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Suture Materials and Suturing Techniques in Periodontal Surgery – A Brief Overview

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ABSTRACT :
Any strand of material used to ligate blood vessels or approximate tissues is described as a "suture." The fundamental goal of dental suturing is to position and secure surgical flaps to facilitate optimal healing (first/primary intention). It offers support for flap margins until they heal, eliminates dead space and reduces postoperative pain. The physical and biologic qualities of the suture material, as well as the healing properties of the sutured tissues must be known and accordingly the suture material has to be selected appropriately to the surgical procedure. Sutures must be sturdy, easy to handle, and should produce secure knots . Sutures of synthetic origin have a more consistent performance and deterioration than sutures of biological origin. There are various suturing techniques available and they are used appropriately according to the type of periodontal surgery performed.

KEYWORDS : Suturing materials, suturing techniques and its indications, periodontal surgery

I. INTRODUCTION :

Wound closure and healing by primary intention is a key element for quick recovery following surgical procedures and it is important to promote favourable and successful healing while reducing complications such as infection.[1,2] Sutures have been used for more than thousand years and there is now an ever-increasing choices of sutures. Advancements in the field of biological materials have given the surgeon multiple options to choose from. Suturing inside oral cavity presents various challenges because of varied anatomy of the area, limited accessibility , a usually conscious patient and constant tongue movements. Also the relatively contaminated and moist environment is a challenge to infection control during suturing. An appropriate suture material and technique is therefore mandatory to ensure immobile tissues and proper flap/graft approximation and to ensure optimum healing . In selecting the perfect suture, many factors must be considered including individual wound characteristics, situation of the wound, the presence/absence of infection and a surgeon's personal preference and knowledge in handling a suture material.[3]

This article will serve as a review of various suturing technique in periodontal surgical procedures and provies an insight into a plethora of suture materials.

Suture materials & characteristics:

Suture materials can be classified into various types based ,

1. According to the absorbability: Absorbable or Non-absorbable (Figure 1).
2. According to source: Natural or Synthetic.
3. According to structure: Monofilament or Multifilament.
4. According to coating: Coated or Uncoated, Dyed or Undyed.
5. According to tissue reaction: Reactive or Not reactive.

6. According to handling: Easy or Difficult to handle.

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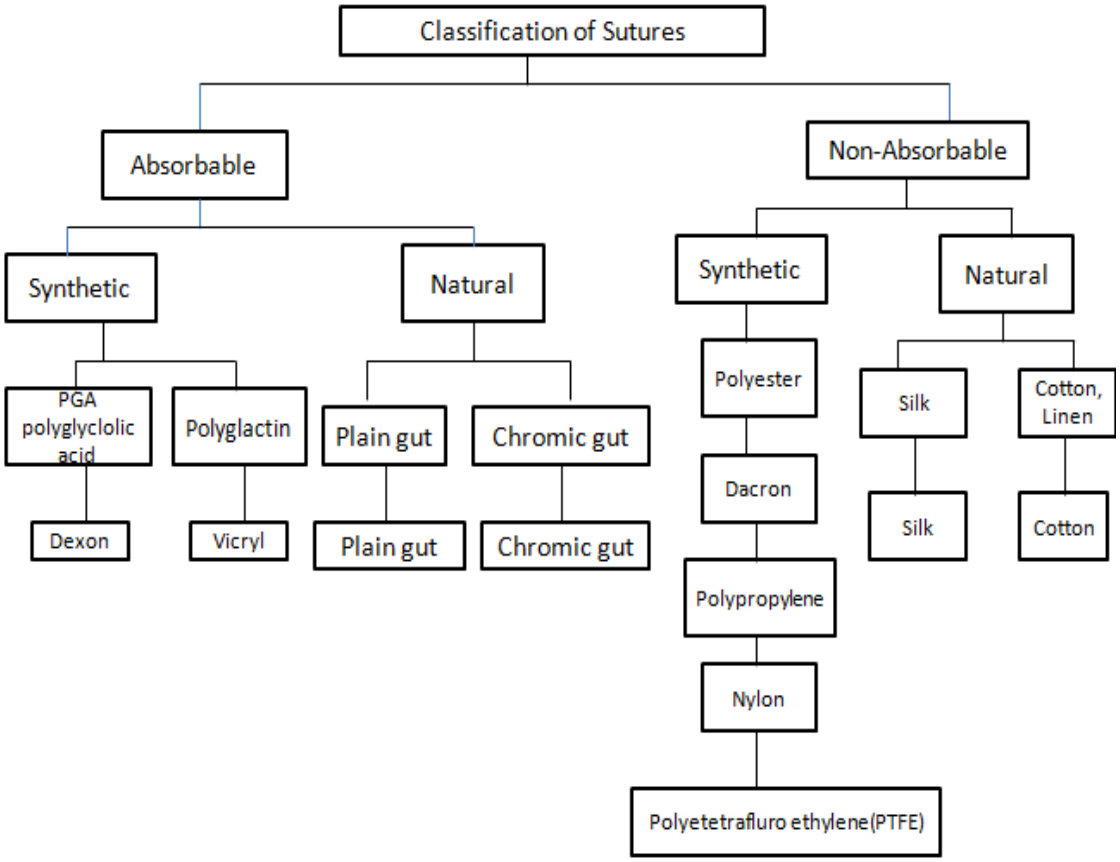

