

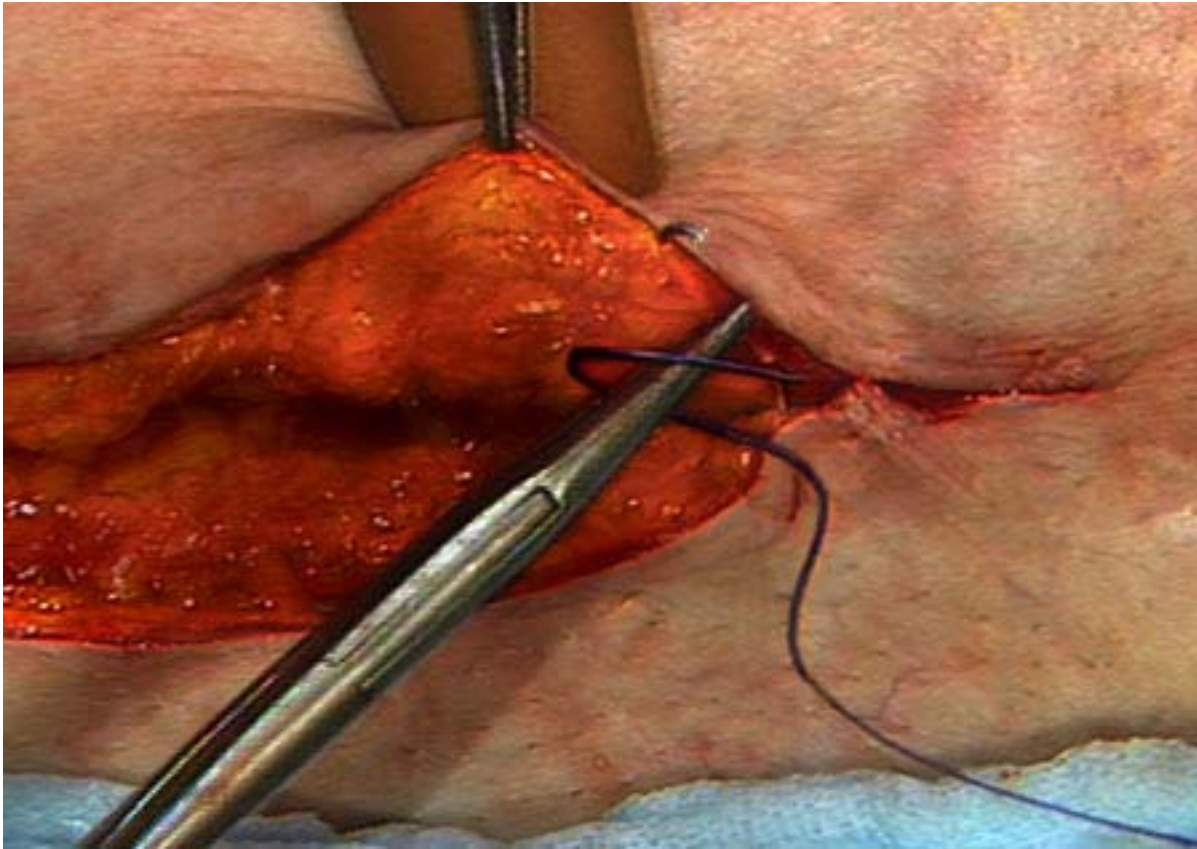
Suturing

Sutures

- Sutures attached to needles are the most common method of approximating skin edges.
- Sutures are classified as absorbable or non-absorbable and as either monofilament or multifilament.
- Sutures vary in their capability to provoke infection, with catgut being the most "reactive" and polypropylene being one of the least "reactive" suture materials.

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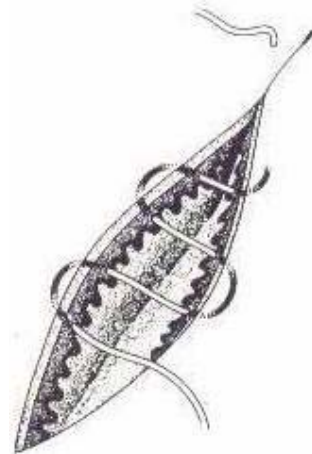
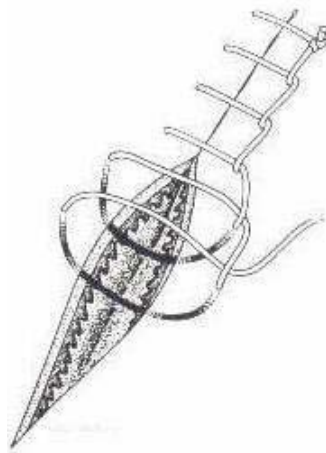
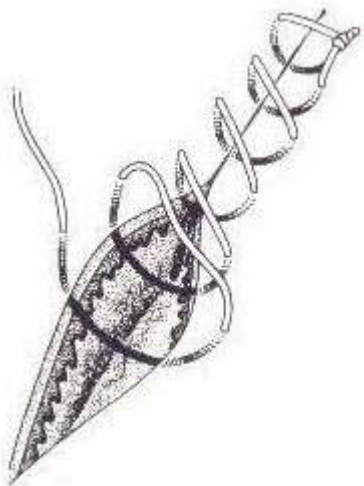
Suture attached to needle



Selection of suture

- **Polypropylene:** a non-absorbable, monofilament material that is the least reactive of all suture materials
- Polypropylene is used with **continuous percutaneous suturing**.
- Its disadvantage is that it has coiled memory, making it difficult to handle.

