

SUTURING IN PERIODONTICS: A REVIEW

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Abstract

Sutures have various tasks to achieve but the most important function that suture is to approximate the wound margins for proper healing and positioning of the tissue. Management of soft tissue is a supreme priority for surgeon in any of the extra & intra-oral surgical or invasive surgical procedures to achieve highest functional & esthetic results. Closure and healing of wound is affected by the initial tissue injury which is basically caused by needle bite and consequent suture passage.

Key Words: Microsurgery, Suture Material, Suture Needles.

Introduction

After a surgical procedure following with wound irrigation and debridement, the surgeon should approximate incised or raised tissue to its previous location or displace it at a newer location to keep it in place with sutures. Sutures have various tasks to achieve but the most important function that suture is to approximate the wound margins for proper healing and positioning of the tissue.

Sutures also help in preserving the blood clot and hence contribute in homeostasis after surgical procedures. If there is profuse bleeding from underlying tissue, the surface skin or mucosa shouldn't be closed, because there is chance of formation a hematoma by continuing bleeding in the underlying tissue. In those cases, it is better to achieve homeostasis first before wound closure. Sutures are also serves as an aid for formation of blood clot in the alveolar socket. A special technique of suturing, like figure-of-eight technique, act as a barrier for clot displacement.¹

Needles

The surgical needle consists of three sections: one is needle point, second one is needle body and the final is swaged end or press-fit. These needles are classified based on to their radius, curvatures and shapes. Regularly used suture needle in dental surgery are the ½ & 3/8 circle needles.^{2,3}

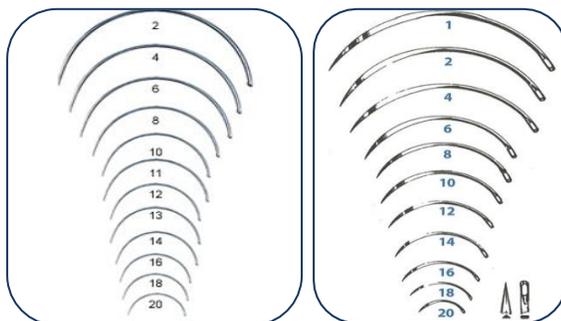


Figure1: 3/8 and ½ circle suture needles

The 3/8 circle needle permit a dental surgeon to bite buccal to lingual flap surface of tissues in a single movement just by angling the needle on a centric axis.

Whereas, the ½ circle needle was conventionally used in major restricted areas, like at the buccal site of maxillary molars and the facial part of mandibular & maxillary incisors the 3/8 circle needle usually used. In addition, ½ circle needles is regularly used for mucogingival & periosteal surgeries. Suture needles are also classified as based on their cutting edges, that is, conventional cutting or reverse cutting.⁴

In dental clinics, surgeons often use reverse cutting edge type of needle which prevents tearing of suture material through surgical flap edges or papillae, which is called as 'cut-out'. A 'cut-out' is generally resulted by a traditional suture needles because of its sharp inner concave curvature, while a reverse cutting edge comprises with smooth inside curvature and its third cutting edge is located on its convex that is outer side.⁵

Suture Materials

Multiple suture materials are available, which are classify based on their properties like filament type (i.e. monofilament & polyfilament), diameter & restorability.

