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Why complicate things when they can be simple? Case series and systematic review on the reconstruction of full-thickness heel defects

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Background: Reconstruction of soft-tissue defects of the heel is challenging due to the functional and structural complexity of this anatomical region. Local flaps are often the first option, due to their ability to provide durable and sensate coverage, though current literature lacks data regarding their use, particularly in the context of the rhomboid flap (Fig 1). The case series and review of the literature aim to assess the efficacy, reported outcomes, and existing gaps in the current literature regarding this specific reconstructive approach.

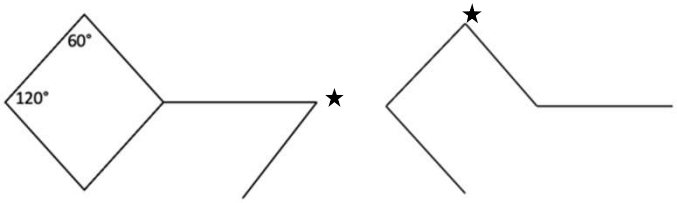

Fig. 1: Rhomboid or Limberg flap design

Material & Methods: 3 clinical cases of full-thickness soft-tissue reconstruction of the heel using modified rhomboid flaps are presented (Fig 2,3,4). The surgeries were performed following ortho-plastic shared decision-making with initial surgical debridement, followed by local rhomboid flap coverage.

In addition, a systematic review of the literature was conducted, using PubMed, Cochrane, and EBSCO databases, in accordance with the PRISMA guidelines. Studies published up to May 2025 were screened, including only articles discussing local flap options to treat heel defects, whereas pedicled island and microvascular flaps were excluded. All included studies were organized using Zotero, and relevant data were extracted and synthesized in a comparative table to facilitate narrative analysis of flap type, defect size, and outcomes.

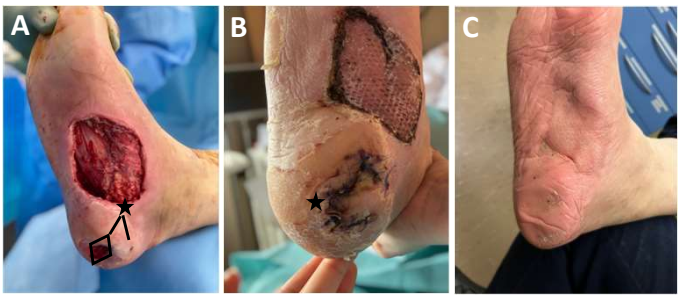

Fig. 2: (A) after debridement, (B) 12 days post-operative, (C) 6 weeks post-operative

References:

1. Bibbo C, Stough JD. J Foot Ankle Surg. 2012;51(3):375-8.
2. Yetkin H, Kanatli U, Oztürk AM, et al. Foot Ankle Int. 2003;24(9):685-9.
3. Ding ZQ, Kang LQ, Zhai WL. Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi. 1999;13(6):337-9.
4. Eisenschenk A, Noack N, Lautenbach M, et al. Z Orthop Ihre Grenzgeb. 2006;144:524-31.
5. El-Shazly M, Yassin O, Kamal A, et al. J Foot Ankle Surg. 2008;47(2):145-52.
6. Huang HH, Wu ZY, Chen XF, et al. J Plast Reconstr Aesthet Surg. 2023;77:31-8.
7. Krishna D, Chaturvedi G, Khan MM, et al. World J Plast Surg. 2021;10(3):63-72.
8. Menke H, Baumeister S, Buchhold C, et al. Unfallchirurg. 2001;104(12):1145-9.
9. Menke H, Baumeister S, Erdmann D, et al. Chirurg. 2000;71(3):311-8.
10. Singh K, Mathur S, Singh B, et al. J Foot Ankle Surg (Asia Pac). 2018;5(1):16-20.

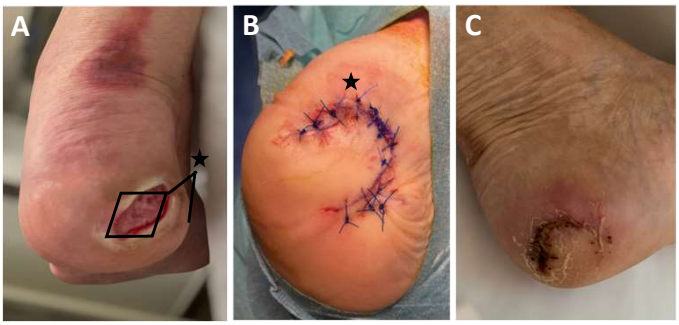

Fig. 3: (A) pressure ulcer of the left heel, (B) per-operative rhomboid flap, (C) 4 weeks post-operative

Results: The average defect size was 3.4 cm². All defects were successfully closed using a modified rhomboid flaps, adapted to the size and location of the defect. Complete healing occurred without donor-site morbidity. Neither complications, nor recurrences were observed during a follow-up period of up to 6 months.

The systematic review identified only 10 studies over more than two decades, including 58 patients treated with local flaps, with a low complication rate of approximately 8% for defects up to 10 cm². The included studies varied in design and flap techniques, but all focused on outcomes such as flap viability, complication rates, and functional recovery.

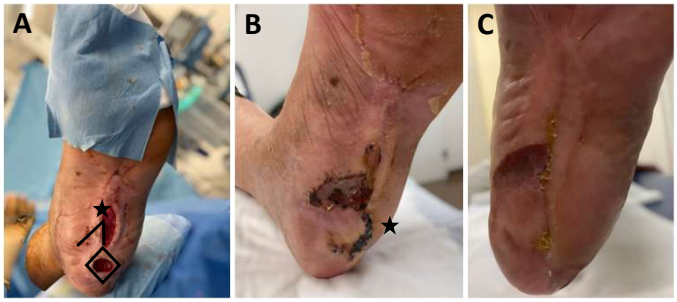

Fig. 4: (A) after debridement, (B) 3 weeks post-operative with split thickness skin graft of donor site, (C) 2 months post-operative

Conclusions: Local rhomboid-like flaps provide tissue of similar characteristics while preserving sensation, and can reliably cover small heel defects (~3.5 cm²) due to their reliable vascularization with very low surgery-related morbidity, accelerating wound closure, reducing the need for long-term dressings and ultimately improving quality of life. The current case series confirms their effectiveness, supporting their role as a valuable local alternative to instep or sural flaps and a potential first-line reconstructive option in selected patients.

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★ The star indicates the corresponding flap corner before and after movement.