Continuous sutures have the advantage of evenly distributing the wound tension. The continuous intracutaneous is ideal for creating inconspicuous wound such as that in direct brow lift operation.

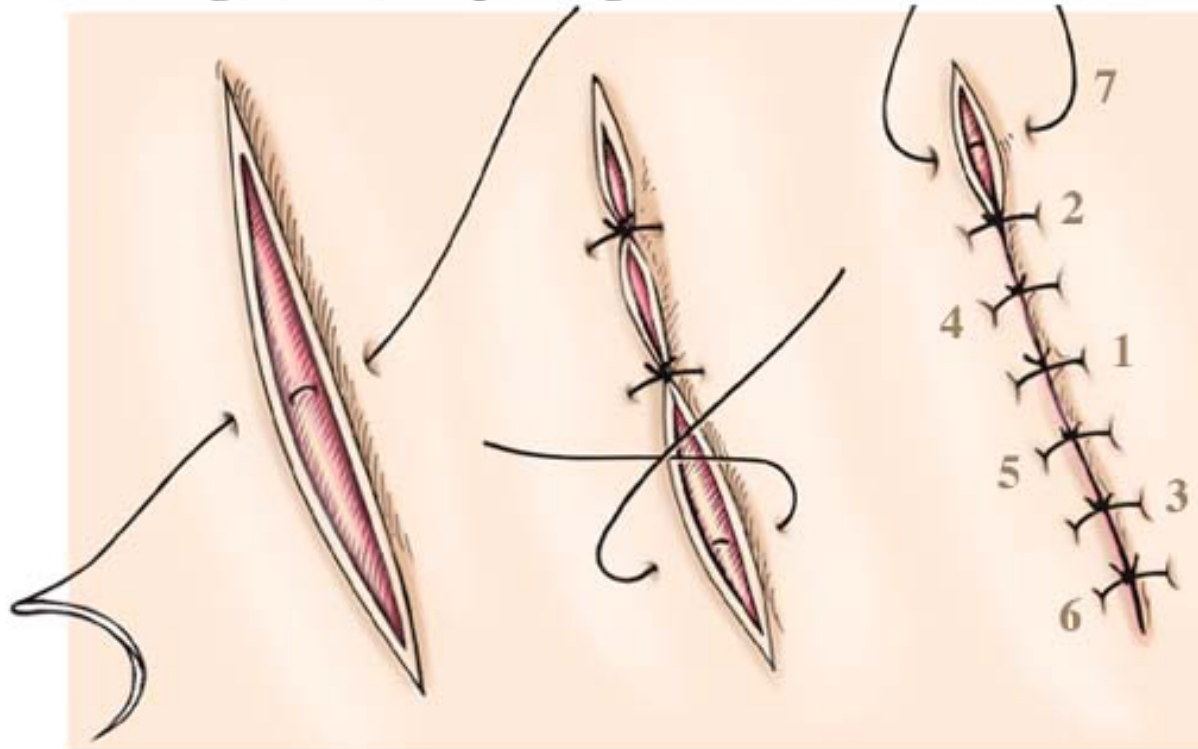


Type of suture

- **Nylon:** a non-absorbable suturing material that degrades *in vivo* by hydrolysis at a rate of about 125% annually.
- The advantages of nylon are good pliability and ease of handling.
- It is favored for **interrupted percutaneous suture** closures.
- Nylon sutures are available in monofilament and multifilament construction. Braided nylon sutures possess the same handling and knot construction characteristics as silk sutures, but unlike natural fiber, nylon is relatively non-reactive in tissue.

Interrupted percutaneous sutures

Suturing Basics: Proper alignment and number of sutures



To facilitate proper alignment, close the wound in segments. To minimize tissue strangulation, use just enough tension to approximate the skin edges, and just enough sutures to prevent gaping.

Non-absorbable suture

- Non-absorbable suture material is used for most skin closures. The synthetics are likely best as these have less tissue reactivity. Monofilaments, for example, nylon (Ethilon, Prolene) or braided materials (Ethibond, Surgilon) may be used. Knots must be “well locked”, and there should be only minimal tension on the tissues themselves.

Type of Suture

- **Synthetic absorbable:** absorbable refers to the degradation and loss of tensile strength over time.
- Absorption and loss of tensile strength are not interchangeable. The former is important only with regard to late suture complications; the latter speaks to the primary function of the suture -- maintaining tissue approximation.

Absorbable suture

- Absorbable suture material is utilized below the skin (except dermal sutures may be used for high tension lacerations), inside the mouth for example, or in other awkward areas where suture removal would be difficult.
- Plain catgut has high tissue reactivity.
- Chromic catgut is less problematic and is absorbed in about 10-14 days.
- Dexon or Vicryl last 90-120 days.

Type of suture

- **Braided synthetic absorbable:** useful for interrupted dermal suture and ligating bleeders.

Monofilament synthetic absorbable: indicated for continuous dermal suture.

Suture Size

- A suture size of 5:0 or 6:0 is used on the face,
- A suture size of 4:0 or sometimes 3:0 (if more strength is required) is used on the trunk or extremity.

