## Wound Remodeling - Approaches and Techniques Aimed at Closure of Wounds with Unfavorable Base or Edges





#### Abstract

Even a perfectly debrided wound may have difficulty healing if the topography of the wound base or edges are unfavorable. A wound may not heal properly if it has an elevated base, vertical edges, undermined areas, or rolled edges. Wound remodeling may need to be performed in such cases. It typically involves lowering the wound base and resecting wound edges at a 45-degree angle. While adjusting the wound base is usually straightforward, edge modifications can be complicated. "Edge Trenching," "Soap Scrap," and "Parallel Pocket Incision" techniques were developed to facilitate closure of wounds where edge resection is not possible or desired.

#### Discussion

The topography of the ideal wound includes a base that is at the periwound level or slightly lower with edges resembling a shallow plate (at 45 degrees or less angle to the wound bed). Below, we will review four typical scenarios where wound remodeling is typically required.

#### Wounds with Elevated Base

The wound bed needs to be at or slightly below the level of the periwound for the keratinocytes to cross the base from the periphery. Contouring the wound base to ensure it is not higher than the periwound can be achieved by debriding the base with a large curette or razor blade. (Figure 1a) If hypergranulation is present in the wound bed, chemical cautery with silver nitrate may be utilized. Debridement can also be combined with chemical cautery to expedite the process. (Figure 1b).



Figure 1a (Left): Traumatic elbow wound with tissue hypergranulation above the periwound level. Figure 1b (Right): The same wound after resection of hypergranulation and chemical cautery with silver nitrate.





## Igor Melnychuk, MD, CLT<sup>1,2</sup>, Julia Juriga, MBS<sup>3</sup>

<sup>1</sup> Edward Via College of Osteopathic Medicine Carolinas, Spartanburg, SC <sup>2</sup> Department of Surgery, UNC at Chapel Hill, NC <sup>3</sup>Nova Southeastern University Kiran C. Patel College of Osteopathic Medicine, Fort Lauderdale, FL

#### Wounds with Vertical Edges

One option for promoting healing in wounds with vertical edges is resecting edges at 45 degrees to ensure that the edge slop is smooth, and nothing impedes the keratinocytes from moving centrally. If the wound is deep or the edge resection would create a significant tissue defect, the base can be raised first by using one of the following approaches:

- Optimizing tissue growth in the wound base (e.g., by applying collagen or extracellular matrix dressings, adding growth factors, etc.)
- Suturing a collagen scaffold (e.g., a bovine collagen dermal repair scaffold) to fill in the wound base. The wound may heal via primary closure or need to be followed by a split-thickness skin graft or myocutaneous flap.



#### Figure 4: A collagen scaffold is sutured into the wound base of the hand

- Application of negative pressure wound therapy (NPWT) to promote granulation tissue in the wound base.
- Using a combination of the above modalities (e.g., placement of collagen dressing under NPWT foam or utilization of NPWT to bolster collagen scaffolds.)

The edges can then be resected to 45 degrees once the wound becomes shallower. When it is not possible to resect edges or if the walls do not merge with the base, the "Edge Trenching" technique can be utilized. Often, these two clinical scenarios coexist. A small curette is used to excavate a trench at the point of convergence of the wound base and wall. Equal parts of the base and the edge are resected. As the newly created trench heals, the wound contracts and creates a favorable transitional angle. (Figure 3) It is essential to immobilize the edges of a wound that is susceptible to stretch during body movement, to allow for an uninterrupted crosslinking process. The procedure is repeated at each visit until the connection between the two wound surfaces is visible to the naked eye.



Figure 3: "Edge Trenching" Technique.

#### Wounds with Rolled Edges

A contracted wound's edge can create an awning or overhang that gets fully epithelialized and subsequently does not adhere to the tissue in the wound base. It is recommended to resect these rolled edges or cauterize them with silver nitrate. When this is not possible, the epithelial tissue on the underside of the awning can be denuded with a curette. Then, a compressive multilayered wrap, a combination of traditional and closed incision NPWT, or both is applied. After the rolled edge attaches to the wound base, one can either resect the edge at 45 degrees or create a trench to merge the base and the edge.



Figure 4a (Left): Medial malleolar wound after debridement. Figure 4b (Right): Combination of conventional and closed incision NPWT.



Figure 5: "Soap Scrap" Technique.

# 

## Florida

Dr. Kiran C. Patel College of Osteopathic Medicine NOVA SOUTHEASTERN UNIVERSITY

### Wounds with Undermined Areas and Pockets

Wound pockets are contained undermined areas. Typically, it is recommended to completely unroof and expose the undermined areas. However, there are two salvage approaches that can be attempted without resection of the undermined areas.

1. The "Soap Scrap" technique consists of debriding contact wound surfaces, immobilizing edges susceptible to movement, and utilizing pressure (multilayered compression, a combination of conventional /closed incision NPWT, or both) to collapse undermining and wound pockets (Figure 5). This method is favorable for wounds located on the extremities (Figure 6a, 6b); it is less successful when applied to lower back wounds, most likely due to increased depth or inability to immobilize tissues successfully.





Figure 6a (Left): The plantar pocket is outlined in a straight line. Figure 6b (Right): Combination of conventional and closed incision NPWT along with compression wraps.

2. The "Parallel Pocket Incision" technique is used in the treatment of pressure injuries with a pocket or leg hematomas. An incision is made at the proximal and distal ends, allowing thorough debridement of the pocket (Figure 6). No compression of the cavity is used, and the cavity obliterates on its own.

Figure 7 (Right): "Parallel Pocket Incision" Technique - The blue dotted lines indicate the area of undermining, and the solid red lines indicate incision lines.

### Conclusion





#### References