American College of Physicians - Internal Medicine Meeting 2025
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Suturing Skills

Faculty Information

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Suturing Skills for the Internal Medicine Physician

ACP Internal Medicine 2025

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Competency:

This clinical skill workshop is design to enable the internal medicine physicians to learn practical and common skills for management of wound/laceration in an office or urgent care center with standard supplies and equipment

Objectives:

- Understand and describe basic wound and laceration assessment.
- Identify the various types and size of suture material
- Identify appropriate instrument for suturing
- Identification and appropriate use of anesthetic agent and their correct doses
- Understand the aseptic technique require for minimizing infection
- Practice suturing and knot tying technique on pig skin
- Basic simple suture technique
    1. Simple
    2. Vertical Mattresses
    3. Horizontal mattress
    4. Subcuticular
- Know appropriate laceration care and follow up
- Understand the principle of application of tissue adhesives
- Practice the application of tissue staples

Evaluation:

Workshop participants of this course will:

1. Accomplish above objective criteria
2. Demonstrate suturing proficiency while practicing with faculty mentors

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Initial Assessment:

History

- Mechanism and timing of injury is important for assessing degree of complication
- Amount of blood loss
- Comorbid condition like diabetes and peripheral vascular disease can affect the healing and incidence of secondary infection
- Immunization status for tetanus
- Assessment of foreign body
- Assessment of underlying vascular, nervous, or tendon injury
- Decision to stop any antiplatelet and anticoagulation agents should be done after the consultation with the specialist

Physical examination

- Blood loss assessment (pallor, tachycardia, orthostatic hypotension)
- Careful note of size and depth of laceration/wound

- Assess for necrotic tissue, contamination of involved tissue
- Detail visualization for foreign body

Time of injury key for deciding the time for closure

- All lacerations are not suitable for primary closure; the decision should be made on individual basis
- Secondary suturing is when wound closure is done two to seven days after the injury.
- Secondary suturing is good option for contaminated wound like puncture and bites.
- Always consider consultation with specialist like plastic surgeon or orthopedic surgeon for wounds involving severe destruction and loss of tissue.

Suture material

- Decision for type of suture material depends on tensile strength, knot security, fiber diameter, and workability in handling, low tissue reactivity, ability to resist infection. Monofilament or multifilament configuration, and application of coating substances.
- All sutures come in two basic varieties: absorbable and non-absorbable.
- Suture sizes: 5.0 is smaller than 2.0
- The usual size is 3.0 or 4.0
- 5.0 or 6.0 for face, 5.0 for neck, 4.0 for chest (if thick skin), 3.0 for back, 3.0 or 4.0 for arms/legs/body, 2.0 on planter skin of foot

Table 1. Absorbable Suture

Material	Suture	Company	Loses 50% Strength at	100% Absorption of Suture by	Tissue Reactivity	Handling and Knot Security
Collagen	Plain gut	Ethicon, Davis & Geck	3 days	2 months	Moderate	Fair
Collagen & chromic salts	Chromic gut	Ethicon, Davis & Geck	1 week	2 months	Moderate to high	Fair
Polyglycolic acid	Dexon S	Davis & Geck	2 weeks	3 months	Low	Fair
Polyglycolic acid & coating	Dexon Plus	Davis & Geck	2 weeks	3 months	Low	Good
Polyglactin 910 & coating	Vicryl	Ethicon	2 weeks	2.5 months	Low	Good
Polydioxanone	PDS	Ethicon	4 weeks	6 months	Low	Poor

Adapted from Bennet RG: Fundamentals of Cutaneous Surgery. St. Louis, CV Mosby, 1988, with permission.

Table 2. Nonabsorbable Suture

Suture	Material (Configuration)	Company	Tissue Reactivity	Memory	Handling and Knot Security
Silk	Silk (braided)	Ethicon, Davis & Geck	High	Poor	Good
Ethilon	Nylon (monofilament)	Ethicon	Low	High	Poor
Dermalon	Nylon (monofilament)	Davis & Geck	Low	High	Poor
Prolene	Polypropylene (monofilament)	Ethicon	Low	High	Fair
Dermalene	Polypropylene (monofilament)	Davis & Geck	Low	High	Fair
Mersilene	Polyester (braided)	Ethicon	Moderate	Fair	Good
Ethibond	Polyester (braided & coating)	Ethicon	Moderate	Fair	Good

Adapted from Bennet RG: Fundamental of Cutaneous Surgery. St. Louis, CV Mosby, 1988; with permission.

