

# HOW TO SUTURE

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Scared of needles?

Don't know your scissors from your scalpels?

Or just want to improve your skills?



Don't worry you've come to the right place! To run alongside the suturing courses we run throughout term time we have developed this new 'How To Suture' guide to help enhance your learning and provide a set of notes for students to use as a quick refresher of the suturing basics.






All information on our upcoming suturing courses will be available on the DUSS website:

<https://dundeesurgsoc.com/>

If you have any questions please contact DUSS via [duss@dundee.ac.uk](mailto:duss@dundee.ac.uk)

## 1. Equipment

NAME	USES	HOLD	PICTURE
<b>Needle Holder</b>	Used for holding sutures to make them easy to maneuver	Tripod Hold	 Image 1
<b>Artery Forceps</b>	Used to compress an artery to stem bleeding	Tripod Hold	 Image 2

<p><b>Toothed (Adson) Forceps</b></p>	<p>Used for handling dense tissue, e.g. during skin closures</p>	<p>Pincer/ Pencil Grip</p>	 <p>Image 3</p>
<p><b>Non-Toothed (Tissue) Forceps</b></p>	<p>Used for fine handling of tissue and traction during dissection</p>	<p>Pincer/ Pencil Grip</p>	 <p>Image 4</p>
<p><b>Mayo Scissors</b></p>	<p>Use depends on the type of mayo scissors. Straight scissors are used for cutting suture (“suture scissors”), while curved scissors are used for cutting heavy tissue (e.g., fascia).</p>	<p>Tripod Hold</p>	 <p>Image 5</p>
<p><b>Metzenbaum (Metz.) Scissors</b></p>	<p>More delicate than mayo scissors metzenbaum scissors are used for cutting delicate tissue (e.g., heart) and for blunt dissection.</p>	<p>Tripod Hold</p>	 <p>Image 6</p>
<p><b>Scalpel</b></p>	<p>Used for making incisions during surgery. Different blades have different uses * see image below table.</p>	<p>Fingertip Grip Pencil Grip Palm Grip</p>	 <p>Image 7</p>



**#10 Blade:** Used primarily for making large skin incisions, e.g., in laparotomy.



**#11 Blade:** Used for making precise or sharply angled incisions.



**#15 Blade:** Smaller version of #10 blade used for making finer incisions.

Image 8

## Suture Types

**Absorbable:** Catgut, Vicryl, Monocryl

- ↓ tissue reaction & likelihood of infection. May lead to wound failure if absorbed too quickly
- Used in skin & subcutaneous tissue

**Non-absorbable:** Surgical silk, steel, Nylon, Polypropylene

- ↑ tissue reaction & acts as permanent foreign body. Good strength & permanent support
- Used in prosthetic valves, hernia mesh fixation, tendon repairs, vessel anastomoses

