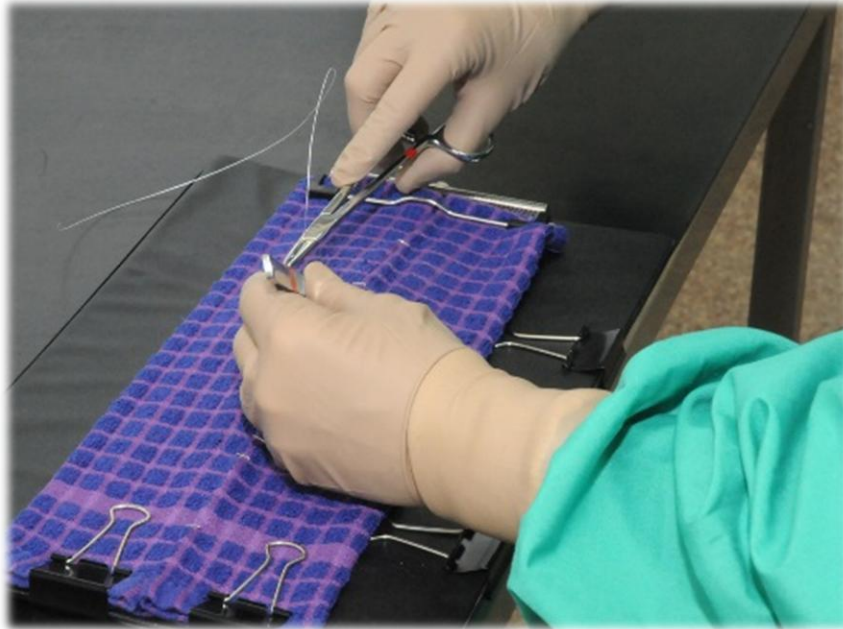


Simple Interrupted Suture (using a tea towel)



Disclaimer

A series of booklets (instructions for skills and flipped classroom materials) has been developed by the Clinical Skills Lab team (staff, recent graduates and students) from Bristol Veterinary School, University of Bristol, UK.

Please note:

- Each flipped classroom booklet includes ways to prepare for learning a skill in class; it is acknowledged that there are often other approaches. Before using the booklets, students should check with their university or college to determine whether the approaches illustrated are acceptable in their context or whether an alternative resources should be used.
- The booklets are made available in good faith and may be subject to changes.
- In using these booklets, you must adopt safe working procedures and take your own risk assessments (as and when appropriate), checked by your university, college etc. The University of Bristol will not be liable for any loss or damage resulting from failure to adhere to such practices.

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Equipment list:

Simple Interrupted Suture

Equipment for this station:

- Tea towel suturing model
- Needle holders (Mayo or Gillies)
- Rat tooth forceps
- Mayo scissors
- Suture material (*usually a reel of nylon suture material is used in the clinical skills lab; sometimes packs with a swaged needle are available*)
- Needle – use a triangular cutting needle for skin (and tea towel)
- Gloves (*use non-sterile vinyl gloves in Clinical Skills Lab*)
- Stitch removal scissors

Study by the Bristol Clinical Skills Lab team found that students learned to suture as well on the tea-towel as on a silicon pad. Baillie S, Christopher R, Catterall AJ, Kruidenberg A, Lawrenson K, Wonham K, Kilfeather P, Warman S. (2020) Comparison of silicon skin pad and tea towel models for learning a simple interrupted suture. J Vet Med Educ. 47(4):516-522. <https://doi.org/10.3138/jvme.2018-0001>



Considerations for this station:

- It is important to handle all the instruments correctly; refer to the booklet 'CSL_SP06 Surgical Instruments' for the correct technique
- When selecting suture materials refer to the booklet 'CSL_SP07 Removing Suture Material from a Cassette or Pack'
- Swaged needles must be disposed of in a sharps container
- Other needles should be re-used (unless blunt or bent in which case dispose of in a sharps container)
- Needles are sharp and can cause injury
- Consider practising suturing wearing gloves (use the non-sterile vinyl gloves in the Clinical Skills Lab to reduce cost)

Anyone working in the Clinical Skills Lab must read the 'CSL_I01 Induction' and agree to abide by the 'CSL_I00 House Rules' & 'CSL_I02 Lab Area Rules'

Please inform a member of staff if equipment is damaged or about to run out.