Preparation:

Prepackaged laceration trays are available with most of necessary equipment Most of them include:

- Skin cleaning agent: alcohol first (x3) then chlorohexidine or povidone-iodine after area is anesthetized
- Sterile gauze

- Local anesthetic
- 3cc syringe with 25 0r 30 gauge needle
- Saline solution (for irrigation only)
- 30-60 ml syringe with splashguard for irrigation and sterile bowl
- Sterile drape
- Needle holder
- Adson-Brown toothed forceps
- Suture scissors

Table 1. Local Anesthetics Used in Laceration Repair.*

Agent	Duration of Action	Maximum Dose	Maximum Volume for a 70-kg Patient
	min	*mg/kg of body weight*	*ml*
1% Lidocaine	30	4.5	31.5
1% Lidocaine with epinephrine	60–240	7	49
0.25% Bupivacaine	240–480	3	84

* A 1% solution is equal to 1 g of agent per 100 ml of diluent. Therefore, each milliliter of a 1% solution of lidocaine contains 10 mg of the agent. Data are from Trott.[3]

Adapted from Thomson TW, Barclay DA, Setnik GS. Basic Laceration repair. N Eng J Med 2006;355: e18, with permission

Technique:

Before procedure

1. Lidocaine is appropriate anesthetic solution for most of laceration repair
2. The addition of epinephrine can extend the duration, must avoid in the areas with single vessel blood supply such as fingers, ear pinna and the penis.
3. Explain the procedure to the patient
4. Wash your hands with soap and water, wear gloves and protective glasses or face shield all the time

Procedure

1. Irrigate the wound with normal saline solution. Vigorous irrigation may require for mechanical debridement
2. Cleanse the area via circular motion three times
3. Anesthetize the wound
4. Switch to sterile gloves and sterile drape

Laceration repair

1. Position yourself, so you are parallel to the frontal plane of your body
2. Place first suture in the center of the wound to bisect the laceration in equal half
3. Do not pinch the tissue between the toothed forceps
4. For good cosmetic, please pay close attention to wound edge approximation during suturing
5. Take “equal depth” bites on each side of the wound edge

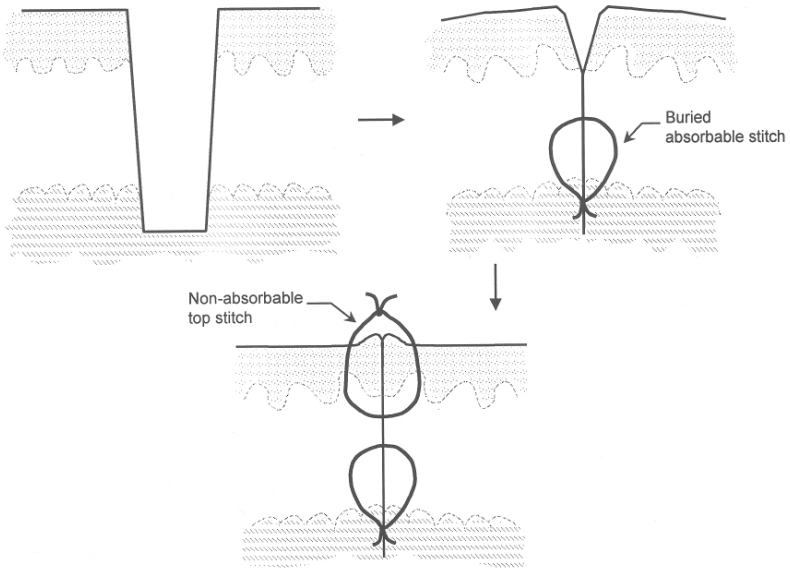


Figure 1. Combination of buried absorbable sutures and non-absorbable top stitch

Adapted from Taylor RS. Needles, Sutures, and Suturing. The Clinical Atlas of Office Procedures. W.B Saunders. Philadelphia. Vol. 2(1) 1999, with permission