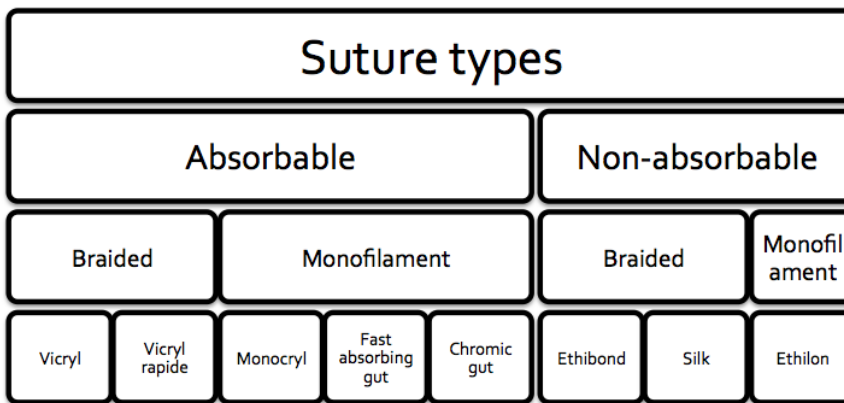


Image 9

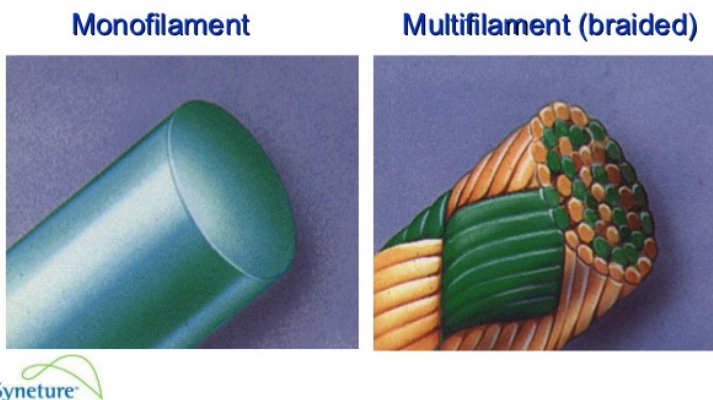
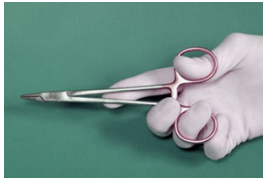

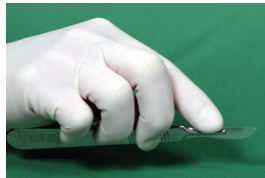



Image 10

## Holds

<p>Tripod Hold</p>  <p>Image 11</p>	<p>Pencil Grip</p>  <p>Image 12</p>	<p>Fingertip Grip</p>  <p>Image 13</p>	<p>Palm Grip</p>  <p>Image 14</p>
<p>Thumb and ring fingers through the handles, used for scissors, artery forceps and needle holders.</p>	<p>Handle resting on your finger with your index and thumb supporting. Allows for delicate incisions when using a scalpel. Used for scalpels and forceps.</p>	<p>Handle held only with fingertips, not touching palm. Allows for long straight incisions with a scalpel.</p>	<p>Handle gripped with fingers and pressed against palm. Allows for pressure to be applied when incising.</p>

## 2. Wound Management

### Wound Healing

When a person sustains a wound from trauma or injury, an intricate and dynamic wound-healing process is triggered.

The 4 distinct stages are -

- 1) Hemostasis (immediate)- This process causes bleeding to stop. In cases of significant injuries, additional steps may be needed to reduce the bleeding. These include pressure, elevation, tourniquet, or suturing
- 2) Inflammation (6 days) - This process aids in reducing the risk of infection. Beneficial enzymes and leukocytes (white blood cells) enter the wound area to facilitate inflammation during vasodilation. The physical traits of this stage are marked by redness at the wound site, pain, swelling and heat.
- 3) Proliferation (2+ weeks) - This process aids in forming granulation that consists of new connective tissue and blood vessels that replace the damaged tissue from trauma. The new tissue looks pink or red indicating normal wound healing.
- 4) Maturation/ Remodeling (2+ years)- This process promotes collagen production to regain tensile strength and skin elasticity leading to scar formation. Scar tissue is approximately 20% weaker and less elastic than pre-injured skin.

# Stages of Wound Healing

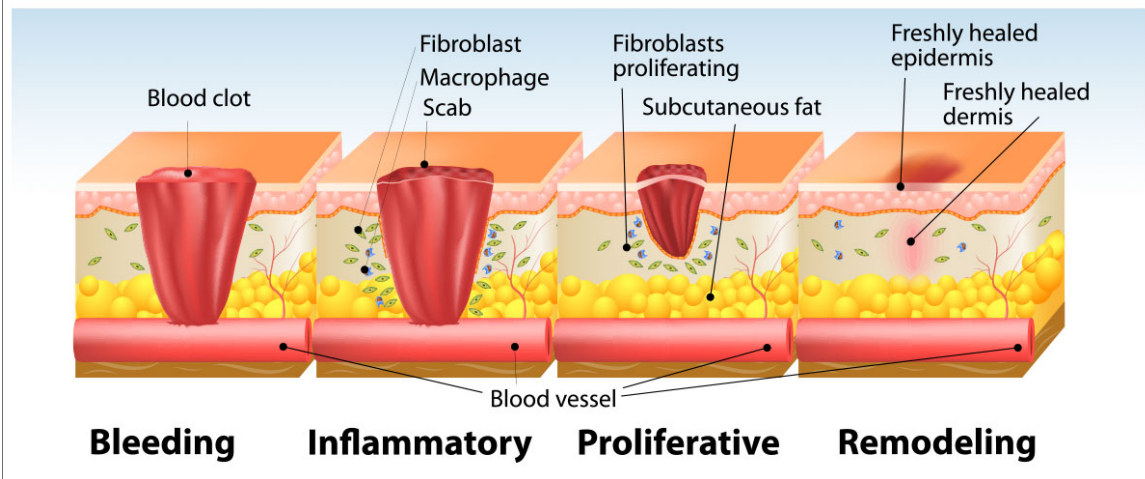


Image 15

## Wound preparation

Before closing the wound ensure that -

- 1) Bleeding is under control
- 2) Mechanical debridement of any necrotic or dying tissue
- 3) Clean / irrigate and removal of all debris.
- 4) Revise necrotic wound margins.
- 5) Ensure all deeper structures are repaired such as tendons, vessels.
- 6) Ensure correct anaesthetic– local/general

