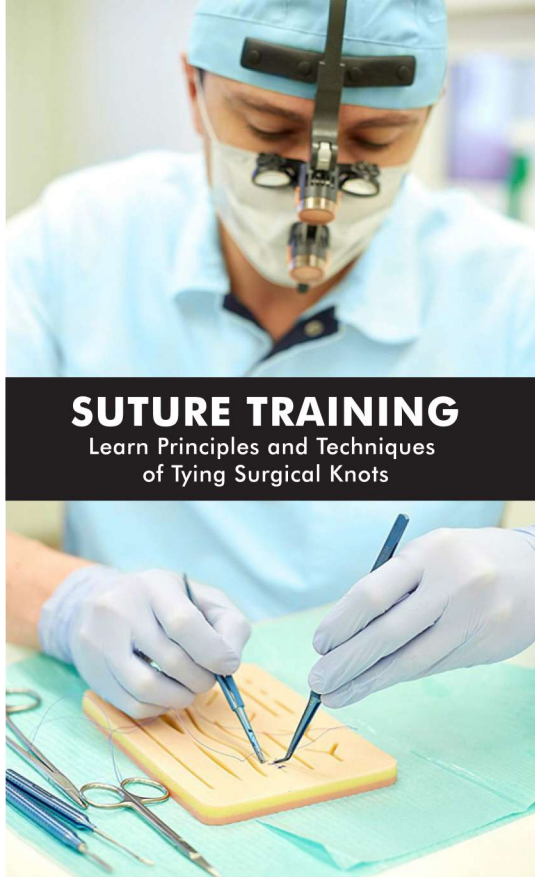


Thank you

We hope that you found this guide helpful in advancing your suturing skills and we wish you all the best in your career!



## SUTURE TRAINING

Learn Principles and Techniques of Tying Surgical Knots

### GENERAL METHOD OF TYING A KNOT

- The strand that contains the needle is generally referred to as the long strand, and the other free end is referred to as the short strand.
- The long strand is wound around the tip of the needle holder. This is referred to as a 'throw'. Depending on the type of knot, the number of throws and direction can vary.
- After the 'throw', the needle holder is used to grasp the short strand.
- The long strand is then pulled to the right, and the short strand to the left to tighten the knot.
- After the next 'throw', the short strand is grasped again with the needle holder.
- The two strands are then pulled in opposite directions, the long strand being pulled to the left and the short strand to the right.
- The above process is repeated until the requisite number of throws has been taken.
- For each throw, the direction of pulling the strands must change.
- Each successive tie must be squarely placed on the first one.

Some commonly used knots are described below.

#### Square knot/Reef knot

- Two throws around the needle holder clockwise
- One throw around the needle holder anticlockwise
- Another throw around the needle holder clockwise

#### Surgeon's knot

- Two throws around the needle holder clockwise
- One throw around the needle holder anticlockwise

#### Granny's knot

- One throw around the needle holder clockwise
- Another throw around the needle holder clockwise
- Third throw around the needle holder anticlockwise- this is optional.
- This knot is inherently weaker than the above two knots and is not frequently used. It is useful when one wants to adjust the degree of tension on the knot.



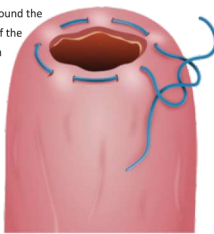
#### Aberdeen knot

The Aberdeen knot is used at the end of continuous suturing technique. In this technique, the short strand does not exist, and instead, the previous section of suture is made into a loop. This knot is best made with hand ties, but instruments may be used if required.

### PURSE-STRING SUTURES

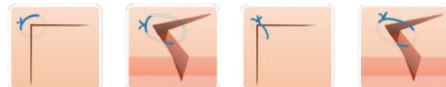
This technique is used to suture 'round' defects. Depending on the size, and the extent of undermining the adjacent tissues, it may not be possible to close the defect entirely, but the size of the defect can be shrunk. This technique produces puckering of the surrounding skin, and may not be acceptable in esthetic areas. It is, however, particularly useful in deep organs, such as in sealing off intestinal defects.

- In this technique, sutures are placed serially around the defect. It is best to start and finish at the side of the wound that is close to you, so that the knot can be placed securely.
- The wound edge on the side of the defect nearest to you must be grasped. A bite is taken through the skin horizontally. The exit bite through the skin is made parallel to the defect, to the right of the original bite.
- This procedure is repeated in an anti-clockwise direction around the wound, till the final exit bite is close to the initial point.
- Both ends of the thread are pulled together to close the defect. An instrument may be used to invert the edges of the wound, so that the defect is obliterated on pulling the two ends of the suture thread together.
- The knot is then placed and tightened.