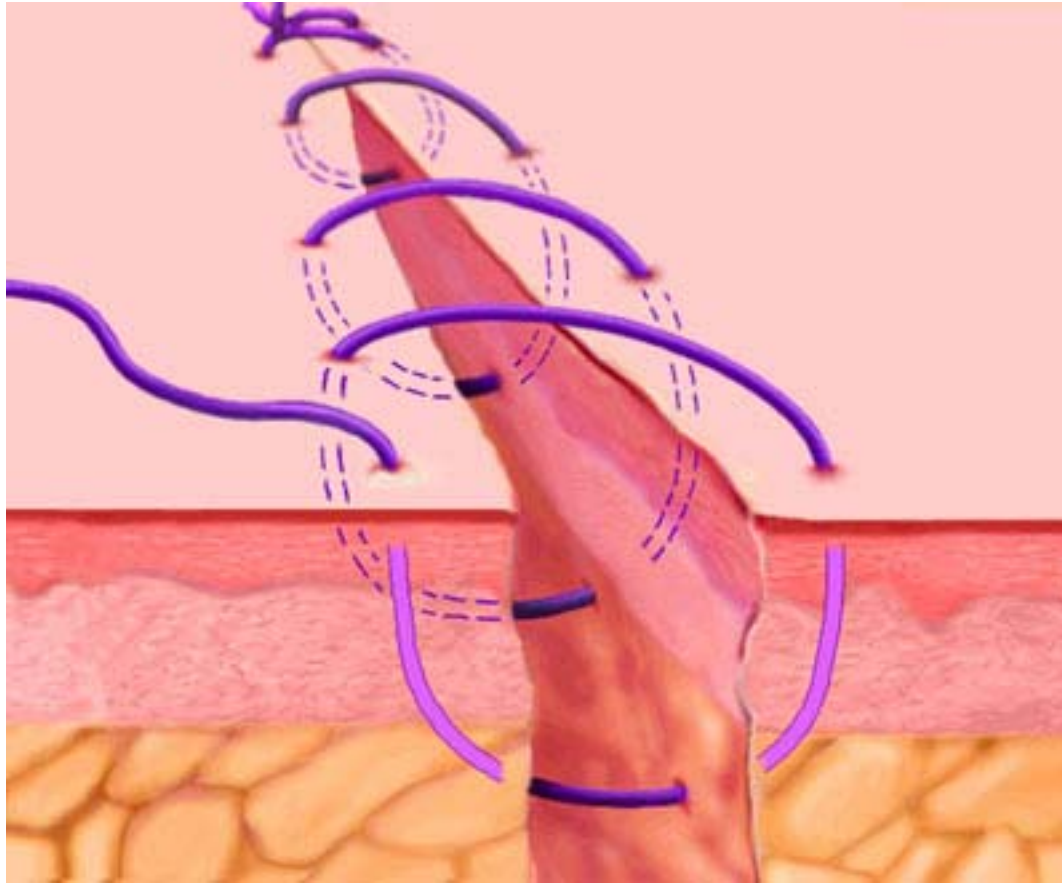
Suture techniques

- The "Running" stitch is made with one continuous length of suture material.
- Used to close tissue layers which require close approximation, such as the peritoneum.
- Also used in skin or blood vessels.

Running Stitch

- The advantages of the running stitch are speed of execution, and accommodation of edema during the wound healing process.
- There is a greater potential for mal-approximation of wound edges than with the interrupted stitch.

