ISSN 1753-044X

Volume 4 Issue 1
January 2010

INTERNATIONAL JOURNAL OF CLINICAL SKILLS

A Peer Reviewed International Journal for the Advancement of Clinical Skills

- 'docendo ac discendo' - 'by teaching and learning'

In this issue:

Executive Board

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Published by SkillsClinic Ltd.

Acknowledgements

We would like to take this opportunity to show appreciation to all those involved with the production of the International Journal of Clinical Skills (IJOCS). Many thanks to all members of the Editorial and Executive Boards.

A special thank you to Dr Mayoor Agarwal for his rich enthusiasm and kind support.

The International Journal of Clinical Skills looks forward to contributing positively towards the training of all members of the healthcare profession.

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Foreword

As we head into the New Year of 2010, the International Journal of Clinical Skills (IJOCS) can feel justifiable pride that it has fulfilled its ambition to provide the international healthcare community with an arena for clinical skills education and research. For almost all the healthcare professions, clinical skills form the basic foundations and therefore a combined approach is absolutely what is needed for the future provision of a high quality health service.

The role of the ePortfolio in both education and continuing professional development of healthcare professionals continues to evolve as training and revalidation become increasingly important. Clinical skills are an essential element of this process and in 2010 the IJOCS will be proud to publish abstracts and papers from the 8th international ePortfolio conference hosted by ElfEL London Learning Forum 2010. Further information can be found at www.ijocs.org/eportfolio

This year will also see the launch of the new and exciting 'CliniTube' website – a free resource providing a single portal for accessing and sharing an array of information. It should be a valuable resource for students and should give teachers of numerous disciplines the opportunity to share educational materials. I'm certainly looking forward to seeing the 'Clinical Skills Lab' which should become an integral component of CliniTube and will comprise information on a variety of clinical skills.

The International Journal of Clinical Skills is a unique publication in its devotion to clinical skills. I encourage professionals all over the world to continue contributing to its on-going success. After all, our patients deserve nothing less than the best.

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The art of basic wound suturing

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Keywords:
Suture
Wound management
Nail bed repair

Abstract

This article outlines a comprehensive overview of basic wound suturing – a vital clinical skill required of almost all practicing physicians and surgeons. In this article we cover subjects such as types of suture material and needles, sutures sizes, suture techniques, nail bed sutures, instrument handling, postoperative care and suture alternatives.

Introduction

"All the operations in surgery fall under two heads, separation and approximation"
Galen, 129–199 AD

The word suture comes from the Latin *sutura*, 'a sewn seam' or the verb *suere*, which means 'to sew, or stitch together'. Suturing to close a wound is a paramount operative skill. It requires careful tissue handling, regulated suture tension and precise knot placement, in order to allow for primary wound healing to occur with minimum scarring. An astute recognition of wound factors such as its location, size and the extent of the defect allows for planning of suture material and the possible need for other reconstructive methods.

Suture material

An ideal suture is a mythical ultimate by which all other sutures may be judged. It would provide wound support for the perfect amount of time until natural healing takes place and then would completely disappear. It should be applicable to any procedure, only varying in size. It should possess a physical limpness, without memory and thus handle easily, and have great tensile strength. It should contain no physical or chemical properties that would create tissue reaction. It would have a surface that glides through tissues easily but sticks to itself for secure knot tying, and finally, have a composition not affected by sterilisation.

Surgeons choose a suture depending on its strength, longevity, knot security, elasticity, memory, fluid absorption, capillarity, visibility and cost. They can come in many types, absorbable or non-absorbable, natural or synthetic and monofilament or multifilament sutures. These categories coexist and thus it is important to know the differences as their uses can vary enormously. For example, absorbable sutures lose their strength over time as the body gradually absorbs them. This occurs by either a hydrolytic (an enzyme mediated) or proteolytic (cellular mediated) process. Synthetic sutures usually absorb through hydrolytic processes, causing much less inflammation than natural sutures, and can be more readily left in a wound without worsening scarring. Non-absorbable sutures are not absorbed and thus do not lose strength. The body encapsulates them. Table 1 on the next page illustrates examples of different sutures.

Table 1: Types of suture materials

Suture	Trade Name	Strength	Handling	Configuration	Reactivity
Absorbable Natural					
Plain gut		Most lost in 7-10 days	Good	Monofilament	High
Chromic gut		10-14 days	Good	Monofilament	High
Absorbable Synthetic					
Poliglecaprone 25	Monocryl®	50-60% at 1 week	High memory and slippery	Monofilament	Low, absorption by 3-4 months
Polydioxanone	PDS®	50% at 4 weeks	High memory and slippery	Monofilament	Low, absorption 6 months
Polyglactin 910	Vicryl®	60-75% at 2 weeks, lost at 4 weeks	Good, poor slippage	Braided	Low, absorption by 90 days
Non-absorbable Natural					
Silk		2-10 weeks	Good	Braided	Moderate
Stainless Steel		Indefinite	Poor, slippery	Monofilament or twisted multifilament	Inert
Non-absorbable Synthetic					
Nylon	Ethilon®	Loses 15-20% per year	High memory and slippery	Monofilament	Low
Polypropylene	Prolene®	Indefinite	High memory and slippery	Monofilament	Low
Polyethylene terephthalate	Ethibond®	High strength	Good, poor slippage	Braided	Low

Type of needle

Needles differ in both their point configuration, size and curve radius. For skin, standard cutting and reverse cutting points are most commonly used. These go through tough tissue more easily than a taper point needle would, which is commonly used for viscera. Needle size depends on the tissue one is dealing with, and needle curvature is described as parts of a circle; a 3/8 circle curvature is most commonly used for skin.