### HALF-BURIED HORIZONTAL SUTURE

- Although this technique is a variation of the horizontal mattress suture, it is mostly used for situations where three points or flaps need to be approximated. It is also known as the tip suture or three-point corner suture.
- Edge 1 of the wound is grasped and everted.
- The needle is passed through the skin and subcuticular tissue on this side.
- The needle is crossed over to edge 2. Rather than taking a bite at 90° to the tissue, a bite is taken parallel to the tissue in the subcuticular plane. The skin is not pierced.
- The needle is crossed back over to edge 1, and a bite is taken through the subcuticular tissue and skin. This bite may not be taken in edge 1 in cases of a three-cornered flap. Instead the bite would be taken through the third flap.
- The knot is placed and secured.



CORNER STITCH

CORNER STITCH

### Dissecting Forceps

There are two main types of forceps available. Toothed forceps are intended for tougher tissue such as fascia or skin, while non-toothed (atraumatic) forceps should be used for delicate tissues such as bowel and vessels.

- Hold gently between thumb and fingers, the middle finger playing the pivotal role.
- Never crush tissues with the forceps but use them to hold or manipulate tissues with great care and gentleness.



### Scalpel Handle

Scalpels are used for incising the skin, and a wide range of blade shapes and types is available depending on the tissue to be incised.

- Hold gently between index finger and thumb.
- Incise the skin by holding the scalpel at an angle of 90° to the skin.



### Needle Holder

There are different types of needle holders depending on the type of suturing. For delicate, fine suturing use a fine short-handled needle holder and an appropriate needle. Suturing at depth requires a long-handled needle holder.

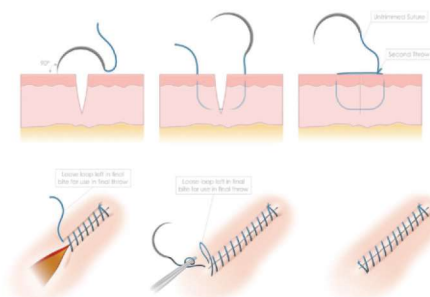
- Hold in a similar manner to scissors.
- Place on vessels using the tips of the jaws.
- Use the ratchet lock to secure the position.



### CONTINUOUS SUTURES

As the name suggests, all the stitches are connected. This method is used for superficial wounds that are long and may take time to close.

- The same technique given for interrupted suturing is followed.
- After knot placement, only the short end of the suture thread is cut, and the thread that contains the needle is left intact.
- Edge 1 is grasped and everted, and the skin-subcutaneous tissue is pierced again.
- Edge 2 is grasped and everted, and the needle is brought out through the subcutaneous tissue and skin.
- The process is repeated successively from edge 1 to edge 2 till the end of the wound is reached. The last section must be left loose, because this 'loop' serves as the free end of the suture.
- To place the knot, the previous section of suture thread is grasped, and the loop is pulled through. Cut all ends.



### CONTINUOUS LOCKING SUTURES

This is a variation of the continuous suture.

- Follow the same technique as given for continuous suture.
- After the needle comes out through the skin of edge 2, the needle must be withdrawn 'within' the thread, that is, through the loop preceding it. This will create a locked loop.
- Repeat the locking process after each bite through edges 1 and 2.
- The last section need not be locked, and is left loose so that it can be used for knot placement.

### Body Type: The needle body can be round or cutting.

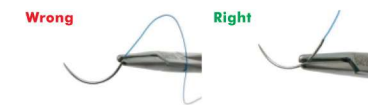


Round body

Reverse Cutting Body

### Holding the Needle

Surgical needles present a specially designed body that allows a perfect hold when grasped by the needle holder. In order to avoid bending of the needle, hold it with the needle holder at 2/3 of the needle length as shown in the pictures.

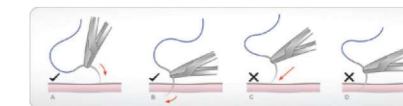


The Bite

- The entry bite and exit bite must be at the same distance from the wound edge, so that the suture will be uniformly placed across the wound. Unequal distances on either side would lead to overlapping of one margin over the other.

- Likewise, the entry and exit bite must also be at the same depth in order to maintain uniform height across the wound. This can, however, be exempted depending on the technique. For instance, dermal-subdermal sutures require suturing of two different layers to each other and therefore the depth of the entry and exit bite would vary.

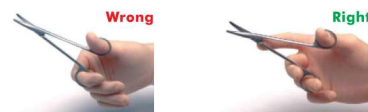
- The bite must always go from the
  - Movable tissues to fixed tissues
  - Thinner tissues to thicker tissues
  - Deeper tissues to superficial tissues



### Scissor

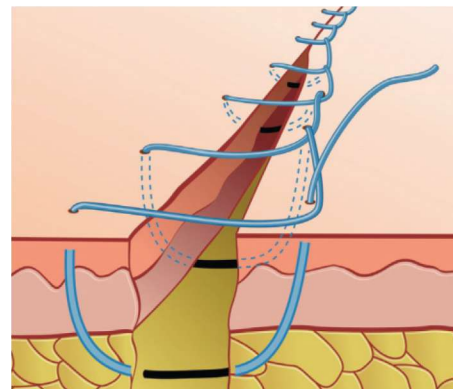
There are 2 types of scissors depending on the material to be cut. One is for soft tissues and the other is for firmer tissues such as sutures.