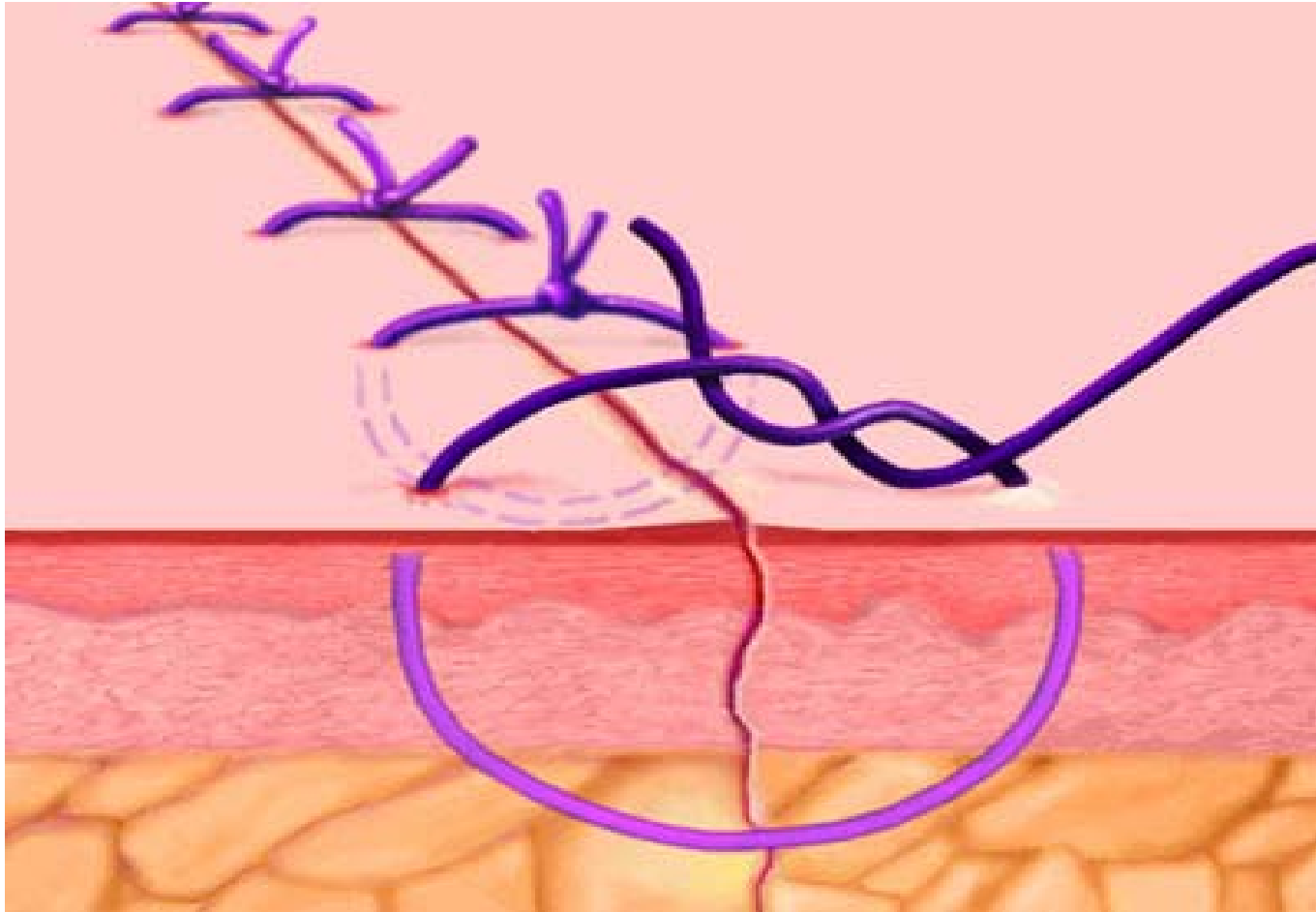
Running/continuous stitch



Interrupted stitch

- Each stitch is tied separately.
- Used in skin or underlying tissue layers.
- Advantages over running stitch
 - More exact approximation of wound edges
 - Greater tensile strength
 - Less potential for wound edema and impaired circulation.
- Disadvantage
 - more time intensive
 - Increased risk of cross hatch marks at suture line

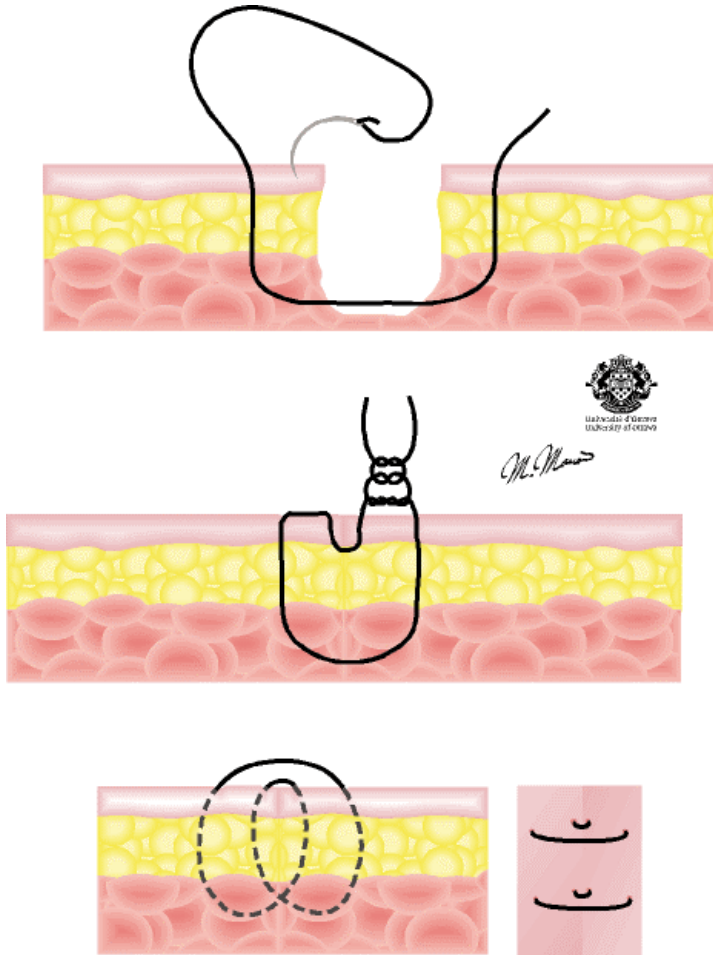
Interrupted stitch



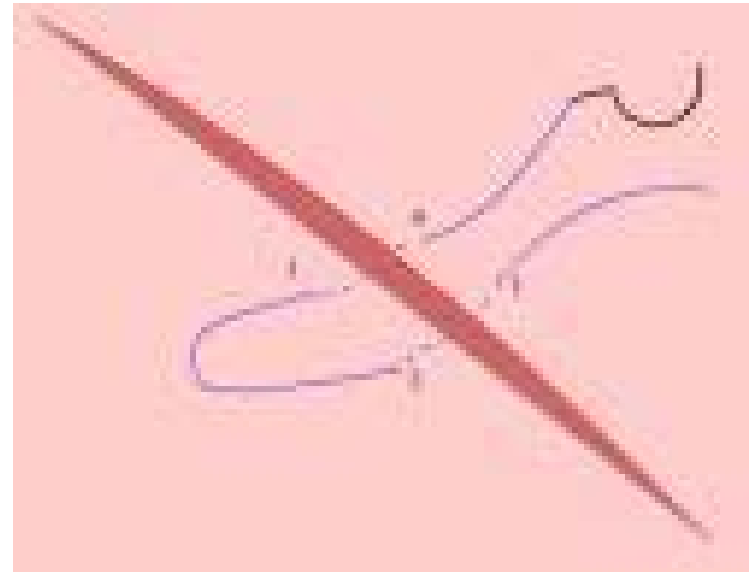
Mattress suture

- A double stitch that is made parallel (horizontal mattress) or perpendicular (vertical mattress) to the wound edge.
- Chief advantage of this technique is strength of closure; each stitch penetrates each side of the wound twice, and is inserted deep into the tissue.

