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Degloved foot sole successfully restored with split thickness skin grafts: A case report

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Abstract
Reconstruction of degloving injuries to the foot sole is highly challenging because of its complex anatomy and functional requirements of weight-bearing surfaces. These wounds, which frequently stems from high-energy trauma, can cause significant soft tissue loss that exposes underlying structures and compromise function. One of the mainstays of the reconstructive arsenal for these kinds of injuries has been split thickness skin grafts (STSGs), which provide a dependable way to restore skin covering and speed up the healing process. This case report describes a successful example of employing STSGs to repair a degloved foot sole.

Keywords: Foot sole, split thickness skin grafting, degloving injury

Introduction
The skin on the plantar side of the foot is subjected to an excessive amount of stress due to an individual's weight and shear forces. The tissue is ideally adapted for its role because of its extraordinarily thick dermal layer, septofibrous subcutaneous fat, and robust connection to the underlying bones [1]. There are no comparable characteristics in any other area of the human skin. Stress lesions often occur following a degloving injury, making regeneration of the foot sole difficult. The current consensus is that the single skin pad need to be conserved and utilized again whenever feasible [2].
A further option is to graft the avulsed skin pad's dermis and epidermis onto the ipsilateral calf or thigh's epithelized surface in order to enable a second stage transfer of the tissue to its original position [3]. Currently, a repair using a fasciocutaneous pedicled or free flap is recommended when the avulsed sole pad cannot be reused. Nevertheless, it seems that a far less intrusive procedure can also be effective. This study describes a successful reconstruction of a degloved foot sole using split thickness skin grafts [4].

Case report
A 32-year-old man who had been in a car accident presented with a degloving injury involving the entire plantar surface of his right foot. The injury exposed underlying musculature and tendons and extended from the forefoot to the heel (Fig.1 &2)

Fig 1 & 2: Presenting clinical picture at emergency department

Fig 3: Pre-operative Radiograph picture

Fig 4&5: Wound pictures after debridment

Fig 6 &7: Pictures showing post-split skin thickness grafting

X-ray showed undisplaced base of third metatarsal fracture (Fig.3). Wound was sutured and waited for viability of the sole. At day 2 the sole skin started turning into blackish discolouration suggesting necrosis of the sole. Patient was posted for wound debridement and vacuum assisted closure (VAC) was done (Fig 4&5). After two setting of VAC, Split thickness skin grafting was done (Fig 6&7).

Post operatively below knee slab was applied. The postoperative care included offloading the foot and constantly monitoring wound healing and graft take. The grafts were successfully integrated, the patient's mobility and function gradually improved, and the skin integrity over the afflicted area was recovered in the weeks that followed. Rehabilitation was initiated to optimize functional outcomes and prevent problems such as contractures or pressure ulcers. At one year follow-up the split thickness skin grafting was successfully integrated with good satisfactory outcome (Fig 8, 9 & 10).

Fig 8, 9 & 10: Images showing graft successfully integrated – post one year follow-up

Discussion

The ability to repair the foot sole with split thickness skin grafts is hampered by recurrent stress ulcers. It appears promising to reduce this stress during the initial weeks of mobilization by wearing a silicon innersole. The silicon innersole's ability to divide pressure prevents the pressure from building up too much in some areas of the delicate, recently regenerated foot sole [5]. Our approach to toughening the foot sole is early mobilization and gradually increasing partial weight bearing. Pressure distribution can be accomplished by using a variety of materials, such as the soft and springy materials of the inlay, socks, orthopaedic

shoes, casts, orthotics, or walking aids [6].

Split thickness skin grafts offer a number of disadvantages that should be taken into account while restoring a degloved foot sole. A second surgical procedure could be necessary if the grafts do not take up well. One further disadvantage with split thickness skin grafts is that complete weight bearing requires a lot more time compared to flaps.

It took our patient eight months to be able to bear full weight on the newly rebuilt foot sole, compared to the eight to twelve weeks it takes for full thickness flaps to heal. Split thickness skin grafts, however, also have a lot of advantages. First off, there's no need to change the vascular anatomy of the leg. Second, split-thickness skin grafts offer an early wound closure at the most affordable tissue cost, making reconstructive options possible in the future [7]. The split thickness skin grafts also cling to the underlying surface more securely, giving the patient a sense of stability and security.

In the end, the regenerated nerve endings more effectively penetrate the split thickness skin graft, returning the feeling to a more usual state. One disadvantage is that the thin covering over the nerve terminals is what caused our patient's hyperalgesia. In conclusion, this case report demonstrates that split thickness skin grafts might, in certain situations, be a helpful option for reconstructing a degloved foot sole instead of using a full thickness fascio-cutaneous flap [8]. However, proper care is required.

Conclusion

This case study demonstrates the possibility of using split thickness skin grafts for the repair of a degloved foot sole.

Consent

Written informed consent was taken from the patient.

Conflict of interest

The author declares no conflict of interest.

Source of funding

None.

Author contributions

Author 1, 2, 3, 4: Supervision, Validation.
Author 5: Writing - Original Draft Preparation.

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