Review Article

Review On Sutures in Oral Surgery- An Update

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ABSTRACT:
Suturing, which is the final procedure of a surgery, is used to reattach the removed tissue, to control bleeding, and allow for primary healing. A wide variety of material is available for suturing and ligating tissues. Sutures are selected for use according to the required function. This review presents an update on characteristics and principles of suture selection to aid the clinician in obscuring optimal soft tissue management.
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Introduction

Dental surgery involves the creation of a wound and necessitates closure of this wound to allow healing and to achieve the surgical objective.[1] Suturing, which is the final procedure of a surgery, is used to reattach the removed tissue, to control bleeding, and allow for primary healing.[2]

The word "suture" describes any strand of material used to ligate (tie) blood vessels or approximate (bring close together) tissues. They are used to close wounds.[3] The primary objective of dental suturing is to position and secure surgical flaps to promote optimal healing. When used properly, surgical sutures should hold flap edges in apposition until the wound has healed enough to withstand normal functional stresses. When the proper suture technique is used with the appropriate thread type and diameter, tension is placed on the wound margins so primary intention healing occurs.[4]

The surgeon's knowledge of the physical characteristics of suture material is important. As the requirements for wound support vary with patient factors, the nature of the procedure, and the type of tissue involved, the surgeon will select suture material that will retain its strength until the wound heals sufficiently to withstand stress on its own. [3]

Suture Thread Characteristics

The desired qualities of a suture thread include the tensile strength that is appropriate for its respective use, tissue biocompatibility, ease of tying, and that it allows minimal knot slippage. It is important that the clinician select the specific suture thread and diameter based on the thickness of the tissues to be sutured and whether there is the presence or absence of tension-free mobile tissues.[5]

In intraoral surgeries, a variety of suture types have been applied. Sutures can be divided into absorbable and non-absorbable ones and are classified as monofilament or multifilament types. [2] Sutures that undergo

degradation and absorption in tissues are considered absorbable sutures. Sutures that generally maintain their tensile strength and are resistant to absorption are nonabsorbable sutures.[3]

Absorbable materials

1. Catgut plain – used to suture mucous membrane of lips and tongues. They are easily absorbed within one week.
2. Catgut chromic – used to suture fascia, muscles, or ligature of blood vessels. It is usually absorbed within 30 – 45 days.
3. Vicryl – used to suture fascia, muscles, or ligature of blood vessels. Takes at least 70 days for absorption. It is the most commonly used suture materials during surgery while closing in layers.

Non-absorbable materials

1. Ethilon – most commonly used to close and suture skin after surgery or trauma to the skin. Cutting needles are usually used.
2. Prolene – used to suture nerve, tendon or blood vessels. Preferable round body needles are used.
3. Silk and Linen – have similar properties. They are very strong, but they are adherent to the tissues and can caused reaction or infection.

Other suture materials that are also used are:

1. Staples – to close wound under high tension, like scalp, trunk and extremeties.
2. Strips and tapes – used to close superficial laceration on the face.

Absorbable materials are digested by tissues during healing process and are made from collagen (animal protein) or synthetic polymers. Non-absorbable materials resist enzymatic digestion process and are usually made of inorganic materials.[6]

Although microbial inflammation response due to the multifilament interstices has been demonstrated, silk has been widely used in intraoral surgeries because it has the advantages of easy manipulation, the capability of maintaining knot security, and less irritation than nylon.[7,8] Polyglycolic acid, a polymer of lactide and glycolide, is used to manufacture an absorbable suture. After being extracted as a melted polymer, a thin fiber is manufactured into a braided form to improve its ease of manipulation. Polyglycolic acid is absorbed in 60 to 90 days after insertion. It is hydrolyzed without any phagocytosis, which results in a weaker immune response than that of absorbable organic sutures.[9] One of the well-known non-absorbable monofilaments, nylon, is made from polyamide polymer and has been reported to show a high resistance to infection, high tension, and a low acute inflammation reaction.[2] The size of suture is expressed in terms of zeroes. The more zeroes in the number, the smaller the diameter of the strand. In maxillofacial surgery 5-0 and 6-0 threads are used for skin closure while 3-0 and 4-0 are used for mucosal closure.[10] If a suture is to be placed in a tissue that heals rapidly (e.g. intraoral tissue), the clinician should select a resorbable suture that will lose its tensile strength at about the same rate that the tissue gains its strength. The suture will be absorbed by the tissue so that no foreign material remains in the wound once the tissue has healed, such as surgical gut or the new, rapidly resorbable PGA suture material (PGAFA).[4]

A: Non-resorbable Type	Commonly used thread size	
Silk	3-0, 4-0, 5-0	
Nylon	4-0, 5-0, 6-0	
Polypropylene	5-0, 6,0	
e-PTFE	4-0, 5-0	
B: Resorbable Type		Resorption time (days)
Gut	4-0	3 to 5
Chromic gut	4-0, 5-0	7 to 10
PGA	3-0, 4-0, 5-0	21 to 28
PGA-dyed	3-0, 4-0, 5-0	21 to 28

Table 1: Suture thread types in dentistry[1]

Methods of suturing are simple interrupted suture**, v**ertical mattress**,** horizontal mattress**, s**ubcuticular and continuous.[6] Interupted sutures is the most commonly used method of wound closure.