Vertical Mattress Suture

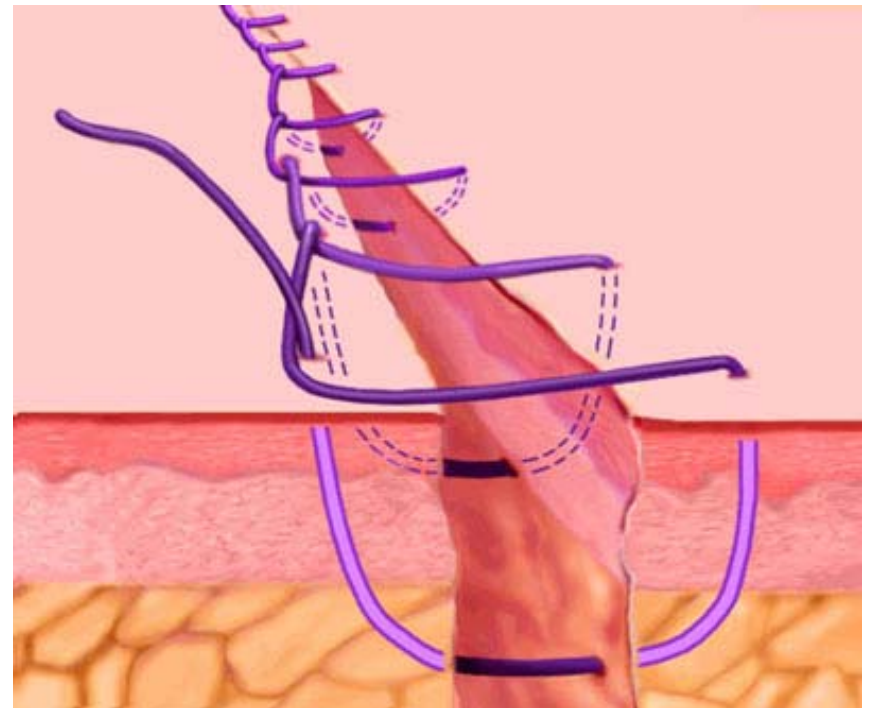


Horizontal Mattress Suture



Continuous locking blanket stitch

- A self-locking running stitch used primarily for approximating skin edges.



Prepare patient

- Explain to the patient and/or family members the need for sutures
- Explain the steps involved in placement of sutures
- Ask the patient and /or family members if they have any questions

Procedure

- Wash your hands thoroughly before and after any contact with patients or specimens.
- Always wear gloves if you might contact blood and body fluids.

Procedure

Stop bleeding, if necessary

- Apply firm pressure on the wound,
- Occasionally a tourniquet applied for no longer than 15 minutes at a time above systolic blood pressure may be required.
- Vasoconstrictors, such as epinephrine can be used, avoiding areas with end organ blood supply such as fingers, nose, penis, and toes.

Wound Cleansing, Irrigation Procedure

- Consider all emergent lacerations contaminated
- Up to 30% sutured lacerations develop wound infections
- Antibiotic administration does NOT substitute for the proper cleaning of wounds.
- Wound irrigation should be copious- use impact pressures generated by a 30-60cc syringe and a 18-gauge needle.
- Normal saline most common choice of solution -use until the wound appears clean.
- Do NOT irrigate with Hydrogen peroxide and povidone

Procedure

Conservative debridement

Devitalized pieces of skin and subcutaneous tissue are excised. Viable tissue should be conserved and this is especially important in the face and hands.

Local anesthetics

Prior to the administration of local anesthetics, check the sensory and motor nerve response, and for allergy (very rare). Anesthetize the area with 1% xylocaine. Slow injection by a small needle (25 Gauge) will reduce the pain of infiltration.

