

# TIPS AND TECHNIQUES:

## Risk Factors and Treatment Options for Pressure Ulcers

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When a trauma patient is rushed into the emergency room, the last thing anyone may think about is how to address the wounds. The focus is on survival. However, once the patient has been stabilized, wounds must be addressed to prevent secondary issues. Having trained at a Level 1 trauma center, I have seen almost every combination of traumatic wound one can imagine, from gunshot wounds to stabbings, road rash that transforms an entire side of a person's body into something from a horror movie, crush injuries, traumatic amputations, animal bites, and even the occasional human bite. Wound management differs depending on location, type of injury, degree of contamination, and acuity of the injury.

When evaluating a wound, it is important first to establish whether it is penetrating, nonpenetrating, or both. An example of a wound that is both penetrating and nonpenetrating is a gunshot. The purpose of establishing this distinction is to determine whether you need to treat just the wound or also the radius of the wound, since the "blast component" of nonpenetrating injuries spreads well beyond the point of impact. This diffuse type of injury can produce a higher rate of tissue necrosis and compartment syndrome. Although wound care must always be individualized to the patient, this article provides some basic guidelines for traumatic wound management. Additional factors influencing wound healing are discussed in our article entitled *Incision Management* in the first issue of *Current Dialogues in Wound Management*.

Abrasions are superficial wounds caused by frictional forces, such as road rash. These wounds should be cleaned and dressed with a nonadherent dressing. Addition of a topical antimicrobial agent or use of a nonadherent dressing with antimicrobial properties should be considered if there is a concern about contamination. Penetrating injuries and clean, sharp lacerations <6 hours old, such as knife wounds and glass cuts, should be debrided, irrigated, and closed after achieving hemostasis and ensuring no underlying vital structures have been disrupted. Most wounds encountered in the first 6 hours after injury

contain  $<10^5$  bacteria per gram of tissue and have a relatively low risk of infection when closed.<sup>1</sup> However, if the patient sustains a stab wound from a rusty old knife, common sense dictates this should not be closed the same way.

Although, traditionally, contaminated and dirty wounds were allowed to heal by secondary intention, the advent of highly effective antibiotics allows these boundaries to be challenged. Alternatives for contaminated and dirty wounds include primary closure over a drain and delayed primary closure. In areas where allowing a wound to heal by secondary intention would be cosmetically unacceptable, such as the face, it is my opinion that after adequate irrigation and debridement, it is our obligation to at least attempt closure.

Wounds resulting from high velocity, such as gunshot wounds and blast injuries, distribute energy not just through the wound tract but into the surrounding tissues as well, producing more ischemia and tissue necrosis and increasing the risk of infection. These wounds are classified as "dirty" and may need multiple debridements, as the combination of ischemia and the distribution of contamination creates an ideal environment for anaerobic organisms, such as *Clostridium perfringens*.<sup>1,2</sup> Primary closure of these types of injuries creates an environment that promotes wound infection and breakdown.

When it comes to bites, the old dictum allows healing by secondary intention. In healthy individuals, it is, however, acceptable to administer antibiotics, irrigate and debride to healthy tissue, and primarily close animal bites, human bites, or a combination of the two. Caution is required with bites overlying joints, as they may have violated the joint capsule; these bites need specialist evaluation.

Nonpenetrating injuries, such as crush injuries, may require prolonged wound care that can range from multiple debridements with healing by secondary intention to skin grafts or even tissue flap coverage, depending on the extent of the injury and the status of the patient.<sup>3,4</sup> Negative pressure wound therapy, which promotes granulation tissue formation and decreases tissue edema, can be helpful in

these types of injuries.

Remember, all wounds that occur outside of the operating room are, at the very least, clean contaminated, and thus evidence supports antibiotic prophylaxis. As a plethora of wound closure options exists it is appropriate to briefly examine some basic guidelines. No evidence supports a benefit for the use of antibiotic irrigation over soap solutions to clean traumatic wounds. In fact, some papers suggest that antibiotic irrigation in traumatic wounds may impede the local inflammatory response that is vital for wound healing.<sup>5</sup>

No ideal suture material for traumatic wound closure exists. Although absorbable sutures are convenient, as they do not require removal, nonabsorbable sutures create less foreign body reaction and subsequent inflammation. Catgut and silk should not be used, as they cause an excessive inflammatory reaction. Monofilament polymers cause the least inflammatory reaction and are the least likely to contribute to secondary infection.<sup>3,6,7</sup>

When tying knots after suturing these wounds, remember to approximate and not strangulate skin. Wounds swell after closure, and a tight knot acts as a noose, resulting in necrosis of skin edges. In certain cases, such as some scalp wounds, staples, which have a low risk of infection and are technically simple to use, can produce an acceptable cosmetic result.

The most important thing to remember about traumatic wound care is that an overwhelming number of correct management options exists. As long as you have a foundation of debridement to healthy tissue, irrigation, and appropriate antibiotic prophylaxis for all wounds, most treatment plans result in successful wound healing.

Location	Days
Scalp/face	4
Extremity	7–10
Trunk	10–14

Table 1. General Guideline for Removal of Nonabsorbable Sutures

#### References:

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