, the literature also describes the use of other regional soft tissue flaps, as well as free microvascular grafts. In particular, in cases of small defects, local muscle flaps of the foot, such as those based on the flexor digitorum brevis or the abductor digiti minimi, which have a reliable blood supply, may be used [6]. Due to the large size of the defect in this patient, this option was not feasible. In cases of more extensive defects of the hindfoot, free microvascular flaps, including the anterolateral thigh flap or muscle flaps transferred with vascular anastomoses, may be used [7]. Such techniques allow effective coverage of large bone and soft tissue defects; however, they require advanced microsurgical skills. Moreover, there is always a considerable risk of thrombosis and flap necrosis; therefore, this option was not chosen in the present case [7-9].

After wound healing, the cement spacer should be removed, usually after 3–6 months, and replaced using one of the available reconstructive methods, depending on the clinical situation, the extent of the defect, the condition of the soft tissues, their degree of vascularization, and the patient's functional requirements.

One of the possible reconstructive methods is the use of an allogeneic bone scaffold, which provides mechanical support in the defect area and creates a framework for subsequent osteoconduction and gradual replacement of the graft with the recipient's own bone tissue. Allogeneic material allows effective reconstruction of large-volume defects without the need for an additional donor site, thereby reducing surgical trauma to the patient. According to S. Mauffrey et al. [4], the use of allogeneic bone grafts in the treatment of post-traumatic limb bone defects achieves consolidation in approximately 75–85% of cases. Postoperatively, limited immobilization or partial weight-bearing is usually recommended for 6–8 weeks depending on the size of the defect and the condition of the soft tissues. Full weight-bearing is possible after 3–4 months upon radiological confirmation of consolidation, while complete bone remodeling may take from 6 months to 1 year [4]. At the same time, the graft integration largely depends on the condition of the surrounding tissues, their degree of vascularization, and the absence of an active infectious process [10]. In the study by P. V. Giannoudis et al. [5], it is noted that the main factors influencing successful integration of allogeneic grafts are adequate vascularization of the surrounding tissues and the absence of an active infection.

A biologically more favorable method is the use of a vascularized bone scaffold, which is characterized by its own blood supply and is transferred to the defect area together with a vascular pedicle, followed by microvascular anastomosis [11]. The presence of an autonomous blood supply ensures high graft viability, enhances osteogenesis, promotes faster integration and remodeling of bone tissue, and significantly reduces the risk of graft resorption and infectious complications. The most commonly used option for such bone reconstruction is a free fibular graft, as the fibula has sufficient length, high cortical strength, and reliable blood supply via the peroneal artery and accompanying veins, allowing for microvascular anastomoses with recipient vessels [12]. In the calcaneal region, the posterior tibial artery or anterior tibial artery is most commonly used as the recipient vessel, to which the vascular pedicle of the graft is anastomosed [13].

An alternative source of a vascularized bone graft may be the iliac crest, which is transferred on the vascular pedicle of the deep circumflex iliac artery along with accompanying veins [13]. Such a graft has a substantial volume of cancellous bone and is well suited for reconstruction of defects with complex geometry. Less commonly, vascularized grafts from

the radius or rib are used, which may be appropriate for smaller defects. According to J. B. Friedrich et al. [11], the use of vascularized grafts achieves successful integration in 85–95% of cases. Similar results are reported by M. T. Houdek et al. [14], who describe successful reconstruction of segmental bone defects of the lower limb in 91% of patients following the use of vascularized bone grafts. Load-bearing on the affected area is recommended to be restricted for 2–4 weeks; partial weight-bearing may be initiated at 4–6 weeks after placement of the definitive graft, and full weight-bearing at 8–12 weeks after consolidation. Complete remodeling and restoration of foot function following vascularized bone grafting typically take from 3 to 6 months, and in some cases up to 1 year in complex situations involving extensive defects or uncontrolled infection. The use of a vascularized bone graft is critically important in conditions of bone loss and impaired local vascularization, as it provides favorable biological and mechanical conditions for full graft integration, restoration of the anatomical integrity of the calcaneus, and subsequent recovery of the weight-bearing function of the lower limb [15,16].

Another possible reconstructive option is the use of an avascular structural bone graft, which can be harvested from the patient's donor sites (fibula, radius, iliac crest, or rib). Such a graft provides primary mechanical stability and allows restoration of the anatomical shape of the calcaneus, which is essential for subsequent recovery of foot biomechanics. Integration of an avascular graft occurs through gradual revascularization from the surrounding tissues, which is a longer process compared to vascularized grafts. Load-bearing on the foot is recommended to be restricted for 6–10 weeks, sometimes up to 20 weeks depending on the condition of the soft tissues and the stability of fixation. Full weight-bearing of the limb is usually possible after approximately 6 months, while complete bone remodeling takes from 8 months to 1 year, with a risk of partial resorption of up to 20–30%, especially in the presence of impaired local blood supply [17-20].