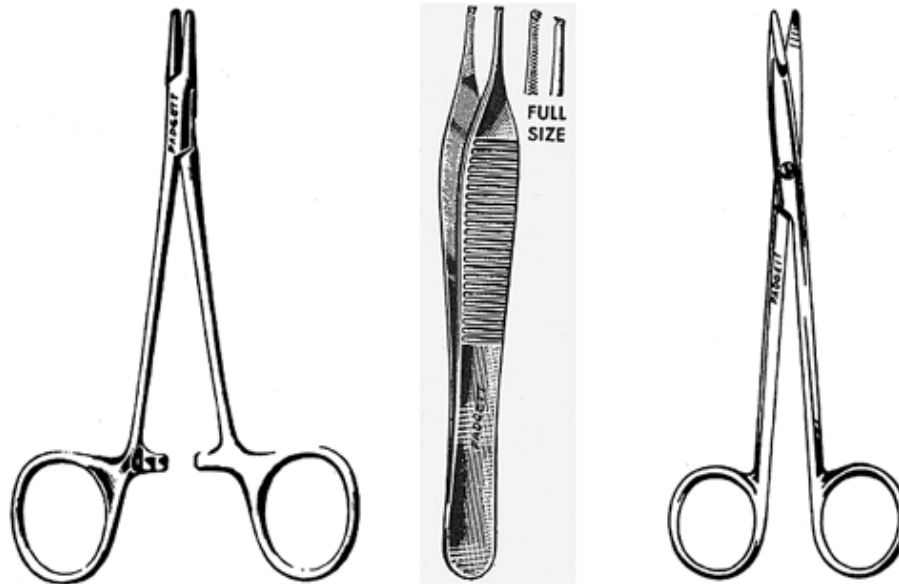
Instruments

Instruments Needed

Needle holder: used to grab onto the suture needle

Forceps: used to hold the tissues gently and to grab the needle

Suture scissors: used to cut the stitch from the rest of the suture material



Left, Needle holder. Center, Forceps with teeth. Right, Suture scissors.
(Courtesy of Padgett Instruments, Inc.)

How to hold Instruments

- Risk – accidentally sticking yourself
- Risk – needle sticks
- Never handle the suture needle with your fingers.

Holding the Instruments

Scissors

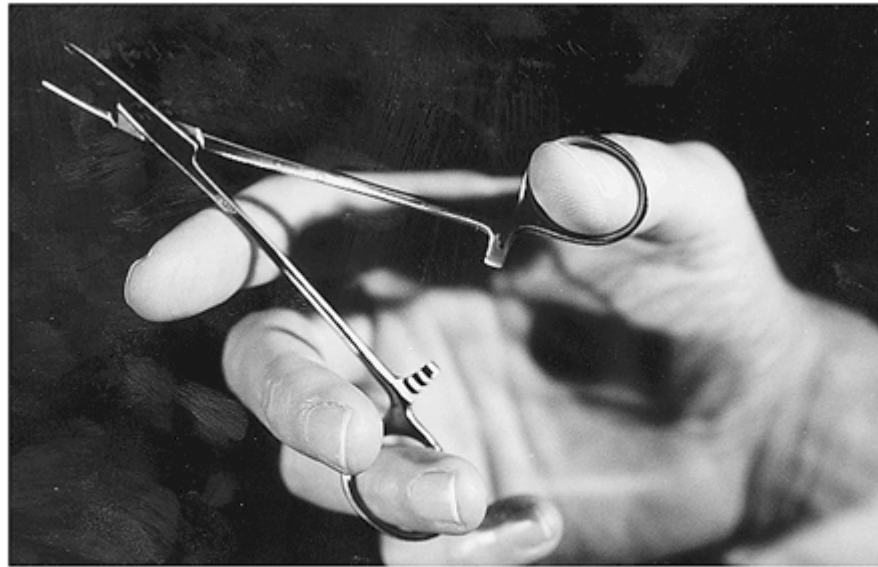
- Place your thumb and ring finger in the holes.
- Cut with the tips of the scissors to not injure any surrounding structures or tissue

Holding Instruments

Needle Holder

- Place your thumb and ring finger in the holes.
- Grab the needle until you hear the clasp engage, ensuring that the needle is securely held.
- Grab the needle at its half-way point, with the tip pointing upward.
- Try not to grab the tip; it will become blunt making it difficult to pass the tip through the skin

Holding needle holder



The needle holder and scissors are handled similarly. For maximal control, place the tips of your thumb and ring finger into the rings of the instrument. Your thumb does most of the work to open and close the instrument.

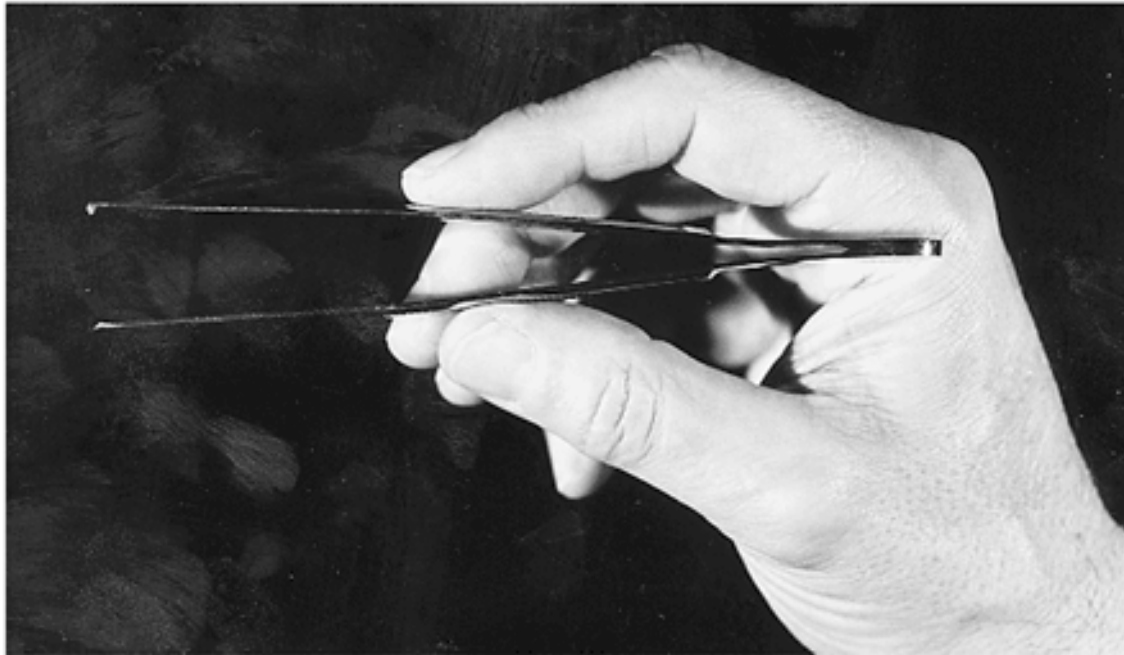
Place needle in needle holder



The needle should be held in the jaws of the needle holder at its midpoint (where the curve of the needle is relatively flat). This technique prevents you from bending the needle as it passes through the tissues.

