



Chapter 10

SECONDARY WOUND CLOSURE

KEY FIGURE:

Dead space under skin closure

Secondary wound closure is also referred to as closure by secondary intention. The skin edges of the wound are not sutured together; the wound is left “open.” Dressings are applied regularly to keep the wound clean, and the wound gradually closes and heals on its own. Secondary wound closure requires little technical expertise. It is the simplest and, therefore, lowest rung on the “reconstructive ladder.” This chapter discusses the important background knowledge you must have when deciding to allow secondary wound closure.

Caveats

Although it is often true that the easiest treatment is the one to choose, you must be aware of what secondary wound closure involves from the patient’s perspective.

Extended Healing Period

It may take several weeks to even months for the wound to heal using dressings alone. This extended healing period can cause considerable hardship for the patient. From a financial standpoint, the patient may not be able to return to work with the open wound. In addition, dressing supplies, no matter how simple you make them, can get expensive.

Wound Location

The location of the wound may make it impossible for the patient to change the dressings. For example, the patient will require outside assistance to care for a wound on the back or the buttocks. It also may be difficult to keep the dressings in place during treatment of a facial wound.

Pain

The sensation associated with an open wound can range from somewhat bothersome to quite painful. Dressing changes are often painful as well. Some pain medications are addictive when given for the long period required for a large wound to heal.

Scarring

Wounds that are allowed to heal secondarily tend to have **larger and more noticeable** scars than the scars that result from primary closure. Secondary healing also has a greater tendency for hypertrophic scar/keloid formation, which can be bothersome and unsightly.

Scar tightness and contracture can be especially problematic in areas such as the upper cheek, where a tight scar can pull down and distort the lower eyelid, or in the arm pit (axilla), where scar problems can lead to limited shoulder mobility and function.

A wound that heals secondarily has a **less stable** scar—that is, the scar is more easily injured than the scar from a wound with primary closure. Over the years less stable scars may be chronically injured. They may reheel only to be reinjured again and again. This cycle can be quite troublesome and also is associated with a risk for the development of an aggressive skin cancer.

Acceptable Settings for Secondary Closure

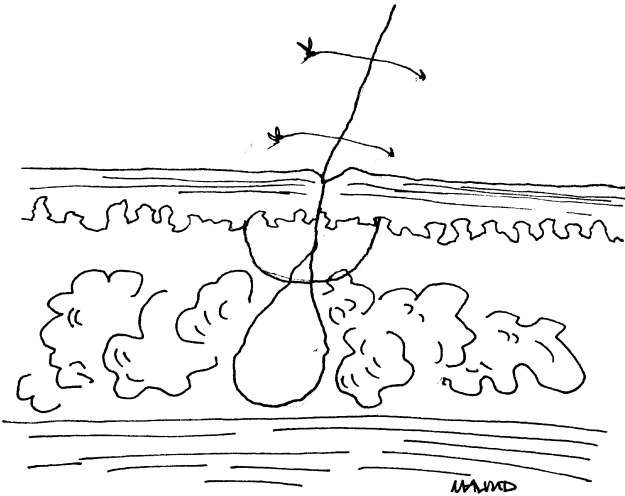
Wounds that will heal with an acceptable scar if the skin edges are not sutured together can be allowed to heal secondarily. Examples include:

- **Relatively small wounds.** Wounds smaller than 1½ cm often heal quite well by secondary intention. Even wounds with a diameter of 3–4 cm or larger, with no exposed tendons, bones, or other important structures, can be allowed to heal secondarily when lack of surgical expertise allows no other option. Be sure to keep in mind the above caveats when wounds > 2 cm are allowed to close by secondary intention.
- **Second-degree burns.** Second-degree burns are often allowed to heal with local wound care alone. See chapter 20, “Burns,” for a more thorough discussion.

Secondary Closure as the Treatment of Choice

Some wounds should *not* be closed with sutures. Instead, they should be left open and treated with dressing changes until they heal. Examples include:

- **Wounds that come to your attention more than 6 hours after occurrence.** With the exception of facial wounds, you should not use primary repair for a wound that is more than 6 hours old. The risk of infection is greatly increased after this amount of time has lapsed.
- **Highly contaminated wounds.** A dirty wound should not be closed because of concerns about wound infection. Examples of dirty wounds include human bites on the hand or wounds deeply embedded with dirt or grass.
- **Wounds with dead space under the skin closure.** Sometimes empty space rather than subcutaneous tissue is seen beneath the repaired skin when you try to bring the skin edges together. This “dead” space occurs due to loss of subcutaneous tissue or swelling of the skin around the wound. If such wounds are closed primarily, the risk for blood collecting under the skin closure is high, increasing the likelihood of infection and problems with wound healing.