The present study has certain limitations associated with the analysis of a single clinical case and the lack of long-term follow-up of functional outcomes after completion of all stages of reconstructive treatment, including replacement of the bone defect and restoration of full weight-bearing of the limb. Future research prospects include the study of long-term outcomes of the use of a reverse sural fasciocutaneous flap in combination with various methods of bone defect reconstruction, as well as the determination of optimal reconstructive strategies to achieve maximal functional recovery of the lower limb.

Conclusions

In the presented clinical case, the study objective was achieved, namely effective coverage of the soft tissue defect of the calcaneal region through the use of a reverse sural fasciocutaneous flap, thereby preparing the patient for subsequent bone reconstruction.

The obtained results demonstrate that the reverse sural fasciocutaneous flap is a reliable option for reconstruction of complex soft tissue defects of the calcaneal region, providing adequate tissue vascularization, coverage of deep anatomical structures, and support for local infection control.

The practical significance of this case lies in confirming the feasibility of using a reverse sural flap for soft tissue reconstruction in patients with extensive traumatic defects of the heel associated with bone loss. This approach enabled successful soft tissue coverage, preservation of flap viability, and creation of favorable conditions for the subsequent stage of osteoreconstruction. However, definitive reconstruction of the calcaneal bone defect, restoration of Achilles tendon insertion, and assessment of long-term functional outcomes remain subjects of further treatment and follow-up.

Article Declarations

Raw Data and Materials. The raw data and materials supporting the findings of this study are available from the corresponding author upon reasonable request.

Study Limitations. This study has several limitations, including the limited sample size and the single-center nature of the study, which may restrict the generalizability of the findings. Further studies with larger cohorts are needed to confirm the obtained results.

Funding. This study received no external funding.

Ethics Approval Statement. The study was conducted in accordance with the principles of bioethics, medical ethics, and the provisions of the Declaration of Helsinki. According to the extract from the protocol of the meeting of the Department of Surgery with the course of Hepatobiliary and Vascular Surgery of the Bogomolets National Medical University, the presented clinical case did not involve biomedical research or additional experimental interventions, and its publication is permitted provided that the principles of confidentiality and anonymity of the patient's personal data are maintained.

Conflict of Interest. The authors declare no conflict of interest. All authors reviewed and approved the final version of the manuscript and consented to its publication. The patient provided written informed consent for the publication of clinical data and photographic materials related to the presented clinical case.

AI Statement. The authors used ChatGPT 5.2 solely for translation, stylistic editing, refinement of wording, and grammatical correction of the text in accordance with the journal's requirements and policies. Artificial intelligence tools were not used to generate scientific data, study results, or conclusions without full authorial control. Written informed consent for the publication of clinical data, examination results, and photographic materials related to the presented clinical case was obtained from the patient.

Author Contributions (CRediT)

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References:

1. Luo S, Jiang Y, Dong Z, Peng X, Shi S, Luo Z, et al. Distally based sural flaps for soft tissue defects following traumatic osteomyelitis of lower leg and foot. Sci Rep. 2024;14:23214. https://doi.org/10.1038/s41598-024-73492-8
2. Durand M, Mathieu L, Venant J, Masquelet AC, Collombet JM. Engineering the bone reconstruction surgery: the case of the Masquelet-induced membrane technique. Eur J Trauma Emerg Surg. 2025;51(1):138. https://doi.org/10.1007/s00068-025-02815-9
3. Prakash O, Ali SS, Khurram MF, Yaseen M. Reverse sural artery flap: a versatile option in distal lower-limb reconstruction. J Orthop Traumatol Rehabil. 2024;16(1):20-23. https://doi.org/10.4103/jotr.jotr_1_24
4. Belmont PJ Jr, Schoenfeld AJ, Goodman G. Epidemiology of combat wounds in Operation Iraqi Freedom and Operation Enduring Freedom: orthopaedic burden of disease. J Surg Orthop Adv. 2010;19(1):2-7.
5. Georgeanu VA, Gingu O, Antoniac IV, Manolea HO. Current options and future perspectives on bone graft and biomaterials substitutes for bone repair, from clinical needs to advanced biomaterials research. Appl Sci. 2023;13(14):8471. https://doi.org/10.3390/app13148471
6. Ortak T, Ozdemir R, Ulusoy MG, Tiftikcioglu YO, Karaaslan O, Kocer U, et al. Reconstruction of heel defects with a proximally based abductor hallucis muscle flap. J Foot Ankle Surg. 2005;44(4):265-270. https://doi.org/10.1053/j.jfas.2005.04.001
7. Yang R, Jin W, Zhang Z, Qi J, Wei Z. The application of chimeric free anterolateral thigh flap and muscle flap for heel ulcer reconstruction: a case series and technical refinements. JPRAS Open. 2025;46:100-108. https://doi.org/10.1016/j.jpra.2025.08.040
8. Chowdhury MA, Sultana T, Hossain S, Islam S. Use of lateral calcaneal flap for the reconstruction of posterior heel defect. J Bangladesh Coll Physicians Surg. 2020;38(3):116-120. https://doi.org/10.3329/jbcps.v38i3.47058
9. Hamayun S, Ullah I, Bilal M, Shah SA. Reconstruction of posterolateral heel defect with lateral calcaneal flap: an experience at Burns and Plastic Surgery Center Peshawar. KJMS. 2021;14(2):81-87. Available from: https://kjms.com.pk/index.php/kjms/article/view/91
10. Schmidt AH. Autologous bone graft: is it still the gold standard? Injury. 2021;52 Suppl 2:S18-S22. https://doi.org/10.1016/j.injury.2021.01.043
11. Soucacos PN, Kokkalis ZT, Piagkou M, Johnson EO. Vascularized bone grafts for the management of skeletal defects in orthopaedic trauma and reconstructive surgery. Injury. 2013;44 Suppl 1:S70-S75. https://doi.org/10.1016/S0020-1383(13)70016-0
12. Feltri P, Solaro L, Errani C, Schiavon G, Candrian C, Filardo G. Vascularized fibular grafts for the treatment of long bone defects: pros and cons. A systematic review and meta-analysis. Arch Orthop Trauma Surg. 2023;143(1):29-48. https://doi.org/10.1007/s00402-021-03962-5
13. He J, Lu Y, Chen Y, Peng Y, Zhu Q, Li Z. Deep circumflex iliac artery-vascularized iliac bone graft for femoral head osteonecrosis: computed tomography anatomical study. J Reconstr Microsurg. 2024;40(7):496-503. https://doi.org/10.1055/a-2238-7798
14. Migliorini F, La Padula G, Torsiello E, Spiezia F, Oliva F, Maffulli N. Strategies for large bone defect reconstruction after trauma, infections or tumour excision: a comprehensive review of the literature. Eur J Med Res. 2021;26(1):118. https://doi.org/10.1186/s40001-021-00593-9
15. Feltri P, Solaro L, Di Martino A, Candrian C, Errani C, Filardo G. Union, complication, reintervention and failure rates of surgical techniques for large diaphyseal defects: a systematic review and meta-analysis. Sci Rep. 2022;12(1):9098. https://doi.org/10.1038/s41598-022-12140-5