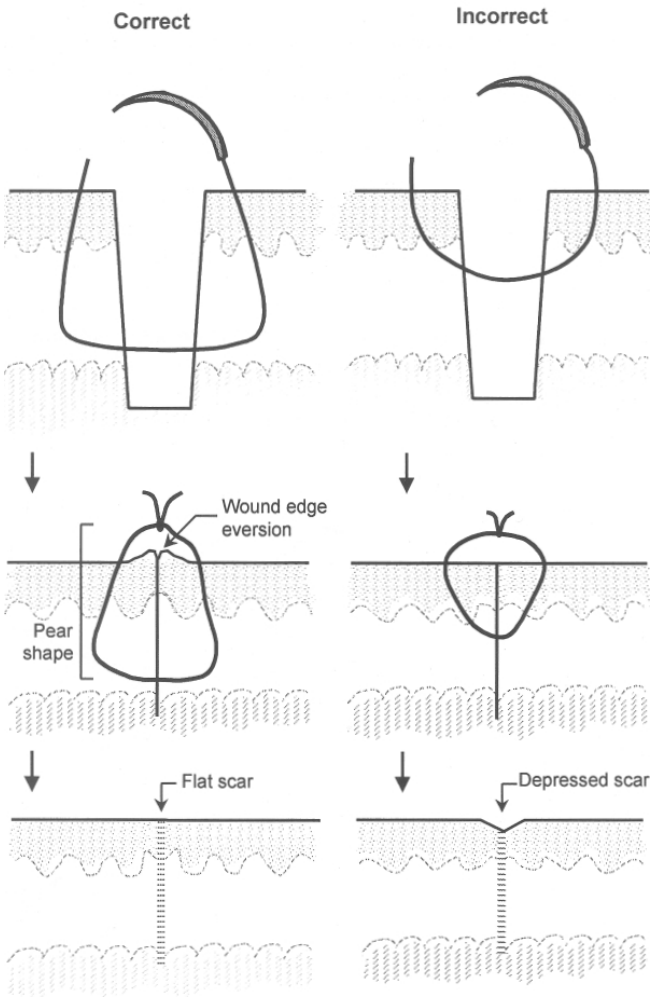


Figure 2. Interrupted simple top stitch. The preferred method of placing interrupted nonabsorbable suture requires looping more dermis than epidermis, which results in *a pear-shaped* stitch when tied. This creates slight epidermal wound edge eversion, which ultimately results in a flat scar.

Adapted from Taylor RS. Needles, Sutures, and Suturing. The Clinical Atlas of Office Procedures. W.B Saunders. Philadelphia. Vol. 2(1) 1999, with permission

