

Utilization of Combined V Flap in Closure of a Skin Defect after Excision of a Verrucous Carcinoma of the Foot

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Statement of Purpose

The purpose of our case report is to present a plastics technique for closing a large circular defect on the plantar aspect of the foot, specifically a Combined V flap.

Literature Review

Circular skin defects can be very challenging to close primarily due to the significant amount of tension present at the skin edges under linear closure. Therefore the remaining options for closure of the skin defect are healing by secondary intention, skin grafts or local skin flaps (1). Healing foot wounds by secondary intention requires prolonged amount of non-weight bearing and/or reduced activity and prolonged wound care. In addition, wounds that heal by secondary intention may become non-healing or chronic ulcers (2). Skin flaps and grafts provide the advantage of immediate closure and faster healing over granulation. In addition, there are several advantages to skin flaps in comparison to skin grafts that makes them the preferred option among the three options. Skin flaps maintain their own blood supply, hair growth and subcutaneous secretion, as well as the physical appearance in terms of color and texture after transfer. These properties may or may not be maintained in skin grafts (1).

A variety of local skin flap designs have been described to close circular defects under reduced tension such as the Bilobed flap (1), Elliptical incision (3), Mercedes Benz closure, O-Z flap, O-T flap (4), as well as the three reciprocal incisions described by Alvarado which include the Double S, Bow-tie, and Combined V incisions (3). Alvarado performed a geometrical analysis comparing the three incisional

Literature Review

approaches showing that the Combined V approach has relatively small extensions useful for confined anatomical areas. He also showed that the Combined V approach is the most skin sparing and has the most convenient profile at the suture line due to being semi-flat which provides more plasticity to the wound. The Combined V incision also produces the least tension at the suture line compared to the double S and bow tie incisions (3).

The optimal design of the Combined V flap (Figure 1) is described as making two V shaped incisions as if making equilateral triangles on opposite poles of the circular skin defect with the central axis of each triangle at 45 degrees from the long axis of the defect and the apex of each triangle pointing toward the center of the circle. The height of each triangle must be equal to the radius of the circular defect. The tips of the V flaps are sutured to the side of the circular defect, and the angular tips at the edge of the circle are sutured at the base of the V-shaped flap. This converts the circular defect into smaller fusiform defects and the skin of each flap is used to close half of the circular defect (5).

Figure 1
Combined V approach optimal incision design and placement, flap transposition and closure technique

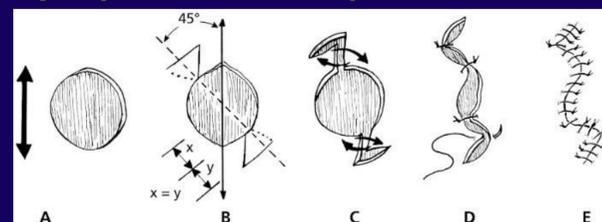


Figure 2
Verrucous Carcinoma
Plantar right forefoot



Figure 4
Immediate post-operative image



Figure 3
Large circular defect post tumor excision
with Combined V flap incision marks



Figure 5
12 weeks post-operative image
of the healed incision site



Case Study

A 58 year old male was referred to the Podiatry department at Kaiser Permanente South Bay Medical Center for surgical consultation for removal of a large painful verrucous lesion of his right plantar foot. The lesion had been present for over 10 years and was increasing in size. Patient had a past medical history significant for a myocardial infarction, coronary artery disease, uncontrolled Type II Diabetes with microalbuminuria, and history of severe alcohol and tobacco use. The lesion was located on right plantar forefoot and measured 2.9cm x 2.8cm. Pedal pulses were palpable and protective sensation was intact to bilateral feet despite subjective numbness. The lesion was biopsied and results showed atypical squamous proliferation suspicious for verrucous or squamous cell carcinoma.

Once the lesion was surgically excised a circular defect was left measuring approximately 4.5cm x 3.3cm x 0.7cm. To close this defect the Combined V flap was utilized. Two flaps were created by making V-shaped incisions on the opposite poles of the circular defect (Figure 3) and undermining. The flaps were then transposed similar to a Z-plasty to cover the defect. A layered closure was performed using 4-0 absorbable sutures for deep closure and 3-0 Nylon for skin closure with simple interrupted and apical suture techniques.

The patient was followed up for 28 months at 1 week intervals for the first 12 weeks post-operatively. He was non-weight bearing in a posterior splint with crutches immediately after surgery. The sutures were removed after 4 weeks and there was an area of dehiscence which was managed by local wound care. Patient started guarded weight bearing in a Cam Boot after 8 weeks. The wound was fully closed after 12 weeks and at that point he transitioned to supportive shoe gear.

Analysis & Discussion

Circular skin defects can be very challenging to close primarily due to the significant risk of wound dehiscence due to the amount of tension present at the skin edges under linear closure. There are numerous options when it comes to flap designs to close circular skin defects; however, with large defects on a confined area such as the foot, skin availability becomes a limiting factor. In such cases the Combined V flap can be an excellent option since it is tissue sparing and produces the least amount of tension at suture lines compared to other flap designs.

References

1. Patrinely JR, Marines HM, Anderson RL. Skin flaps in periorbital reconstruction. *Surv Ophthalmol.* 1987;31(4):249-61.
2. Dixon AJ, Dixon JB. Reducing opposed multilobed flaps results in fewer complications than traditional repair techniques when closing medium-sized defects on the leg after excision of skin tumor. *Dermatol Surg.* 2006;32:935-42
3. Alvarado A. Reciprocal incisions for closure of circular skin defects. *Plast Reconstr Surg.* 1981;67:482-491
4. Dockery G. and Crawford M.E.: *Lower Extremity Soft Tissue & Cutaneous Plastic Surgery*, 2 Edition
5. Swaim SF, Welch JA, Gillette RL: *Management of Small Animal Distal Limb Injuries*. Jackson (WY):Teton NewMedia; c2015. Chapter 3, Carpal-Metacarpal/Tarsal -Metatarsal Wounds; p. 111-112