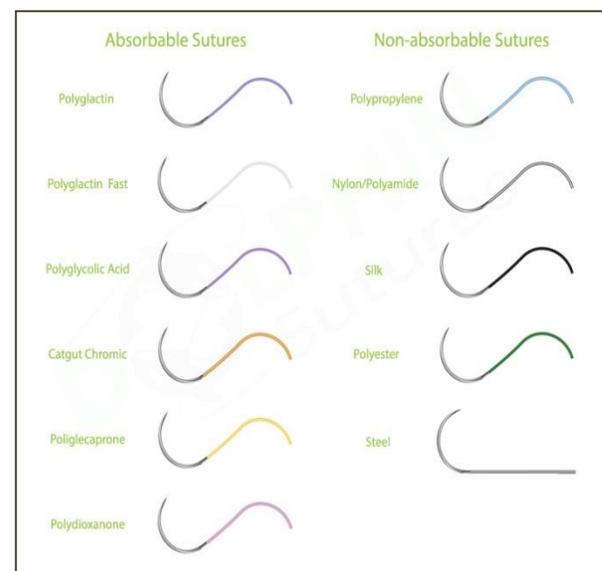


Figure2: Types of Suture material

SUTURE MATERIALS	Proprietary name where Applicable	Comment	Approximate cost/yd
CHROMIC CATGUT			24
Polyglycolic Acid	Dexon (davis & Geck)	Can be purchased at this cost in less than 12 units.	42
Silk (Black)			6
Cotton (white Twisted)			6
Stainless steel(Monofilament)		Can be purchased at this cost in less than 12 units. Smaller gauge wire such as used for skin suture is 50 %less costly	8
Stainless steel(Multifilament)		Can be purchased at this cost in less than 12 units. no marked cost reduction	12
Nylon (Monofilament)	Ethicon (ethic on)	Can be purched at this cost in less than 12 units	3
Polymerized caprolactum	Vetafil (Jackson)	Cost based on 164ft.	8
Braided dacron	Mersilene (ethicon)		6
Teflon-polyester	Cottony Dacron (deknatel)		6
Teflon-polyester	Silky polydek (deknatel)		6
Teflon-polyester	Tevdek (deknatel)		7

Knot techniques

For periodontal plastic surgery atraumatic suture material is preferred, because the ends of the threads are knotted with the aid of the needle which is the only way to anatomically forceps for very thin sutures like 6/0, 7/0, 9/0 suture material. Among the different types of knots that can be used by dentist, three of them have greater importance.

1. The surgeon 'knot

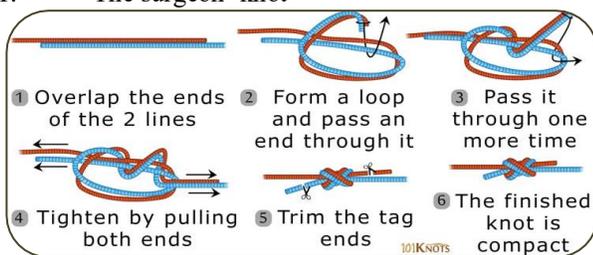


Figure 3: Surgeon Knot Tutorial

2. The square knot(or reef knot)

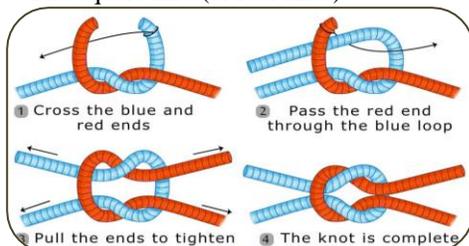


Figure 4: Square (Reef) Knot Tutorial

3. The slip knot

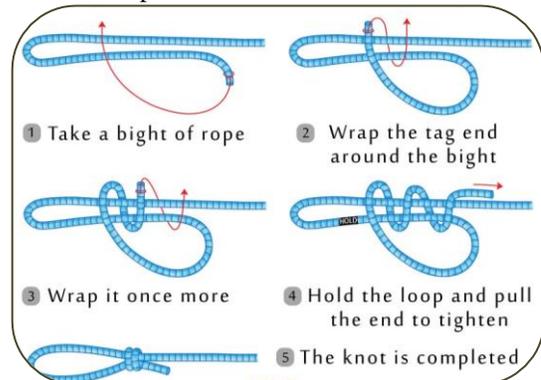


Figure5: Slip Knot Tutorial

Art of suturing!

- Specific type of knot must be used for the specific suture material
- Slip knot: used with silk, chromic or plain gut suture
- Surgeon's knot: used with synthetic resorbable and other non-resorbable synthetic suture materials to prevent untimely knot untying.

'surgeon's knot' is the standard knot, in which thread is looped twice rather than once around the shaft of needle holder, then a simple reverse loop will be formed by pulling end of thread through this double loop, by blocking of the first knot. In some cases requirement of third knot is needed in opposite direction to the second knot to confirm it even more secure.

In square knot type, two ends of the suture thread are attached with each other by looping one around the needle holder shaft, and the thread is wound with the needle holder, then the end of thread is grasped and pulled.