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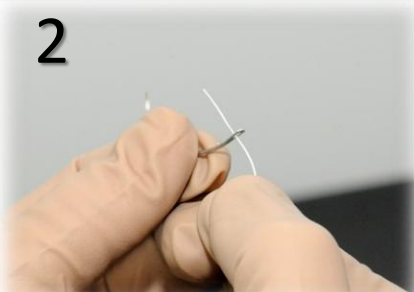
Simple Interrupted Suture

1



Remove suture material from the cassette or open suture material packaging – see booklet 'CSL_SP07 Removing Suture Material from a Cassette or Pack'.

2



If using separate needle and suture, thread the needle. Press the suture material back around the eye of the needle firmly (or double thread the eye, which may be acceptable under certain circumstances) to avoid the suture material coming off.

3



Grasp the needle with the needle holders approximately 1/3 of the way along its length (from the eye or swaged end). If the tissue is tough it may help to hold the needle closer to the point.

4



Hold the rat tooth forceps in your non-dominant hand and lift the far edge of the incision, near where the first suture will be placed.

N.B. Refer to the booklet 'CSL_SP06 Surgical Instruments' for correct instrument handling techniques.

5



Start suturing at the end of the incision nearest to your dominant hand i.e. right end if right handed, and insert the needle on the far side of the incision.

6



Hold the needle holders with the palm of your hand facing towards the skin (tea towel).



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Clinical Skills:

Simple Interrupted Suture



Pierce the tea towel (skin) approximately 5mm away from the edge with the needle at a right angle to the incision and pointing towards you.

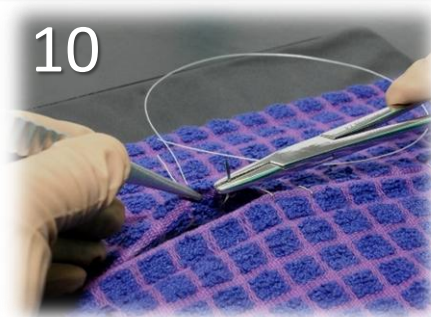


Grasp the near edge of the incision with the forceps close to the place where the needle is to enter.



Redirect the needle within the incision, through the subcutaneous tissue and out of the skin on the near side. The needle should emerge approximately 5mm away from the edge of the incision.

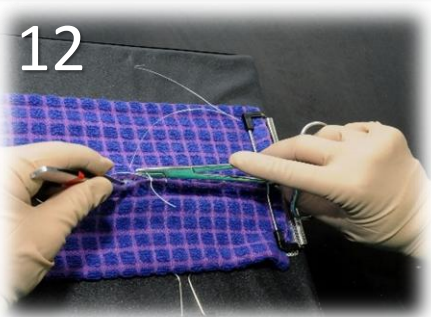
Note: Push the needle far enough through the skin to then be able to grasp the needle on the body not just at the tip.



Note: If closing a large wound or the skin is particularly thick it may be helpful to bring the needle out fully in the middle of the incision and then re-insert the needle in the incision on the near side.



Grasp the section of the needle exiting the skin.
N.B. Avoid grasping just the needle tip.



Pull the needle all the way through. As the needle passes through the skin and tissues roll your wrist.

Note: Rolling your wrist will help minimise tissue damage caused by trying to force or 'tug' the needle through the tissue.

