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Reconstruction of a large leg defect with a combined hatchet flap technique

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Abstract

The repair of lower leg defects, not amenable to primary closure, may be challenging, since the skin at this level is scarcely elastic and difficult to mobilize. Local skin flaps are generally utilized only to restore moderately sized losses, whereas grafting becomes a realistic choice in presence of larger wounds. We present the case of a 70-year-old man with a wide defect on his right leg following the surgical excision of a squamous cell carcinoma. The wound was successfully closed with a combination of three hatchet flaps. The various steps of the procedure and the subsequent outcome are illustrated. Our choice proved to be an easy, time-sparing, but effective reconstructive solution for a large skin defect involving the leg.

Keywords: hatchet flap, reconstruction procedure, local flap, skin defect

Introduction

The management of lower leg defects that are not suitable for direct closure is challenging, because the skin at this level is tight and difficult to mobilize. Skin grafts rather than flaps are often utilized, especially to restore large defects, usually over 4 cm in diameter. However, they tend to heal slowly, causing delays in normal patient ambulation and activity. Typically, depressed, atrophic, hairless, or hypopigmented scars inevitably occur even in cases of more favorable outcomes. Traditional skin flaps have a limited role for the reconstruction of moderate size defects because of the high risk of complications, such as flap necrosis, wound breakdown, or infection. Finally, graft and flap failure favors the development of leg ulcerations, especially in patients with circulation inadequacies.



Figure 1. Clinical aspect of squamous cell carcinoma on the lateral aspect of the right leg.

Satisfactory results have been reported with the use of new techniques, such as the 'reducing opposed multi-lobed flap,' the 'opposed bilateral transposition flap,' the 'keystone island flap,' and the 'double helix flap' procedures [1-4].

We illustrate the case of a patient with a large surgical defect on the leg, which was successfully restored with a combination of three hatchet flaps (HF).

Case Synopsis

A 70-year-old man presented with a biopsy proven, squamous cell carcinoma on the lateral aspect of his right leg, which had been present for approximately two years (**Figure 1**) The tumor was excised with 1-cm lateral surgical margins down to the muscle fascia. Intra-operative frozen section examination disclosed a surgical oncologic clearance. The residual oval-shaped wound measured approximately 4.0 x 5.5 cm.



Figure 2. Defect closure with the use of two opposite hatchet flaps. The hatchet flaps have been outlined and partially incised.



Figure 3. Both flaps are elevated, rotated and advanced on the defect.



Figure 4. Partial flap suture and marking of an additional hatchet flap to restore the secondary residual defect.

Two opposite HF were designed on both sides of the defect, perpendicularly to the larger diameter of the loss, in order to provide a greater mobilization of the surrounding tissue (**Figure 2**). The length of each flap was approximately 1.5 times the larger wound diameter, whereas the width of the pedicles exceeded the defect radius. Both flaps were incised down to the fascia, elevated, and then rotated and advanced into the primary defect (**Figure 3**). Buried 3-0 vicryl and superficial 3-0 polypropylene simple interrupted sutures were applied. To avoid a closure with excessive stretching, a residual defect was left at the vertex of the laterally-located flap. This secondary triangular loss was then restored with another HF, which was dissected with a medial base on the lateral and upper leg surface (**Figure 4**). Suturing was then completed and a tension-free closure was achieved (**Figure 5**). The whole surgical procedure was performed under local anaesthesia. No relevant complications, such as total or partial flap necrosis, wound dehiscence, or infection were observed postoperatively. Early mobilization of the patient was also possible. He was assigned bed rest for 2 days and then was able to move with a compression bandage for 3 weeks, until complete removal of the skin sutures. Histopathology of the excised specimen showed a well-differentiated squamous cell carcinoma, with uninvolved surgical margins. Six months later, the outcome was quite satisfactory on both functional and aesthetic points of view (**Figure 6**).

Case Discussion

The HF is a reconstruction technique, firstly described by Emmett [5] in 1977, based on the use of a random pattern triangular flap with a back cut at the base, corresponding to the vascular pedicle. This procedure showed high versatility and satisfactory results in the reconstruction of circular defects of various sizes in different body areas, such as the head and neck region, trunk, and limbs [6]. In particular, the double HF variant has achieved excellent outcomes in the resurfacing of scalp defects, after oncologic surgery [7, 8].

In our patient we chose to restore the leg defect with a double HF procedure for various reasons. Firstly, no modification of the original roundish defect shape or extra skin excision was required. The combination of rotation and advancement of



Figure 5. View of the complete suture.



Figure 6. Post-operative view after six months.

two opposing flaps allowed a defect closure with reduced tension, compared to the use of a single flap. To further reduce the stretching, and consequently decrease the risk of flap failure, an additional HF was than incised. Again, the relatively narrow base of HF favored flap mobilization also in a site with limited skin elasticity, such as the leg. Since this feature could increase the risk of flap necrosis, we carefully avoided undermining the flaps around the bases in order to maintain the integrity of the underlying vascular perforators.

Our report is limited by its single case nature. It is also a more complicated procedure than healing by second intention or other closure methods and there is an unknown complication rate. Notwithstanding the limitations, this option has proved to be a

versatile and effective solution for a single-stage reconstruction of a large skin defect in a problematic area, like the leg.

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