## **Importance of Debridement**

- This process involves the removal of non-viable tissue from the wound bed to encourage wound healing.
- The best type of debridement depends on your wound, age, overall health and risk of complications.

Types of debridement <sup>1</sup>	
<b>Sharp</b>	Uses surgical tools such as curettes, scalpels, or scissors to cut away devitalized tissue quickly and efficiently.
<b>Autolytic</b>	Uses occlusive dressings to provide a moist wound environment that promotes wound bed cleaning via patients' own phagocytic cells and proteolytic enzymes.
<b>Chemical</b>	Uses enzymatic agents to degrade and chemically digest necrotic tissue and cellular debris; includes fibrinolysin/DNAse, collagenase, streptokinase/streptodornase, and papain/urea.
<b>Mechanical</b>	Uses methods such as wet-to-dry dressings, hydrotherapy, and irrigation to remove debris from the wound bed.
<b>Biologic</b>	Uses fly maggots to liquefy / ingest necrotic tissue; also produces a bactericidal effect.

Image 16

## Suturing in wound management

Indication	Contradictions
<ul style="list-style-type: none"> <li>- Clean wounds with minimal skin loss allowing for closure under minimal tension</li> <li>- Securing drains/lines to prevent loss (e.g. central lines, intercostal drains)</li> <li>- Operative closure</li> </ul>	<ul style="list-style-type: none"> <li>- Do not close actively infected or grossly contaminated wounds</li> <li>- Animal bites- require operative washout +/- debridement</li> <li>- Novices should avoid facial suturing if little experience</li> <li>- Do not close wounds if you suspect significant underlying vital structure</li> </ul>

	<p>damage e.g. nerve/tendon/vessel</p> <ul style="list-style-type: none"> <li>- Avoid closing wounds with significant skin loss as this may place undue tension on the wound. - ask a senior for help or discuss with the appropriate speciality e.g. plastic surgery</li> </ul>
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### 3. Suturing Techniques

The purpose of suturing is to enhance the healing of a cutaneous wound in which the two sides of skin are far enough apart that the healing process could be difficult. Suturing can reduce scarring and the risk of infection therefore allowing wounds to heal properly, there are different techniques for different types of wounds, the main styles are demonstrated in this guide.

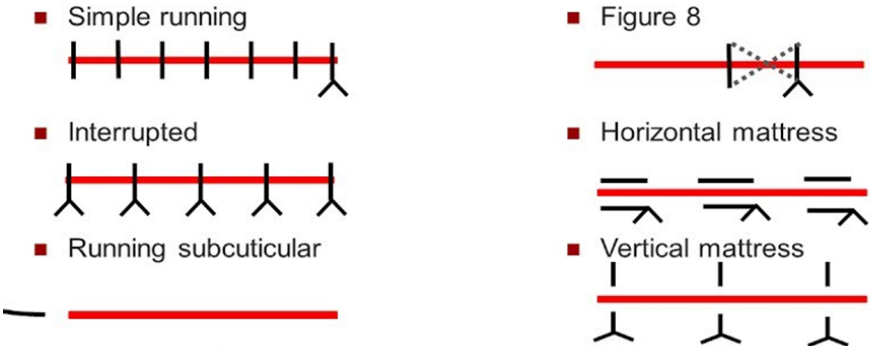


Image 17

#### Interrupted

<https://www.youtube.com/watch?v=z8oWv-nVO6g&t=100s>

Used for uncomplicated laceration repair & wound closure

- Easiest technique to learn
- Closes wound cleanly & securely
- Maintains integrity even if one stitch breaks
- Slow to apply