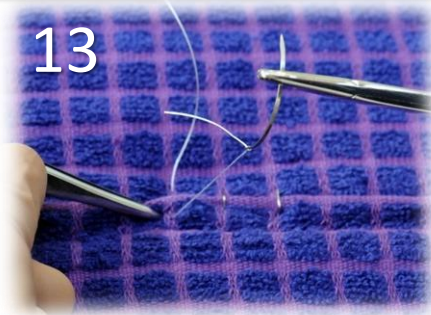


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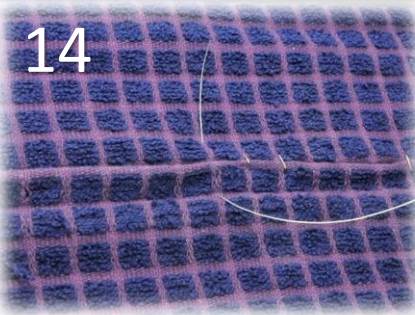
Simple Interrupted Suture

13



Continue to pull the suture material through the tissue and skin.

14



Stop pulling when there is approximately 3-4cm of suture material remaining on the opposite (far) side of the incision.

Note: Avoid leaving a long end, it makes it harder to tie the knot.

15



Hold the needle and suture material in your non-dominant hand

16



Place the needle holders over the incision between the two ends of suture material.

17



Wrap the 'needle end' of the suture material once or twice (as above) around the needle holders (**once** to tie a square knot or **twice** to tie a surgeon's knot - see 'Knots and Throws' guide later in this booklet).

18



Use the needle holders to grasp the short end of suture material near the free end.



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Clinical Skills:

Simple Interrupted Suture

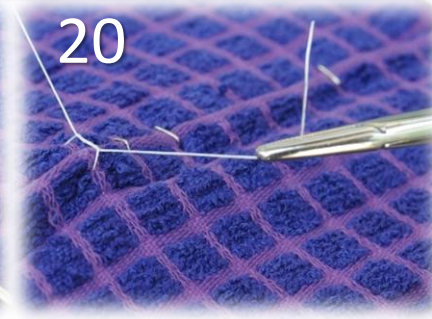
19



Pull the short end (held by the needle holders) towards yourself and through the loop around the needle holders while also moving the hand holding the loose thread (with needle) away from yourself.

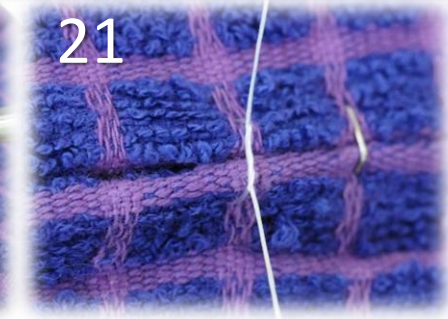
Note: Move both hands simultaneously while pulling the free end of the suture material through the loop.

20



Pull evenly with both hands to maintain an even tension.
Note: If you don't pull evenly, the first part of the knot will start with a 'half hitch'. These knots are more prone to slipping and will be less secure - see 'Knots and Throws' guide later in this booklet.

21



Stop pulling when the knot is lying flat across the incision. The suture should be tight enough to appose the wound edges but not too tight to cause discomfort.
Note: The short end of the suture material is now on the near side of the incision.

You have now completed the first throw of the knot.

22



Don't tie the knot too tightly. Remember that in the living animal, minimal tension must be placed on the skin otherwise post-operative swelling, redness and discomfort may occur, which can impede wound healing.

23



Once again place the needle holders over the incision and knot. Wrap the needle end of the suture material **once** around the needle holders.

24



Grasp the short end of the suture material with the needle holders and pull ('draw') it back through the loop around the needle holders.

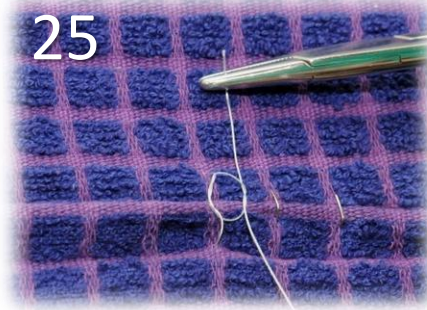
Note: The short end of the suture material will then be on the opposite (far) side of the incision.