Interrupted mattress sutures

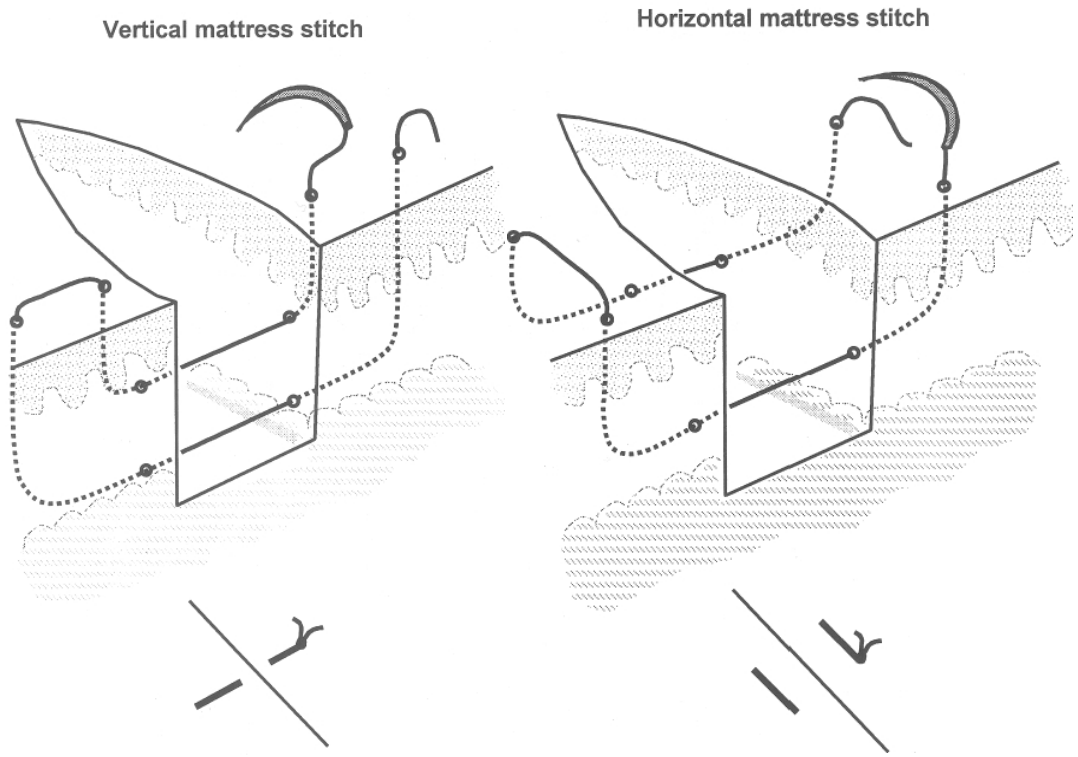


Figure 3. Mattress stitches. Referred to as the "far, far, near, near" stitch, the vertical mattress stitch results in exact epidermal wound edge eversion. The horizontal mattress stitch is useful for redistributing wound tension away from fragile wound edges.

Adapted from Taylor RS. Needles, Sutures, and Suturing. The Clinical Atlas of Office Procedures. W.B Saunders. Philadelphia. Vol. 2(1) 1999, with permission

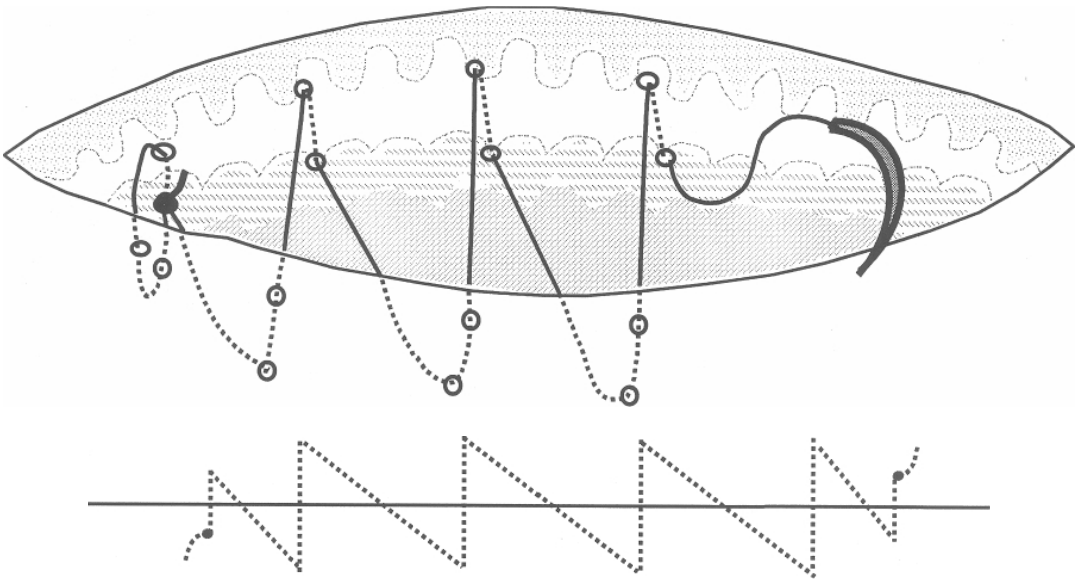


Figure 4. Buried running intradermal stitch. This stitch is a rapid means of closing wounds with a buried stitch. It is usually not sufficient alone and must be used in combination with some form of epidermal closure.