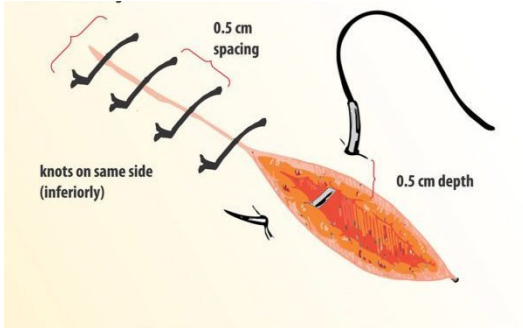


Image 18



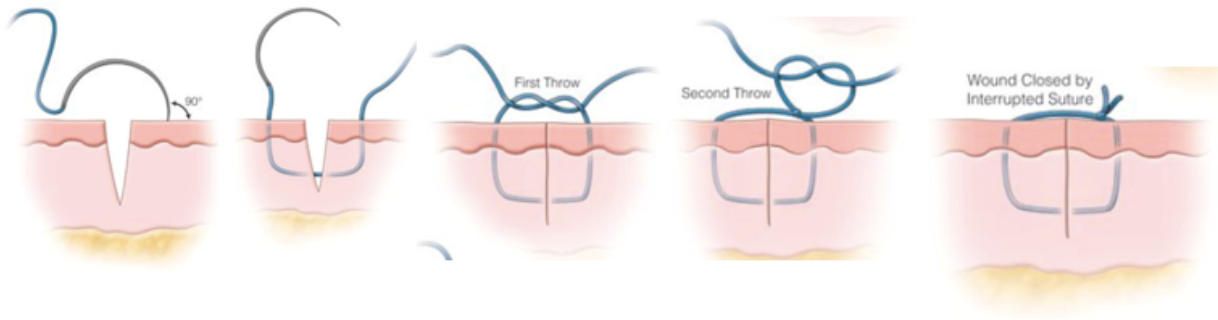
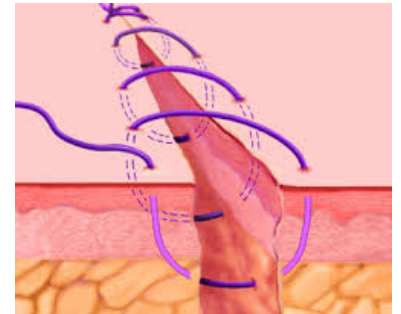
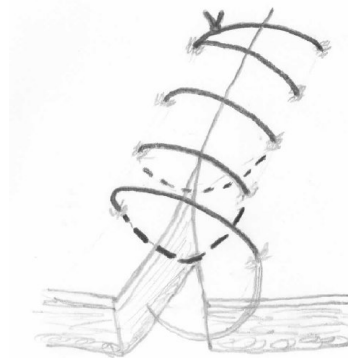


Image 19

### Simple Running

<https://youtu.be/o5EKmHAJiuw>

- Quick
- Less scarring without the knots
- Good for long wounds
- Can lose integrity if one loop is broken

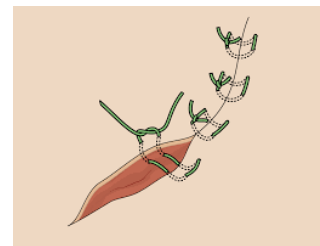
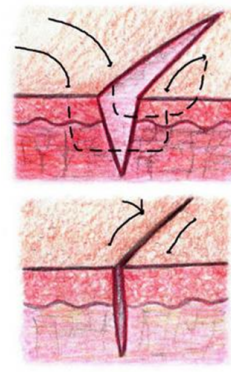


Images 20 and 21

### Horizontal mattress

<https://youtu.be/6qF4mxB7KzM>

- Used for deep wounds and or wounds under tension.
- Good for wound edge eversion & approximation
- Good haemostasis
- More complex to insert

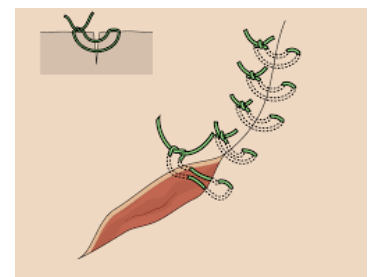
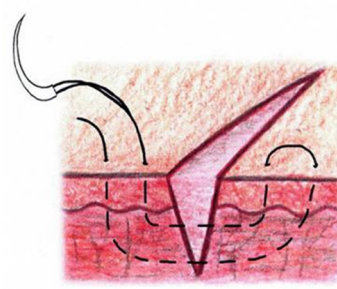


Images 22 and 23

### Vertical mattress

<https://youtu.be/-Sa7VMcMCJA>

- Used for deep wound and or wounds under tension
- Reduces wound tension & gives better support when delayed healing is expected
- Risk of cross-hatching