In cases of sliding knot which majorly resembles the square knot where thread will be loop circularly to the needle first, then on another hand two knots will run in the same course, so that the needle holder is laid on the thread each time which lead to certain instability, even after the ends of the thread are tightened. The basic aim of simple interrupted technique of suturing is to approximate tissue areas adjacent to the two sides of the wound.

Methods of suturing are simple interrupted suture, horizontal mattress, vertical mattress, sub-cuticular and continuous.⁶ The most commonly used method is interrupted suture for wound closure. In which each suture is totally independent to the next suture. Advantage is, the loosening of one suture will not disturb another suture or wound closer will not be affected.⁷

The mattress suturing technique, are variation of the interrupted suture, which is mostly used in areas where tension-free flap closure cannot be accomplished by means of simple interrupted suture. Mattress suturing techniques are generally used in cases of resist muscle pull, evert the wound edges (this keeps epithelium away from underlying structures) and to adapt the tissue flaps tightly to the underlying structures (e.g. alveolar ridge, bone graft, regenerative membrane, tissue graft or dental implant).

There are numerous types of the mattress suture technique, the horizontal and the vertical mattress which can be a part of coronally & apically repositioned flap. Another variation of the interrupted suture technique is called a continuous suture, which is mostly used to approximate two surgical flap edges or simultaneously can secure multiple inter-proximal papillae of one flap independently of the another flap. Suturing must be carried out under strict aseptic technique with the help of proper assistant. First and foremost, it is important to assess and clean the wound thoroughly.⁶

Ideal suture needle characteristics

- Good-quality stainless steel material
- Smallest diameter needle if possible
- Should be stable in the grasp of needle holder
- Capable of implanting suture material through tissue with minimal trauma
- It should be sharp enough to bite tissue with minimal resistance
- Sterile and corrosion resistant to prevent introduction of microorganisms or foreign materials into the wound.⁸

Principles for Suture Selection

Surgeon always has a variety of suture materials to opt for use in body tissues. But they follow the criteria's like;

adequate strength of material which prevent suture breakage, secure knots which will help in preventing of knot slippage. For this surgeon must understand the nature of the suture material, the conditions of biologic forces in the wound healing, and the interaction between the suture and tissues.

Principles that guides the surgeon for selection of sutures.

- When wound has already reached at maximal strength, sutures are no longer needed.
- Foreign bodies in already contaminated tissues might be convert contamination into infection.
- Where esthetics is in priority, prolonged and close apposition of wounds and prevention of any irritants at suture site will produce the appreciating results.

Regarding suture size:

a) Smallest size suture is appropriate for maintaining the natural strength of tissues.

b) Strains on the suture line at postoperative evaluation of patients can be treated with retention sutures. And as the patient's condition is stabilized it should be removed.^{9,10}

Periodontal microsurgical suture

Periodontal microsurgeries and periodontal plastic surgery are important for esthetic enhancement of patients. Some basic premise of microsurgery is required to passive wound closure. The primary approximation of the wound edge for desired results, incision should be almost invisible and approximated with properly placed small sutures with minute tissue trauma and no bleeding. Application of microsurgery principles require vast knowledge of tissue healing, characteristic and biological properties of the various suture materials being used in dentistry and for periodontal plastic surgery. An ideal suture material should be easy to handle, sterile, resistant to shrinkage in tissue, minimally reactive to tissues, and should capable of holding securely when knotted without cutting.

Sutures sizes are referred numerically, as 3-0 to 9-0. The larger will be the number of zero's, the smaller will be the size of suture, the less tensile strength the suture will be depending on the procedure being performed, most periodontal microsurgical suturing is done with sutures ranging in size from 6-0 to 9-0. The most common suture used in macroscopic dentistry is a 4-0 suture on a three-eight circle FS-2 reverse cutting needle.

Conclusion

Management of soft tissue is a supreme priority for surgeon in any of the extra & intra-oral surgical or invasive surgical procedures to achieve highest functional & esthetic results. Closure and healing of wound is affected by the initial tissue injury which is basically caused by needle bite and consequent suture passage. Surface characteristics of the suture, Needle selection and coating on the suture materials selected for

wound closure are significant factors that must be considered by the surgeon.

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