Each suture is independent of the next suture. The loosening of one suture will not produce loosening of another suture.[10]

The mattress technique, a variation of the interrupted suture, is usually used in areas where tension-free flap closure cannot be accomplished. Mattress suturing techniques are generally used to 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. bone graft, tissue graft, alveolar ridge, regenerative membrane or dental implant). There are variations of the mattress suture technique, referred to as the horizontal and the apically or coronally repositioned vertical mattress. Another variation of the interrupted suture technique is called a continuous suture. Continuous sutures can be used to attach two surgical flap edges or to secure multiple interproximal papillae of one flap independently of the other flap.[1] Suturing must be carried under strict aseptic technique with the help of an assistant. First and foremost, it is important to assess and clean the wound thoroughly.[6]

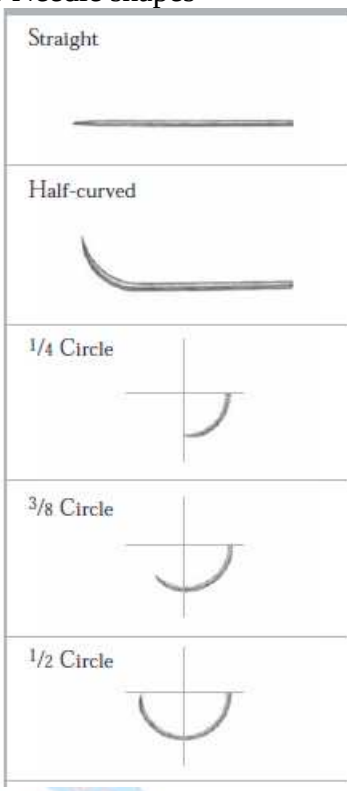
Surgical Needles

Surgical needles are produced from stainless steel alloys, which have excellent resistance to corrosion. Those made of a high nickel managing stainless steel have a greater resistance to bending and breakage than stainless steels without nickel.[11]

Ideal surgical needle characteristics

- High-quality stainless steel
- Smallest diameter possible
- Stable in the grasp of the needle holder
- Capable of implanting suture material through tissue with minimal trauma
- Sharp enough to penetrate tissue with minimal resistance
- Sterile and corrosion resistant to prevent introduction of microorganisms or foreign materials into the wound.[11]

Table 2: Needle shapes[12]



Regardless of its intended use, every surgical needle has 3 basic components: eye, body and the point.[11] Suture needles also are classified as either conventional cutting or reverse cutting. In dentistry, the clinician always should use reverse cutting sutures to prevent the suture material from tearing through the papillae or surgical flap edges, which is referred to as "cut out." Usually, a cut out is caused by a conventional suture needle because it has an inside concave curvature that is sharpened, whereas a reverse cutting needle has a smooth inner curvature and its third cutting edge is located on its convex (outer) edge. The most commonly used suture needles in dentistry are the 3/8 and 1/2 circle needles. The 3/8 needle allows the clinician to pass from the buccal surface to the lingual surface in one motion. In contrast, the 1/2 circle needle is traditionally used in more restricted areas; for instance, in the buccal of the maxillary molars and the facial aspect of the maxillary and mandibular incisors. In addition, the 1/2 circle needle is routinely

used for periosteal and mucogingival surgery. [13]

Principles of Suture Selection

The surgeon has a choice of suture materials from which to select for use in body tissues. Adequate strength of the suture material will prevent suture breakage. Secure knots will prevent knot slippage. But the surgeon must understand the nature of the suture material, the biologic forces in the healing wound, and the interaction of the suture and the tissues. The following principles should guide the surgeon in suture selection.

- When a wound has reached maximal strength, sutures are no longer needed.
- Foreign bodies in potentially contaminated tissues may convert contamination into infection.
- Where cosmetic results are important, close and prolonged apposition of wounds and avoidance of irritants will produce the best results.
- Regarding suture size: a) Use the finest size suture commensurate with the natural strength of the tissue. b) If the postoperative course of the patient may produce sudden strains on the suture line, reinforce it withretention sutures. Remove them as soon as the patient's condition is stabilized.[3]

Conclusion

The importance of soft-tissue management is today an absolute priority in any intra and extra-oral surgical procedure if a correct esthetic and functional result is to be achieved. Wound closure and healing is affected by the initial tissue injury caused by needle penetration and subsequent suture passage. Needle selection, surface characteristics of the suture and suture-coating materials selected for wound closure are important factors that must be considered by the surgeon.

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