There are a variety of needles for wound closure. Curved needles have two basic configurations – tapered and cutting. For wound and laceration care, the reverse cutting needle is used almost exclusively. It is made in such a way that the outer edge is sharp so as to allow for smooth and atraumatic penetration of tough skin and fascia. Tapered needles are used on soft tissue, such as bowel and subcutaneous tissue, or when the smallest diameter hole is desired.

Suture size

The calibre of suture (Table 2) denotes its strength and not size, which is a common misconception. For example, the thickness of 1-0 steel is much thinner than a 1-0 gut suture, as it is much stronger. The size of suture material is measured by its width or diameter.

Table 2: Suture calibre and specific areas of their usage

Calibre	Common usage
1-0 and 2-0	High stress areas requiring strong retention, e.g. deep fascia repair
3-0	Areas requiring good retention, e.g. scalp, torso, hands
4-0	Areas requiring minimal retention, e.g. extremities. It is the most common size utilized for superficial wound closure
5-0	Areas involving the face, nose, ears, eyebrows and eyelids
6-0	Areas requiring little or no retention. Primarily used for cosmetic effects

Holding instrument

Holding the needle holder in the palm of your hand allows a much greater degree of movement than the conventional placement of your thumb and ring finger through the instruments' holes. It takes practice to open and close the needle holder, but when mastered, the improvement in dexterity is significant. The needle

holder is twisted with the fingers and not at the wrist. It allows for the needle to enter the skin perpendicular, which is essential if tissue eversion is to be achieved.

Interrupted sutures

The most basic suture is a simple loop suture. This is a loop of suture through both wound edges, knotted on one side of the wound. The needle should be passed through the skin at an angle of 90 degrees in order evert the skin edges allowing total dermal approximation. Care should be made to ensure that the bites are equal which keeps the wound level. Fine adjustment is made on placing the knot on one side of the wound or the other depending where it lies better.

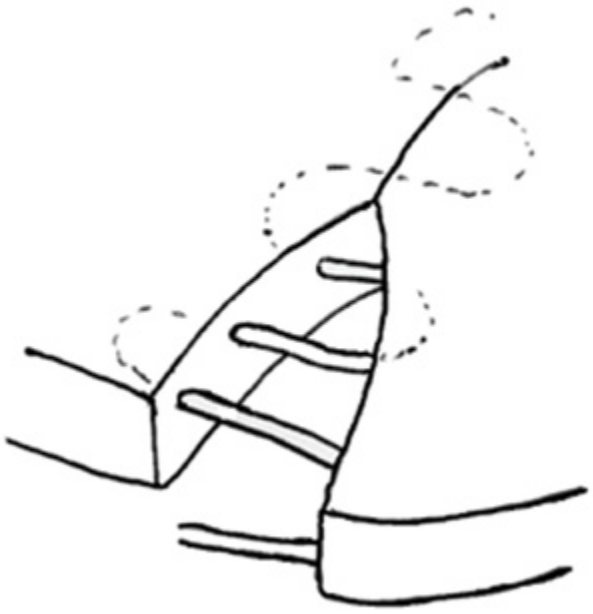
Mattress sutures are a modification of the simple interrupted suture. The vertical mattress suture consists of a simple interrupted stitch placed wide and deep into the wound edge and a second more superficial interrupted stitch placed closer to the wound edge and in the opposite direction. The horizontal mattress suture is where the two suture lies lie parallel to one another in the horizontal plane. The needle enters on the far side of the wound and exits on the near side. This is then reversed, entering near side and exiting far, and then is tied. Mattress sutures have the benefit over simple interrupted, as eversion of the skin edges is much greater. Also as more passes of suture are undertaken, there is less possibility of tearing through the tissues.

Continuous suture

Continuous sutures have advantages over interrupted in that they are quicker and use less suture material. However, they are less reliable as if the suture breaks the whole wound will fail, unlike interrupted which needs failure of more than one suture to result in the same problem.

A beginner usually finds interrupted sutures much easier to perform. The running subcutaneous suture (also referred to as a continuous subcutaneous suture, Figure 1) begins with a simple interrupted subcutaneous suture, which is tied and the excess trimmed. The suture is looped through the subcutaneous tissue by successively passing the needle through the opposite sides of the wound. It is important to take passes at the same level, and to not enter directly opposite the exit of your needle but to backup a millimetre or so. This gives the best result. The knot is tied at the opposite end of the wound by knotting the long end of the suture material to the loop of the last pass that was placed, or using an Aberdeen knot. Jenkins' rule states that the length of suture required is four times the length of the wound.