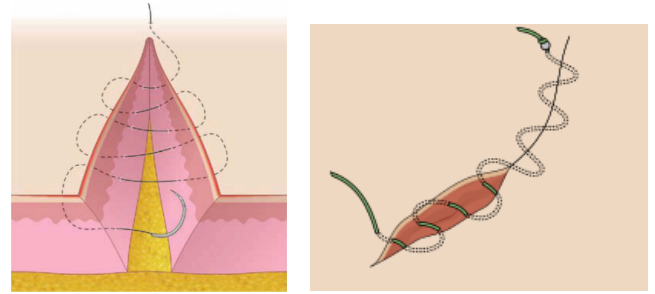
Images 24 and 25



## Running Subcuticular

<https://youtu.be/RN991nUXhC4>

- Better cosmetic result
- Allows for tight closure of wound
- Complete suture with Aberdeen knot or Z stitch
- stitch



Images 26 and 27

# 4. Knot Tying Techniques

## Knot application basics

- Complete knot should be tight, firm and tied so that slippage does not occur
- To reduce infection risk, knot should **not** be placed in incision line
- Knots should be small and ends cut short (2-4mm)
- Avoid excessive tension to finer gauge materials as breakage may occur

## Learning different types of knots

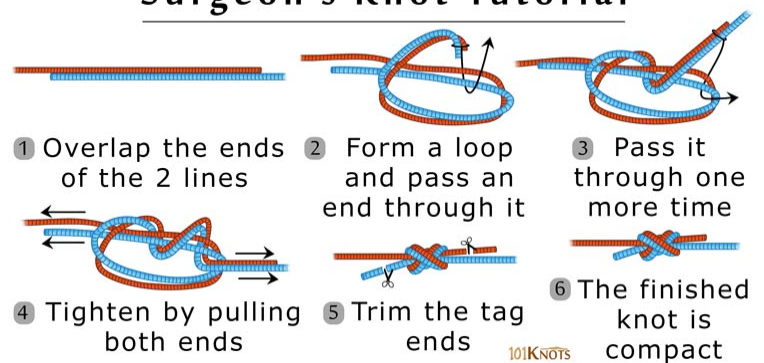
- Knot tying skills can be learnt through online videos as they demonstrate a step-by-step process.
- **TIP**: Practice Practice Practice !

## Surgeons knot

The surgeon's knot is a modified reef knot with an extra twist in the first throw which increases the tensile strength of the knot, surgeons will then normally follow this knot with a few more throws to secure it in place.

Image 28

## Surgeon's Knot Tutorial



Video Guide - [https://www.youtube.com/watch?v=zoo4OQoHaz8&feature=emb\\_title](https://www.youtube.com/watch?v=zoo4OQoHaz8&feature=emb_title)

## Square knot/ Reef knot

Although not as strong as the surgeon's knot, square knots are commonly used to secure sutures as it is an easy reliable knot to create.



Image 29

Video Guide - <https://www.youtube.com/watch?v=yuNONWr6jFA>

## Aberdeen knot

Used for tying of subcuticular sutures.

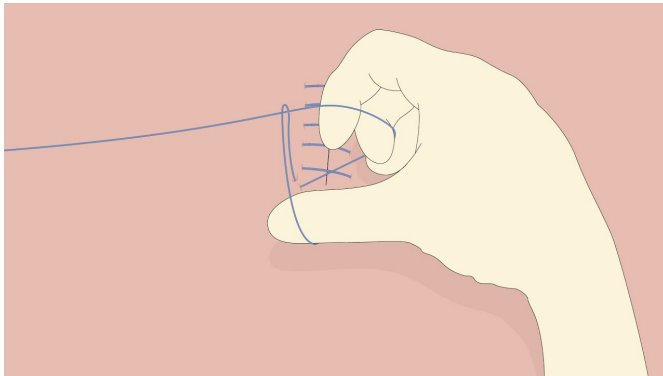


Image 30

Video Guide - <https://www.youtube.com/watch?v=tRX5cyZMISA>

# Reading guide reference

- Suture like a Surgeon: A Doctor's Guide to Surgical Knots and Suturing Techniques used in the Departments of Surgery, Emergency Medicine, and Family Medicine

LINK - free on kindle (<https://www.amazon.co.uk/Suture-like-Surgeon-Techniques-Departments/dp/1698150857>)

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## Image Links

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