- Insert the thumb and ring fingers into the rings of the scissors so that just the distal phalanges are within the rings.
- Use the index finger to steady the scissors by placing it over the joint.
- When cutting tissues or sutures, especially at depth, it often helps to steady the scissors over the index finger of the other hand.
- Cut with the tips of the scissors for accuracy rather than using the crutch which will run the risk of damaging tissues beyond the item being divided and will also diminish accuracy.



### Suture Practice Pad

Our Suture Pad has a realistic feel and provides the best human tissue simulation possible. It is designed to replicate the anatomical structure of human skin and its underlying subcutaneous tissue, consisting of three layers of material simulating skin, fat and muscle. In addition, the stabilising mesh that we have embedded inside of our pad, makes our p-rudore less prone to ripping than other pads on the market.



### HORIZONTAL MATTRESS SUTURES

- This suture produces a pronounced 'eversion' of wound margins after suturing, and is therefore used in cases where strong, secure approximation of wound margins is required.
- Edge 1 of the wound is grasped and everted.
- Pass the needle through the skin and subcutaneous tissue of edge 1, and bring it out through the subcutaneous tissue and skin of edge 2 as described previously.
- After this, the needle must be reoriented 'backwards' in the needle holder.
- The needle is then passed backwards, through the skin and subcutaneous tissues of edge 2. The point of entry of the needle at edge 2 must be horizontally across the exit point of the initial bites.v
- The needle is then passed through the subcutaneous tissues, and skin of edge 1. The exit point of the needle at edge 1 must again be horizontally across the entry point of the initial bite. The knot is placed as described in the previous section, and both ends of the thread are cut 0.8 to 1 cm away from the knot.



## Introduction

When tying, the surgeon should follow a number of basic principles:

- The knot has to be firm in order not to slip.
- The knot should not be too tight in order to allow post-operational edema and inflammation.
- Avoid excessive tension as it could break the suture or cut the tissue.
- After the first throw, enough traction should remain on one end of the strand to prevent it to loosen when tying the second throw.
- Extra knots do not add to the strength of a properly tied knot. They only contribute to its bulk.
- Knots should be as small as possible in order to minimize the reaction to foreign body material in case of nonabsorbable sutures, or to prevent an excessive amount of tissue reaction when absorbable sutures are used.
- Avoid sawing (friction between strands) of threads when tying in order not to weaken the suture.
- Avoid damage to the suture material when handling. Avoid the crushing or crimping application of surgical instruments to the strand except when grasping the free end of the suture during an instrument tie.

## Preparation

Suturing is the art of joining tissues together using a needle and a thread. Suturing requires three or four basic instruments. The following list gives the basic armamentarium required for suturing:

### Gather the necessary equipment:

- Suture Practice Pad to Practice the Suturing Techniques
- Tissue Forceps: opens up wound and allows clear vision of the needle's puncture site
- Needle Holder: To prevent the spread of germs, the needle must always be held by the needle holder rather than being held with your hands.
- Needle with Thread: The choice of the needle size and thread type depend on the reason for performing a suture and the nature of the wound.



### SUTURE MATERIAL AND NEEDLE SIZES

Both the suture material and the needles come in various sizes which are numbered. As the number increases, the size of the needle and material is decreased. The use of various sizes of sutures is detailed in the table below.

SUTURE SIZE	USES
0-0 and 1-0	Abdominal wall closure, securing drains.
2-0 and 3-0	Closure of thick skin, fascia, muscles and tendon repair.
4-0 and 5-0	Skin closure in esthetic areas (hands, feet, face), skin closure in pediatric patients.
6-0 and 7-0	Plastic surgery procedures on hands, face, lips etc. Vessel repair.
8-0 to 11-0	Ophthalmic surgery and microsurgery.

The advantages and disadvantages of the more common techniques of suturing are summarized below:

TYPE OF SUTURE	ADVANTAGES	DISADVANTAGES
Interrupted sutures	Each individual suture can be removed without compromising the entire wound closure High tensile strength	Requires more time for placement More prone to infection as each suture has its own knot
Continuous suture	Faster method	Entire wound closure is compromised if the material breaks at a single point
Mattress sutures	Better apposition of wound edges, which leads to better eversion and closure of dead spaces	Time consuming
Subcuticular sutures	Cosmetically appealing	Difficult to place in curved or uneven wounds



### Use And Safety Disclaimer Notice

Warning: This is not a Medical Device. Our products are non-sterile, and not intended for personal care or patient care. We prohibit the use of these products on humans or animals. Objects are sharp and to be used only by adults or students over the age of 16. Please store out of reach from children and pets. Please do not run, play, swallow or any other action not in line with general universal safety precautions. This product is for training and educational purpose only. Dental Point Products and it's affiliates are not legally responsible for any misuse, damages, incidents or accidents that may occur while using this product.