Figure 1: Illustration of a continuous subcutaneous suture



The running suture (also known as a continuous suture, Figure 2) starts with a simple interrupted suture. The suture is not cut but is passed as another loop of suture through the wound edges. This is repeated along the length of the wound and secured at the end.

Figure 2: Illustration of a continuous suture

The locked running suture (also referred to as a blanket 'locking' suture, Figure 3) is similar to the running suture. This suture, however, passes through the preceding loop before re-entering the skin. The locked running suture is useful in the rare situations where the wound edges have to be pulled together under tension to control bleeding. The sutures are secure in that they are locked into preceding loops.

Figure 3: Illustration of a blanket 'locking' suture

Another variant of the running suture is the cushion or continuous mattress suture (Figure 4). This suture allows good eversion of the wound, and due to the amount of passes through the tissue, it has a low rate of cut out.

Figure 4: Illustration of a continuous mattress suture

Tensioning suture

A tensioning suture is useful when the first throw of a knot is slipping, especially when a knot is under tension. A standard knot is tied as the first throw. A loop is made as normal for the second throw of an instrument tie. The free end of the loop is held between the thumb and middle finger tips. The needle holder is passed through the loop to grasp the other end of the suture. The index finger tip is now inserted into the loop and the end grasped in the needle holder is drawn through the loop. If the index finger and needle holder are now pulled in opposite directions, the initial throw can be tensioned down. The loop is now allowed to quickly slip off the index finger tip whilst maintaining traction on the needle holder, causing the second throw to tighten, locking the initial throw [1].

Nail bed suture

This section has been included due to the need to replace a nail plate following nail bed repair. The horizontal figure-of-eight suture is most commonly used, however, this does not secure the nail plate distally and the nail plate can slide out [2]. A modification of this technique secures the plate distally using notches distally [3]. A longitudinal figure-of-eight suture can be used to splint a tuft fracture but has the risk of damaging the germinal matrix of the nail bed [4]. A combination of these techniques is called a clover leaf suture [5]. Tissue glue is an alternative also used [6].

Postoperative care

Suture removal should not be performed until the wound is strong enough that dehiscence does not occur. However, this should be before the development of suture marks. Table 3 shows the approximate time for suture removal. On removing the suture it is important to cut only the knot and not both threads. The suture should then be pulled across the wound and not away to avoid dehiscence.

Table 3: Approximate time for suture removal by body area

Body Area	Adult (Days)	Children (Days)
Face	4 - 5	3 - 4
Scalp	6 - 7	5 - 6
Trunk	7 - 10	6 - 8
Arm	7 - 10	5 - 9
Leg	8 - 10	6 - 8
Joint extensor	8 - 14	7 - 12
Joint flexor	8 - 10	6 - 8
Dorsum of hand	7 - 9	5 - 7
Palm	7 - 12	7 - 10
Sole of foot	7 - 12	7 - 10

Alternatives to sutures

Wound closure tapes, or Steri-Strips™, are reinforced microporous surgical adhesive tapes. They can be used as extra support to a suture line or as a suturing alternative in shallow wounds not under tension, but are rarely used for primary wound closure. Stainless steel staples are frequently used as alternatives to sutures as they are quick to use, have minimal tissue reaction and are very strong. Superglues that contain acrylates may be applied to superficial wounds [7]. The usefulness of rapidly polymerizing plastics is limited because of the difficulty in handling the adhesive and the potential for tissue toxicity and inflammation.

Declaration of interests

The authors have no financial or other interests in relation to this submission.

References

1. Abbas A, McMurtrie A, Guha A R, Wootton J R. (2008). Letter to the Editor: A novel modification of the standard surgical knot. The Internet Journal of Orthopedic Surgery. **8**(1).
2. Schiller C. (1957). Nail replacement in finger tip injuries. Plastic and Reconstructive Surgery. **19**(6):521-530.
3. Bristol S G, Verchere C G. (2007). The transverse figure-of-eight suture for securing the nail. Journal of Hand Surgery. **32**(1):124-125.
4. Bindra R R. (1996). Management of nail-bed fracture-lacerations using a tension-band suture. Journal of Hand Surgery. **21**(6):1111-1113.
5. Mason L W. (2009). Clover-leaf suture for securing the nail. Journal of Hand Surgery, European volume. **34**(3):401-402.
6. Richards A M, Crick A, Cole R P. (1999). A novel method of securing the nail following nail bed repair. Plastic and Reconstructive Surgery. **103**(7):1983-1985.
7. Nahas F X, Solia D, Ferreira L M, Novo N F. (2004). The use of tissue adhesive for skin closure in body contouring surgery. Aesthetic Plastic Surgery. **28**(3):165-169.

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