16. Tan L, Xing Z, Ji T, Guo W. Effectiveness of free vascularized fibular graft for bone defect after resection of lower limb malignant tumor. Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi. 2019;33(7):850-853. https://doi.org/10.7507/1002-1892.201810118
17. Alqarni MA, Alhomayani KM, Bukhary HA. Allograft use in foot and ankle reconstruction: a narrative review of indications, outcomes, and limitations. J Musculoskelet Surg Res. 2026;10:33-39. https://doi.org/10.25259/JMSR_300_2025
18. Wang X, Jia C, Wu H, et al. Activated allograft combined with induced membrane technique for the reconstruction of infected segmental bone defects. Sci Rep. 2024;14:12587. https://doi.org/10.1038/s41598-024-63202-9
19. Temel M, Kahraman A, Atilgan N. Enhancing ankle and foot reconstruction: outcomes and techniques with sural flaps in diverse patient groups. Eur Clin Anal Med. 2024;12(3):50-54. https://doi.org/10.4328/ECAM.10095
20. Strafun SS, Shypunov VH, Borzykh NO, Zahovenko MA. The use of neurovascularized flaps in plastic surgery of gunshot defects of the hindfoot. Terra Orthopaedica. 2024;(1):4-11. https://doi.org/10.37647/2786-7595-2024-120-1-4-11

Клінічний випадок лікування пацієнта з вогнепальним пораненням та масивним кістково-м'якотканинним дефектом п'яткової ділянки

Вікторія Погоріла, Павло Бик

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Національного медичного університету імені О.О.Богомольця, м. Київ, Україна

Анотація. *Вступ.* Ушкодження п'яткової ділянки з поєднаними кістково-м'якотканинними дефектами є складною проблемою реконструктивної хірургії через високий ризик інфекційних ускладнень та втрати опорної функції кінцівки.
Мета. Представлено клінічний випадок поетапного лікування військового пацієнта з вогнепальним пораненням лівої стопи, багатоуламковим переломом п'яткової кістки та масивним кістково-м'якотканинним дефектом.
Матеріали та методи. На першому етапі виконано вторинну хірургічну обробку рани, санацію вогнища інфекції та встановлення PMMA-спейсера з гентаміцином для локального контролю інфекційного процесу й збереження об'єму кісткового дефекту. Після стабілізації локального стану проведено реконструкцію м'якотканинного дефекту за допомогою ротованого сурального клаптя з подальшим закриттям донорської ділянки аутодермотрансплантатом.
Результати. У результаті лікування досягнуто повного укриття дефекту, збереження життєздатності клаптя та створення сприятливих умов для подальшої остеореконструкції.
Висновки. Представлений випадок демонструє ефективність поетапного підходу із застосуванням PMMA-спейсера та сурального клаптя для лікування складних травматичних дефектів п'яткової ділянки та підготовки пацієнта до наступного етапу реконструкції кісткового дефекту.

Ключові слова: вогнепальне поранення, кістково-м'якотканинний дефект, перелом п'яткової кістки, рото-ваний суральний клапоть, PMMA-спейсер з гентаміцином.

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