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Clinical Skills:

Simple Interrupted Suture



25

This time move and pull the short end of the suture material (held by the needle holders) away from yourself and pull the other end (with needle attached) towards yourself. Pull evenly otherwise the knot will become asymmetric.

Note: This action is in the opposite direction to the previous throw.



26

Tighten the knot by pulling evenly i.e. continuing to apply gentle, even pressure.

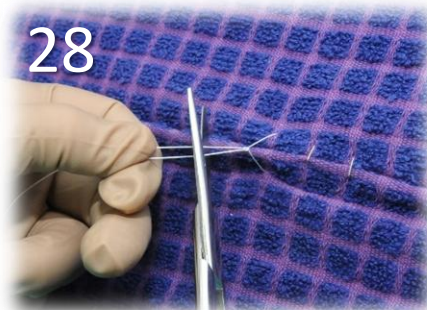
You have now completed the second throw of the knot.



27

Add extra single throw/s as required (see 'Knots and Throws' guide later in this booklet) for additional security.

Each time: Place the needle holders over the incision and knot, wrap the suture material **once** around the needle holders, grasp the free end, pull it through the loop and tighten the knot.



28

Cut the ends of the suture material to approximately 1cm. Cut both ends together, rather than singly, to avoid uneven tension being applied. Use needle holders (if they have blades) or mayo scissors.

Note: The suture ends need to be left long enough to grasp and hold when removing the sutures.



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Resetting the station: Simple Interrupted Suture

1. Remove all the sutures from the tea towel using the **stitch removal scissors**
2. Put waste suture material and any packaging in the bin
3. Needles
 - If using a swaged needle, place in a sharps bin
 - Other needles should be re-used (unless blunt or bent in which case dispose of in a sharps bin)
4. Place instruments in the tray provided
5. Leave the area tidy

Station ready for the next person:



Please inform a member of staff if equipment is damaged or about to run out.

Instrument ties

Square Knot and Surgeon's Knot



Definitions

There are many different words you will need to be familiar with when discussing suture, suturing and surgical knots. Sometimes people in practice use the terms throws / loops / wraps to all mean the same thing which can be confusing. We have defined how **we** will use these terms when teaching you how to place secure surgical knots:

- **Suture material** = surgical thread used to create surgical sutures and/or ligatures.
 - (e.g. Nylon)
- **Suture pattern** = the pattern used to close tissues during surgery
 - (e.g. simple interrupted, simple continuous, cruciate and intradermal)
- **A Throw** = Square/surgeon's knots are made up of first and second throws with extra throws on top to secure the preliminary knot. Each throw may have one or more loops/wraps around the needle holder. Throws usually go in opposite directions to each other.
- **A Surgical knot** = a combination of throws of surgical suture used to create a knot that is secure and unlikely to undo.

N.B. Loops / wraps are all used typically to mean the same thing, but it is best to think of throws in terms of the direction you are taking the suture.



Clinical Skills

Knots and Throws

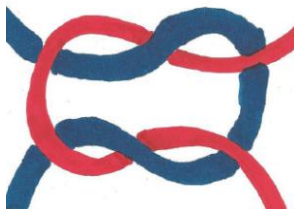
Square Knot & Surgeon's Knot

Different surgeons have different preferences for the knots they use in different circumstances. Below are two approaches.

Square knot:

1st throw = single wrap/loop

2nd throw = single wrap/loop
(1+1)

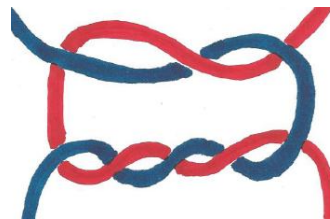


Surgeon's knot:

Surgeon's throw = double
wrap/loop

2nd throw = single wrap/loop
(2+1)

The double wrap of the first throw gives extra friction which is useful when working with slippery suture material.