After the skin is sutured together, the underlying tissues are not well approximated. This dead space promotes hematoma (a collection of old blood) formation and infection.

- **Wounds with too much swelling or skin loss.** Excessive swelling or skin loss makes the skin closure very tight. A tight skin closure decreases blood circulation to the skin edges, thereby causing the tissues to become ischemic (low supply of oxygen and nutrients). If the tightness does not soon resolve, the skin may die. Skin death results in a wound that is larger than the initial wound and even more problematic to close.

Contraindications to Secondary Closure

Certain wounds should not be allowed to heal by secondary intention. These are wounds that are associated with exposure of an important underlying structure or are located in areas where a tight scar will be particularly problematic. Such wounds should be closed primarily. If primary closure is not possible, one of the other options from the reconstructive ladder must be chosen (see following chapters).

Exposure of a Vital Structure

Sometimes wounds occur over important structures such as fracture sites, tendons, or prosthetic devices (e.g., artificial joints). If these structures are not covered by healthy soft tissue, there is an almost 100% risk for the structure to become infected or die.

To avoid permanent disability, a wound that results in exposure of an important structure should optimally be closed quickly (within days) with healthy tissue.

Areas Where a Tight Scar is Undesirable

Wounds over Creases

Secondary closure is not useful on wounds that are larger than 3–4 cm and located over creases (e.g., front of the elbow [antecubital fossa], armpit [axilla]). The scar that results from secondary closure will cause tightness across the crease and may result in significant limitation of movement. If splints and movement exercises are used diligently (see chapter 15, “Scar Formation”), this problem may be avoided. But even with the best of care, limitation of movement often results.

Face Wounds Near the Lower Eyelid

In many areas of the face, a wound can be allowed to heal secondarily without significant cosmetic ill effects. However, wounds on the cheek near the lower eyelid may pull the eyelid downward if allowed to heal secondarily. The result not only is cosmetically unacceptable but also may expose the eye to injury.

Guidelines for Use of Secondary Closure

If you decide to treat a wound by secondary intention, the wound must be evaluated thoroughly and cleaned rigorously. The appropriate dressing regimen must then be implemented. See chapter 9, “Taking Care of Wounds,” for specific dressing recommendations.

Unless the wound involves a human or a deep animal bite, antibiotics (oral or intravenous) are not required. However, you should see the patient within a few days to ensure that no signs of infection are present and that the wound is being cared for properly.

Signs of Infection

Signs of wound infection include redness, warmth, swelling, and tenderness in the tissues around the wound. Drainage of pus from the wound is also a sign of infection.

Gray exudate on top of the wound does *not* mean that the wound is infected. It is often just proteinaceous debris from the wound itself. A green, somewhat sweet-smelling, creamy material is a sign of colonization by *Pseudomonas* bacteria. Without signs of surrounding soft tissue infection, antibiotics are not required. However, you should treat the wound with wet-to-dry dressing changes, preferably with Dakin's solution, and increase the number of changes each day.

Change in Dressing Regimen

Do *not* be afraid to change dressing regimens. You may start with a dressing regimen of antibiotic ointment covered with dry gauze. After a few days, a lot of exudate covers the wound. At this point you should change to a wet-to-dry dressing and observe how the wound progresses. Once the wound has improved in appearance, you can go back to the antibiotic ointment or continue with the wet-to-dry dressings.

Duration of Wound Dressing

The dressings should be continued until the wound heals. Often during the course of secondary healing, the wound develops a dry eschar (scab). The patient can cover the area with dry gauze or even leave it uncovered. As the wound heals, the eschar gradually falls off.

If the wound is near a crease, encourage the patient to exercise the area to prevent formation of a tight scar. Splints also may be useful. See chapter 15, "Scar Formation," for more details.

Bibliography

1. Goldwyn RM, Rueckert F: The value of healing by secondary intention for sizable defects of the face. *Arch Surg* 112:285, 1977.
2. Montandon D, D'Andiron G, Gabbiani G: The mechanism of wound contraction and epithelialization. *Clin Plast Surg* 4:325, 1977.