

General principles

- Holding instruments
 - Hold the needle holder and scissors with a thumb and ring finger in the holes; hold the forceps like a pen
 - Use the dominant hand to grip the needle with the needle holder
 - Position of needle within needle holder teeth: the needle should be grasped at a right angle, two thirds of the way down, facing medially with the needle tip pointing upwards
 - Use the non-dominant hand to mainly hold the non-toothed forceps (used to bring the needle out from the other side of the wound). You can also use it to hold the needle directly if desired or hold the toothed forceps (if needed used to manipulate skin).
 - The needle should be held in the needle holder to enter skin; the non-toothed forceps should be used to bring the needle out of the centre/other side of the wound, before transferring it back to the needle holder for more suturing.
 - When tying a knot, the needle can be held by the non-toothed forceps (in your non-dominant hand) or your non-dominant hand's fingers directly
 - If you hold the needle directly, ensure you only hold the distal end to avoid risk of sharp injury
 - Never bring the needle out of the skin with your fingers
- Placing sutures
 - Suture so edges are slightly everted (it is the dermis contact that allows healing)
 - Do not constrict the tissue
 - In general, most sutures are performed 5mm wide from each wound edge and 5mm apart (except for face – 2-3mm wide and 3-5mm apart)
 - Note, in order to get the final sutures 5mm wide from each wound edge, you will need to go a bit wider because the skin will become compressed when pulled tight
 - Where possible, enter the side of the wound opposite and farthest from you (so you are bringing the needle towards yourself)
- Deep, gaping wounds will need deep absorbable sutures placed before closing the skin
- Sharp safety
 - If you need to hold the needle, only hold the distal end
 - When finished, clamp the sharp part of the needle inside of the needle holder to safely dispose of it

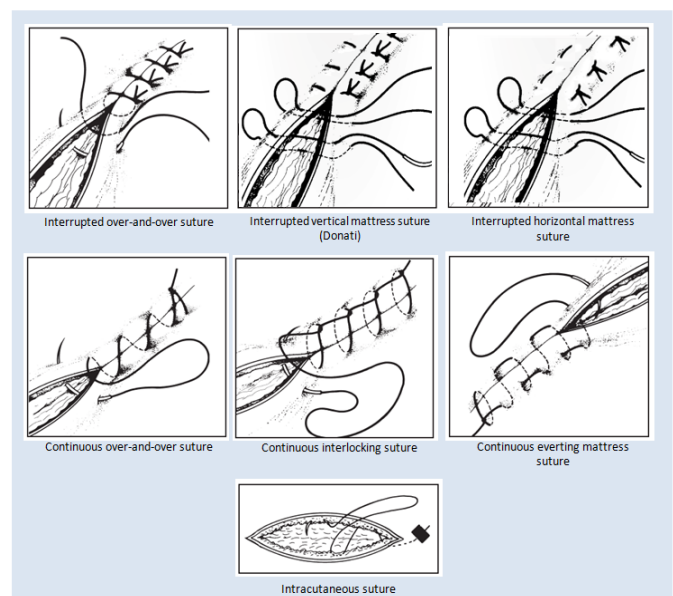
Techniques overview

Suture techniques

- Interrupted – permit precise adaption of wound edges; can be used anywhere; better if you are worried about the cleanliness of the wound
 - **Interrupted over-and-over suture** – most commonly used (see details below)
 - Interrupted vertical mattress suture – mattress sutures are good to help evert the wound edges if they are difficult to evert
 - Interrupted horizontal mattress suture
- Continuous – permit closer approximation of wound edges; prevent passage of bodily fluids (including blood); evenly distribute tension; wound must be clean and it must be easy to bring edges together; not commonly used for skin
 - Continuous over-and-over suture
 - Continuous interlocking suture
 - Continuous everting mattress suture
- Special sutures
 - Intracutaneous (subcuticular) suture – creates inconspicuous wound
 - Tendon suture
 - Cervical suture

Knot techniques

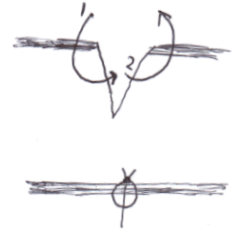
- Surgical reef knot
- Tying techniques
 - **Instrument ties** – most commonly used (see details below)
 - Two-handed
 - One-handed



Interrupted over-and-over suture

Most common technique used to close skin (use non-absorbable suture)

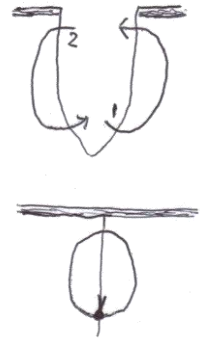
- Start in the middle of a linear wound, or at corners of a jagged wound
- Enter the skin at a 90° angle, about 5mm wide of the edge of the wound side farthest from you
- Then go about 5mm deep into the subcutaneous tissues before coming out the centre of the wound (optional – usually done for the first sutures but not as the wound edges become closer together)
- If you came out the centre: enter the subcutaneous tissues of the other side of the wound about 5mm deep
- Come out of the skin on the opposite side of the wound at a 90° angle about 5mm wide
- Pull the majority of the thread through the wound, leaving enough distally to tie a knot
- Tie knot (see details below)
- Start the process again for other sutures – place sutures about 5mm apart



Inverted subcutaneous suture

Most common technique used to close deep tissue (use absorbable suture)

- Enter into the deep aspect of the wound travelling with the needle towards the superficial dermis (but not entering it)
- Exit from the superior aspect of the inner wound
- Enter the superficial aspect of the other side of the wound, travelling from superficial to deep
- Come out at the deep aspect of the same side of the wound
- Pull the majority of the thread through the wound, leaving enough distally so you won't lose the end during knot tying
- Tie knot as usual (see details below)
- Start the process again for other sutures – place enough sutures to re-approximate the tissue



Instrumental knot tying

Most common knot tying technique

- Pull the majority of the thread through the wound, leaving enough distally to tie a knot
- Using your non-dominant hand, hold the needle with your fingers or with the non-toothed forceps (like you brought it out of the wound edge)
- Twist the needle end of the suture around the shaft of the needle holder in your dominant hand ('throws' below), then grip the end of the other end of the suture with the needle holders' teeth and secure by pulling each end in opposite directions. Do:
 - 2 throws away from self first
 - 1 throw in the opposite direction (towards self)
 - 1 final throw in the original direction (away from self)
- Cut ends about 5-10mm from knot
- Ensure knots are pulled to one side of the wound rather than overlying the centre (or they may get stuck in the granulation tissue and become difficult to remove)

Removal

- Face - 3-5 days
- Limbs/trunk/abdomen/scalp - 7 days
- High tension/diabetic/immunocompromised - 10-14 days

Types of sutures for skin

Size

- 3-0 (thick) – foot, over big joints, scalp
- *4-0 (medium) – hand, body, limbs
- 5-0 (fine) – face
- 6-0 (very fine) – child's face, delicate structures

Materials

Non-absorbable – for superficial sutures

- **Novafil™** (synthetic monofilament polybutester)
- ***Nylon** e.g. Ethilon™, Dermalon™, Monosof™ (synthetic monofilament polyamide)
- **Prolene™** (synthetic monofilament polypropylene)

Absorbable – for deep sutures

- ***Vicryl™** (synthetic polyfilament polyglactin)
- **Monocryl™** (synthetic monofilament polyglactone)

Polyfilaments are stronger but cause more inflammation and infection

Needles

- ***Curved cutting needle** – sharp tip and sharp edges, used for skin