Total numbers of throws (T) (Numbers of loops per throw)		Square Knot (2T) (1+1 = 2L)	Surgeon's Knot (2T) (2+1 = 3L)
Simple Interrupted pattern		3T (1+1+1=3L)	4T (2+1+1+1=5L)
Simple continuous pattern (subcutaneous or linea alba)	Start	4T (1+1+1+1=4L)	5T (2+1+1+1+1=6L)
	End (1 more throw than starting knot)	5T (1+1+1+1+1=5L)	6T (2+1+1+1+1+1=7L)

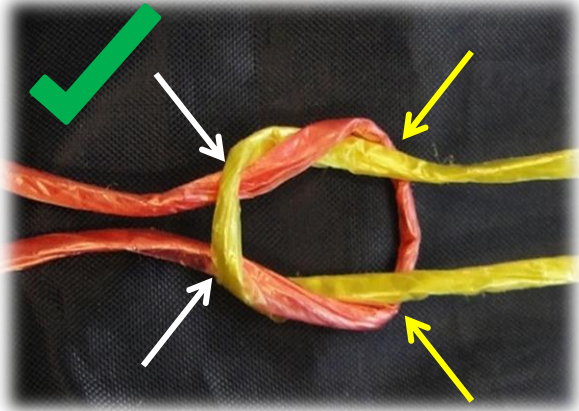


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Clinical Skills

Knots and Throws

Tying a Square Knot (in string)

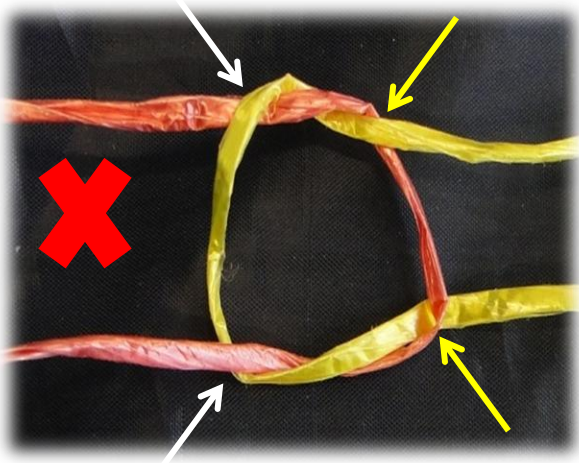


This is a square knot (also known as a reef knot).

Compare it to the other knots below.

On the right-hand side of the picture, both the yellow strands run over the top of the red loop (yellow arrows).

On the left-hand side, both the red strands run under the yellow loop (white arrows).



This is a granny knot. It is not secure.

Compare it to the square knot above.

On the right-hand side of the picture, one yellow strand runs over the red loop and one runs under the red loop (yellow arrows).

On the left-hand side, one red strand runs over the yellow loop and one runs under (white arrows).

Avoid creating granny knots by always following the correct technique.



This is a slip knot or half-hitch, and should be avoided as it is not secure.

Compare it to the square knot (at the top).

Half-hitches form when uneven tension is applied to the ends of a knot.

Even if you perform the correct hand movements but apply uneven tension, an insecure knot will be created.



One advantage of using a tea towel with a check-pattern is that it helps to illustrate good & bad technique

Good technique

- The tea towel lines are aligned across the incision
- Sutures are even and consistent
- Sutures are not too close to the incision

Bad technique

- The tea towel lines are out of line across the incision
- There is a gap at the end of the incision
- Sutures are uneven in length and tension
- Some are too close to the incision



Making the Model Tea Towel for Suturing

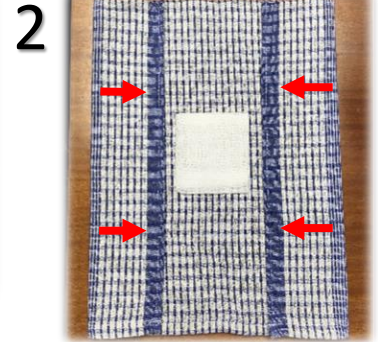
EQUIPMENT LIST

- 1 x check pattern tea towel (approximately 80 x 50cms). *The check pattern is important as it helps identify good and poorer technique - the lines should align across the incision. If a check pattern tea towel is not available, draw lines on the cloth with a marker.*
N.B. Check pattern tea towels can be purchased at many online shopping sites.
- 1 x 10cm x 10cm gauze swab
- Scissors
- Stapler
- 1 x clipboard
- 2 x foldback clips



Cut the material in half (each tea towel will make 2 suture models, each approximately 40cm x 50cm).

