

PRIMARY WOUND CLOSURE

KEY FIGURE:

Everting skin edges

In primary wound closure, the skin edges of the wound are sutured together to close the defect. Whenever possible and practical, primary closure is the best way to close an acute open wound.

Advantages of Primary Wound Closure

- Primary wound closure simplifies wound care for the patient, who simply needs to keep the suture line clean and dry. Secondary wound closure requires several dressing changes per day.
- A wound closed primarily heals much more quickly and with less pain than a wound allowed to heal with dressings alone.
- Primary closure involves fewer problems with abnormal scarring and has a better cosmetic outcome.
- All vital, underlying structures are covered.

Contraindications to Primary Wound Closure

Concern about wound infection is the main reason not to close a wound primarily. If infection develops, the resultant deformity may be worse than that caused by the initial injury alone. The following circumstances are associated with an unacceptably high risk of infection:

- An acute wound > 6 hours old (with the exception of facial wounds)
- Foreign debris in the wound that cannot be completely removed (e.g., a wound with a lot of embedded dirt that you cannot clean completely)
- Active oozing of blood from the wound
- Dead space under the skin closure
- Too much tension on the wound

Before Primary Closure

Clean Wound

The wound must first be evaluated thoroughly for injury to underlying structures to rule out the need for urgent exploration in the operating room. (See chapter 6, “Evaluation of an Acute Wound,” for specific details.)

The wound must then be cleansed.

Evaluating and cleansing a wound can hurt; remember pain control.

Anesthetize the Area Before Suturing

If local anesthetic was administered for wound cleansing, check to ensure that the anesthesia is still effective.

Pinch the tissues with your forceps, or gently touch the skin edges with a needle. If the patient feels *sharp* pain, more anesthetic is required.

Pressure sensation is not dulled by local anesthetics. With adequate anesthesia, the patient may still feel a sensation of pressure when you pinch the tissues with the forceps, but it should not hurt.

Agents

Injectable lidocaine (lignocaine) or bupivacaine should be used. For wounds of the face or scalp, the addition of epinephrine decreases bleeding caused by the placement of sutures. The effects of lidocaine last approximately 1 hour; the effects of bupivacaine last 2–4 hours.

Administration

1. Inject the anesthetic with as small a needle as possible. A 25-gauge needle is acceptable, but use the smallest needle that you have. The larger the number, the smaller the needle: a 25-gauge needle is much smaller than an 18-gauge needle.
2. Inject slowly. It is acceptable to inject into the wound after it has been cleaned. If the tissues are dirty, however, inject into the skin surrounding the wound to prevent foreign material from being pushed into the uninjured surrounding tissues.
3. Inject enough anesthetic to make the tissues swell just a little.
4. If the injury is in an area where a nerve block can be done (e.g., on the finger), do a nerve block. It provides better anesthesia.
5. Allow 5–10 minutes for the anesthetic to take effect. See chapter 3, “Local Anesthetics,” for more details.

How to Suture the Wound

Most wounds can be closed by suturing the skin edges together. Chapter 1, “Suturing: The Basics,” contains a detailed description of the various suturing techniques, but some reminders are included below.

Suture Size

On the Face

Small sutures such as 5-0 or 6-0 should be used to repair facial lacerations. Smaller sutures decrease scarring, which is a major concern with facial wounds. Again, the bigger the number, the smaller the suture. (See chapter 16, “Facial Lacerations,” for more details.)

All Other Sites

Usually, in areas where cosmetic concerns are less important, 3-0 or 4-0 sutures are best because of their larger size and increased strength.

Absorbable vs. Nonabsorbable Sutures

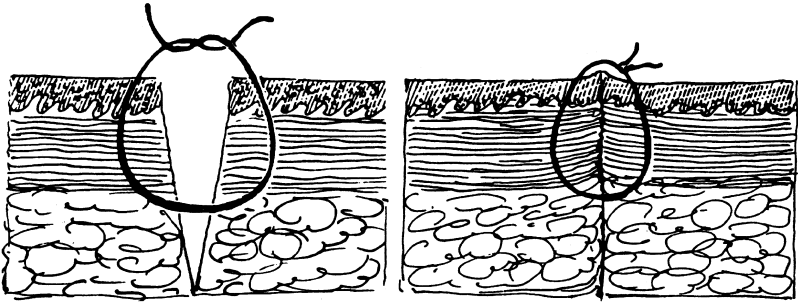
For most skin suturing, nonabsorbable sutures are best because they are associated with less noticeable scarring. Exceptions include patients who cannot return for suture removal, children (because of the difficulty in removing sutures from a frightened, crying child), and some facial lacerations.