Adapted from Taylor RS. Needles, Sutures, and Suturing. The Clinical Atlas of Office Procedures. W.B Saunders. Philadelphia. Vol. 2(1) 1999, with permission

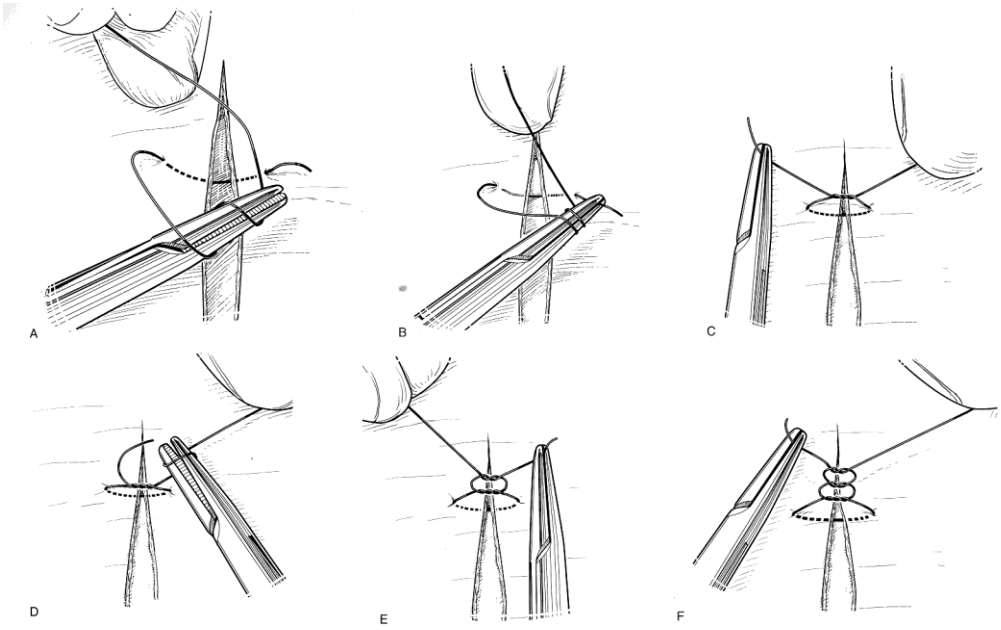


Fig 3. Instrument tie. *A,* Holding the end of the suture attached to the needle in the nondominant hand, the suture is wrapped over and around the needle holder twice. *B,* The other end of the suture is grasped and held in the jaws of the needle holder. *C,* The two ends of the suture are then pulled in opposite directions until the wound is closed and the knot lays flat. *D,* The suture in the nondominant hand is now wrapped once over and around the needle holder. *E,* The other suture end is again grasped and the ends pulled in the opposite direction from the first knot. *F,* The final loop is thrown in the same fashion

Adapted from Taylor RS. Needles, Sutures, and Suturing. The Clinical Atlas of Office Procedures. W.B Saunders. Philadelphia. Vol. 2(1) 1999, with permission

Complications:

- Allergic reaction
- Discomfort
- Retain foreign body
- Possible infection and dehiscence
- Bruising and bleeding
- Scarring

Timing for suture removal:

- Depends on location of laceration
- Facial suture should be removed in four to five days
- Scalp, torso, arms, legs sutures within 7-10 days
- Suture over joints and tension area kept for 10-14 days

Follow up:

- Early follow up with wound check in one or two days should be done if complication is expected at time of repair
- Cover laceration with sterile, non-adherent dressing except for face and scalp
- Keep wound dry for first few days
- Then wash gently with soap and water, prolonged immersion in water should be minimized
- The role of topical antibiotics and creams is controversial and limited
- Instruct patient to change dressing daily
- Prophylactic antibiotics are not needed for clean laceration
- First generation cephalosporins are adequate for most of complicated wounds
- Open fractures and bite wounds may need use of amoxiclin with clavlanic acid
- Avoid direct sunlight to for healing wound for six to twelve months

Patient Education Handout

Care of Sutured Wounds

1. Remove the dressing in 24 hours. Avoid activities or movements that stress or pull the wound.

2. Avoid the use of aspirin

3. Clean the wound daily with soap and water. Remove any crust. Pat dry.

4. Showering is permitted, avoid bathing and swimming.

5. After the wound is clean, apply a thin film of antibiotic ointment (Bacitracin, Mycitracin, or Polysporin) or petroleum jelly (Vaseline) over the sutures. Covering the wound with a dressing or Band-Aid is optional.