Forceps. Hold the forceps like a writing utensil. The forceps is used to support the skin edges when you place the sutures. Be careful not to grab the skin too hard, or you will leave marks that can lead to scarring. Ideally, you should grab the dermis or subcutaneous tissue—not the skin—with the forceps, but this technique takes practice. For suturing skin, try to use forceps with teeth, which are little pointed edges at the end of the forceps.

Holding forceps



Hold the forceps as you would hold a writing instrument.

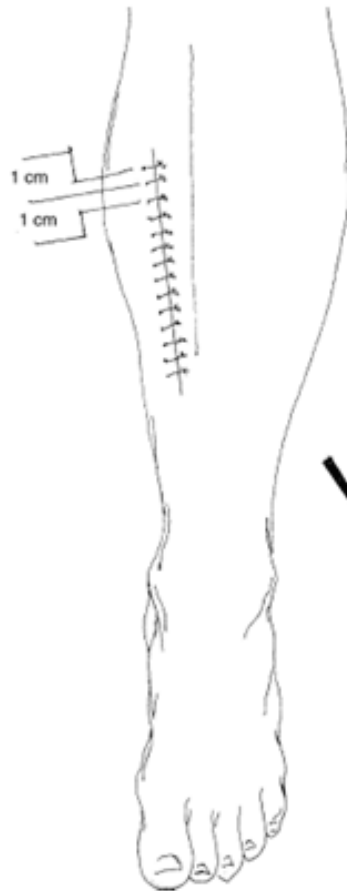
Placement of suture

- Bites should be about **4-5 mm from wound edges.**
- Sutures should be spaced about **5 to 7 mm apart**, enough to approximate the wound edges but not so tight to cause ischemic skin edges.

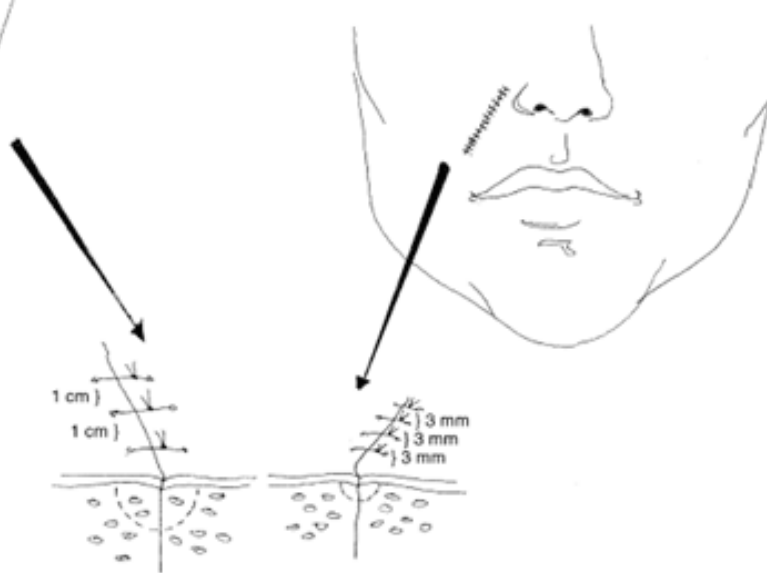
Placement of sutures

Placing the Sutures

For most areas of the body, except the face, the sutures should be placed in the skin 3–4 mm from the wound edge and 5–10 mm apart.



Sutures placed on the face should be approximately 2–3 mm from the skin edge and 3–5 mm apart. Sutures placed elsewhere on the body should be approximately 3–4 mm from the skin edge and 5–10 mm apart.



Procedure simple sutures

Start on the side of the wound opposite and farthest from you to ensure that you are always sewing toward yourself. By sewing toward yourself, the suturing process is made easier from a biomechanical standpoint.

Do not drive yourself crazy by placing too many sutures.