Suture Placement

When you suture a wound, it is important to evert the skin edges—that is, the underlying dermis from both sides of the wound should touch (see figure at top of following page). If the edges are inverted (i.e., the epidermis turns in and touches the epidermis of the other side), the wound will not heal as quickly or as well as you would like.

Choose the suture technique (simple vs. mattress sutures) that allows the best dermis-to-dermis closure for optimal wound healing.

For most areas of the body except the face, the sutures should be placed 3–4 mm from the skin edge and 5–10 mm apart. There is no need to drive yourself crazy by placing too many sutures.



For optimal healing, sutures should be placed so that the skin edges are everted, allowing the dermis on both sides of the wound to be well approximated. (From McCarthy JG (ed): *Plastic Surgery*. Philadelphia, W.B. Saunders, 1990, with permission.)

Interrupted vs. Continuous Closure

In an interrupted closure, you tie the suture once it has passed through each side of the wound. In a continuous closure, you place the sutures one right after the other without tying each suture individually.

In a relatively simple laceration with smooth edges that line up easily, it makes no difference which method you choose. On the average, a continuous closure is faster to perform, but you should choose the method with which you are most comfortable.

In a laceration with irregular edges, an interrupted closure is preferred because it allows better alignment of the tissues.

If you have any concern that the wound may become infected, it is better to do an interrupted closure. If an area of the wound begins to look inflamed, the sutures in that area can be removed and the other sutures left in place. By removing a few sutures and placing the patient on oral antibiotics, you may be able to treat the infection adequately without having to reopen the entire wound. This approach results in a smaller scar and a happier patient.

Closure in Layers vs. Simple Skin Closure

Although most wounds require only skin closure, sometimes it is necessary to close the wound in layers. The layers may involve muscle, fascia (the layer of connective tissue that overlies the muscle and is actually quite strong), or dermis, depending on the particular wound.

If the muscle or fascia is widely separated, a few absorbable sutures can be placed in a figure-of-eight fashion to bring the tissues together.

If the wound is widely separated or the closure will be under some tension, a few buried dermal sutures are useful. Such sutures are placed in the skin layer just below the epidermis and should be made of an absorbable material.

Aftercare

1. After suturing the wound closed, apply a small amount of antibiotic ointment over the suture line and cover the area with a dry gauze.
2. After 24 hours, remove the original dressing.
3. The patient can wash the area with gentle soap and water the day after the repair. A shower is fine, but if the patient wants to take a bath, the injured area should not be allowed to soak in the water for more than a few minutes.
4. A small amount of antibiotic ointment can be applied daily for the first few days; then leave the area open to air.
5. If the injured area is on the hand, foot, or calf, have the patient elevate the affected extremity. Elevation decreases swelling in the injured area and thereby improves healing.

Suture Removal

Sutures should be removed according to the following guidelines:

- Face: 5–7 days
- Hand: 10–14 days
- Elsewhere: 7–10 days

To decrease scarring, skin sutures are removed while the scar tissue is still relatively weak compared with the final scar strength (which is not attained for several months). To help maintain the wound closure, it is useful to place Steristrips (if available) across the scar once the sutures have been removed. These strips fall off on their own, and the patient can wash the area, even with the strips in place.

What to Do if the Suture Line Becomes Red

If the suture puncture sites start to become red and irritated-looking but the surrounding skin area is not tender or red, simply remove the sutures. No antibiotics should be needed. This reaction probably represents nothing more than inflammation and irritation from the sutures. As a precaution, you should check the patient within 24–48 hours to be sure.

If the area around the sutures becomes red, tender, and swollen, an infection probably has developed. Remove a few sutures, and open the wound. Try to express any underlying fluid or pus, and clean the area with saline or other antibacterial solution. If you cannot fully drain the underlying fluid or fully cleanse the area by taking out a few sutures, all of the sutures should be removed, the wound opened, and the area treated with wet-dry dressings. Oral antibiotics are also needed.

Delayed Primary Closure

Delayed primary closure is a compromise between primary repair and allowing an acute wound to heal secondarily. This option may be considered for a wound with characteristics that require secondary closure (e.g., a wound over 6 hours old) even though primary closure is preferable (e.g., a large wound or a wound near a skin crease).

In delayed primary closure, you initially treat the wound with wet-to-dry dressing changes for a few (2–3) days with the hope of being able to suture the wound closed within 3–4 days.

During the few days of dressing changes, the reasons for not closing the wound initially may resolve. The dressings should clean the wound, the tissue swelling caused by the trauma may subside, and all bleeding may be fully controlled. If the wound shows no signs of infection and can be closed without tension, it may be possible to close the wound primarily within a few days.

Delayed primary closure is a relatively simple technique and avoids having to choose a more complex method for wound closure.

Bibliography

Millard DR: *Principles of Plastic Surgery*. Boston, Little, Brown, 1986.