6. Contact the office at _____ if signs of infection appear. These include:
   - Red, painful, swollen and warm
   - Red streaks around wound
   - Yellow or green pus in wound
   - Chills or fever

7. Sutures should be removed in _____days.

Appendix A: Tissue Adhesives

Overview. Tissue adhesives, such as 2-octylcyanoacrylate, can be used as an alternate to suture closure of simple lacerations. They have similar cosmetic results, dehiscence rates, and infection risk when compared to sutures. Some advantages include rapid application, no need for local anesthesia, and no need for follow-up for suture removal. Some disadvantages include complications from the procedure such as unintended adhesion caused by run-off of adhesive and slightly increased cost.

Patient selection.

- Ideal application considerations include patients with superficial linear lacerations less than 5 cm with good approximation and no increased risk of healing complications in body areas of low tensile skin stress that require a 5-0 or smaller suture equivalent for closure.

- Contraindications include patients with lacerations that are jagged, crushed or contaminated, are in contact with mucosal surfaces, are in areas that are moist areas such as axillae, do not achieve hemostasis, are in areas of increased skin tension (unless immobilized or preceded by subcutaneous sutures), and patients with allergies to the adhesive.

Technique.

- Prepare the wound with adequate irrigation and dry the surrounding tissue with sterile gauze. Position the patient in a position to minimize run-off from the wound area.

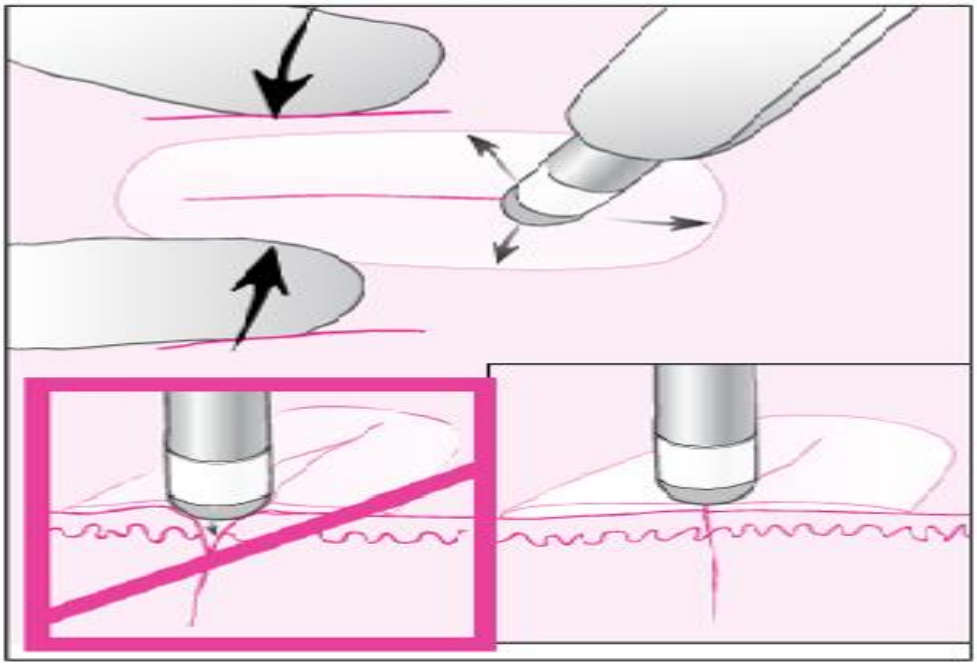
- Appose the wound edges with gloved fingers or forceps and hold during the procedure.

- Apply the adhesive in in a thin layers smoothly over the wound with a brushing motion.

- Do not press into the wound to avoid adhesive entering the wound itself as this will interfere with wound healing.

- Repeat application three times within 30 seconds and cover a 10mm margin of surrounding skin. Hold wound edges apposed for an additional 30 seconds to achieve full tensile strength from the first application of the adhesive.

- Unintended run-off can be wiped within 10 seconds and adhesions can be treated as soon as possible with petrolatum ointment.