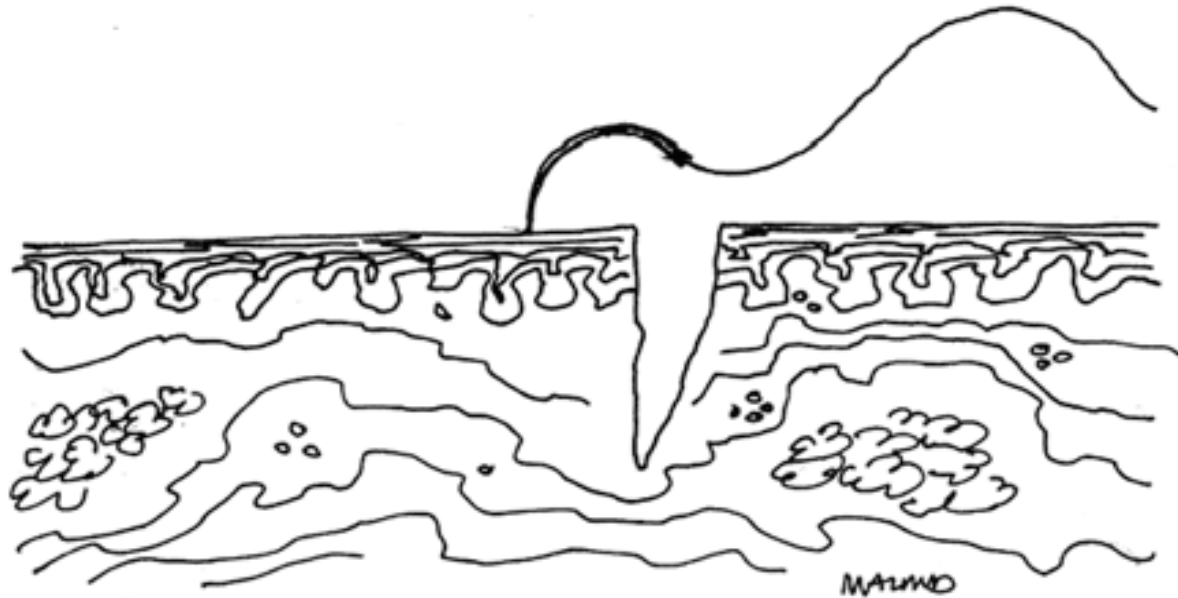
Simple Sutures

Indication. This technique is the easiest to perform. It is used for most skin suturing.

Technique

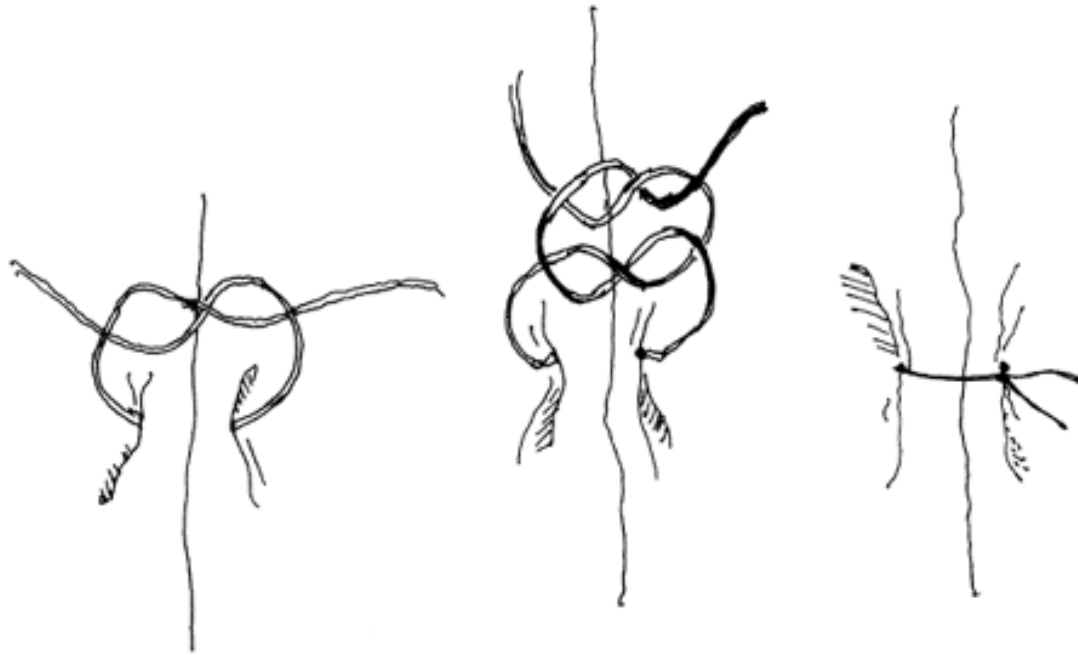
1. Start from the outside of the skin, go through the epidermis into the subcutaneous tissue from one side, then enter the subcutaneous tissue on the opposite side, and come out the epidermis above.
2. To evert the edges, the needle tip should enter at a 90° angle to the skin. Then turn your wrist to get the needle through the tissues.
3. You can use simple sutures for a continuous or interrupted closure.

Needle entering skin



The needle tip should enter the tissues perpendicular to the skin. Once the needle tip has penetrated through the top layers of the skin, twist your wrist so that the needle passes through the subcutaneous tissue and then comes out into the wound. This technique helps to ensure that skin edges will evert.

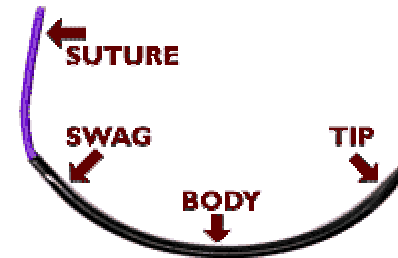
Simple suture



A simple suture.

Tips for better technique

- Grip swaged needles by the body and not by the swag to avoid needle damage.
- Loose approximation of wounds produce stronger wound margins because proliferative activity can occur in the wound clefts and proper wound edge alignment is encouraged



Knot throws

General Guidelines

The tensile strength of the suture material determines the number of throws for a knot.

- Silk:3 or more throws
- Absorbable braided:4 or more throws
- Monofilament (absorbable or nonabsorbable):
6 or more throws

Instrument ties are appropriate for all wounds except when tension must be carefully adjusted. In those cases, **hand ties** are indicated