Place a gauze swab in the centre of the tea towel.



Fold the outer edges of the tea towel inwards but do not cover the gauze swab.

3



Fold the outer edges (again) into the middle and over the gauze swab (where the folded edges will meet).

4



Once both edges have been folded inwards twice (Steps 2 & 3), the gauze swab will be hidden under the tea towel.

5



To make the incision, staple the edges of the tea towel together. First staple the top two edges - the staple will appose and secure the two sides of the tea towel (like a 'bridge').

Ensure the lines of the tea towel match up across the incision (as the lines are used for guidance when suturing).



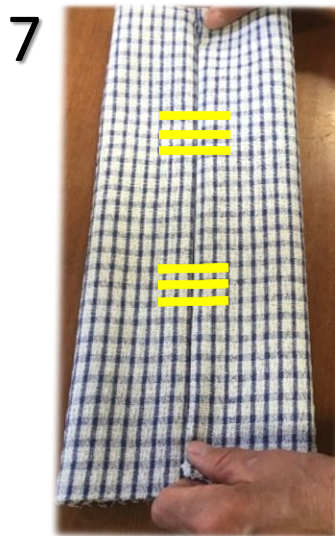
Making the Model Tea Towel for Suturing



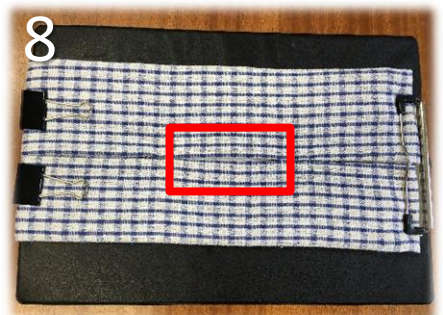
Place three staples (one behind the other).

Do not staple the gauze swab (the staples sit on top of the swab).

Repeat the stapling at the other end to make an incision about 8-10cm in length. While placing the three staples ensure the lines of the tea towel match up across the incision.



The yellow lines above represent the position of the staples, creating an incision approximately 8-10cm in length.



Place the tea towel suture model on the clipboard using two foldback clips to anchor it in place.

The incision and suturing area are represented by the red box.

N.B. An extra foldback clip or G-clamp can be used to fix the clipboard to the table.



If using white suture material (e.g. cheap nylon on a reel), dyeing the tea towel a darker colour maybe helpful (as long as the lines are still clearly visible) as it is easier to see the sutures.



I wish I'd known:

Simple Interrupted Suture

- Skin sutures must not be placed too tightly otherwise inflammation will develop with swelling, redness and discomfort surrounding the incision. The sutures may then appear to be tighter than when initially placed.
- If you are prone to tying sutures too tight practise placing the knots without pulling unduly or overtightening the knot below. Avoid jerky action and try to use controlled and gentle hand and instrument movements.
- Skin sutures should be tight enough to appose the wound edges and prevent gaping, which allows dirt or infection into the wound and slows healing.
- The serrated edge of instruments i.e. the inside of needle holder jaws, are rough and should not be used to grasp or loosen suture material (except to grasp the short end when tying a knot). The suture will be damaged by the serrated edge and could then breakdown prematurely.

Some tips for checking your suturing technique:

1. When finished, the two sides of the wound will be:
 - Apposed for the whole length of the incision
 - With no gaps at either end or between sutures
2. Sutures will be at the correct tension
 - Not too tight: indicated by 'cutting in' to the skin
 - Not too loose: leaving gaps for dirt and infection to enter
3. Sutures will not be too close to the incision
 - Each suture is about 5mm away from the incision edge
4. Sutures will be placed at similar intervals from each other and the suture ends are consistent in length.