APEENDIX B: STAPLES IN WOUND CLOSURE

Overview. Skin staples can be used as an alternate to sutures for wound closure. They have similar dehiscence rates, hemostasis rates, infection rates, and in the scalp, similar cosmetic results. Some advantages when compared to suturing are rapid application and decreased risk of injury needle injury to health care provider. Some disadvantages include cosmetic results in areas outside the scalp, increased discomfort for patient in certain areas with increased motion, slight increase in product cost.

Patient selection.

- Ideal application considerations include patients with long superficial linear lacerations in non-cosmetic areas of the scalp, trunk, arms or legs.

- Skin staples may be used in areas of increased skin tension but not hands or feet.

- Contraindications include patients with lacerations that are jagged, crushed or contaminated, that are in areas that require best cosmetic results, patients who need CT or MR radiologic imaging.

Technique.

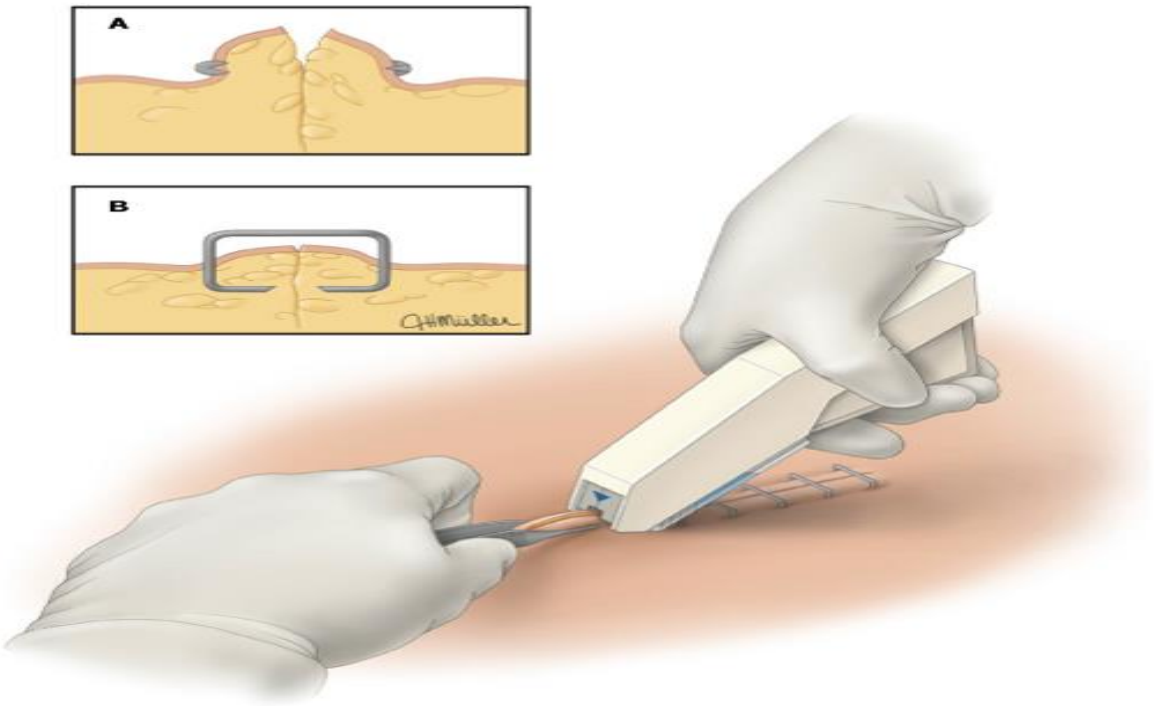
- Prepare the wound with adequate anesthesia and irrigation.

- There are several commercially available skin stapling devices with unique features and required techniques but the following general principles apply to most.

- Appose the wound edges with gloved fingers or forceps creating eversion at the wound edges. Line up the midline indicator on the stapling device with the wound margin in a perpendicular angle.

- Squeeze the trigger mechanism and deploy the staple. The staple should be a few millimeters above the skin surface. The staples should be about 1 cm apart.

- Apply antibiotic ointment over the wound. Place a gauze dressing over the wound, except over the scalp. Remove staples between 7 and 14 days depending on vascularity of wound location.



Further reading and reference:

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