Figure 1 : Classification of suture materials (According to the absorbability)

NON ABSORBABLE SUTURE:

Non-absorbable sutures are made of inert materials which cause minimal reaction when placed in tissue. They are removed after the initial healing , usually within 7-10 days . The properties of some of the commonly used non-absorbable suture materials is given in table 1.

SUTURE	TYPES	COLOUR OF MATERIAL	TENSILE STRENGTH RETENSION IN VIVO	ABSORPTION RATE	TISSUE REACTION	COLOUR CODE OF PACKET
PERMA-HAND * Silk Suture	Braided	Violet White	Progressive degradation of fiber may Result in gradual loss of tensile Strength over time	Gradual encapsulation By fibrous connective Tissue.	Acute inflammatory Reaction	Light blue
Surgical Stainless	Monofilament Multifilamen	Silver metallic	Indefinite	Non absorbable	Minimal acute Inflammatory reaction	Yellow – ochre

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Steel Suture	t					
ETHILON* Nylon Suture	Braided	Violet Green Undyed (clear)	Progressive hydrolysis may result in Gradual loss of tensile strength over Time.	Gradual encapsulation By fibrous connective Tissue.	Minimal acute Inflammatory reaction	Mint green
NUROLON* Nylon Suture	Braided	Violet Green Undyed (Clear)	Progressive hydrolysis may result in Gradual loss of tensile strength over Time.	Gradual encapsulation By fibrous connective Tissue	Minimal acute Inflammatory reaction	Mint green
MERSILENE* Polyester Fiber Suture	Braided Monofilament	Green Undyed (White)	No significant change known to Occur in vivo.	No significant change known to Occur in vivo.	Minimal acute Inflammatory reaction	Turquoise
ETHIBOND* EXCEL Polyester Fiber Suture	Braided	Green Undyed (White)	No significant change known to Occur in vivo	Gradual encapsulation By fibrous connective Tissue.	Minimal acute Inflammatory reaction	Orange
PROLENE* Polypropylene Suture	Monofilament	Clear Blue	No subject to degradation or Weakening by action of tissue Enzymes.	Non-absorbable.	Minimal acute Inflammatory reaction	Deep blue
PRONOVA* POLY (hexafluoropropylene-VDF) Suture	Monofilament	Blue	No subject to degradation or Weakening by action of tissue Enzymes.	Non-absorbable.	Minimal acute Inflammatory reaction	Royal blue

Table 1 : Properties of non-absorbable suture materials

ABSORBABLE SUTURE:

As the name suggests , the absorbable sutures are absorbed either by enzymatic degradation or hydrolysis . It is available in two forms natural or synthetic The enzymatic degradation takes place by enzyme secreted by PMN's usually seen with natural materials , whereas hydrolysis of suture takes place in the presence of water causing the breakdown of synthetic suture material. These sutures have less

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postoperative inflammation, more patient's comfort. The properties of some of the commonly used absorbable suture materials is given in table 2 .

SUTURE	TYPES	COLOUR OF THE MATERIAL	TENSILE STRENGTH &RETENSION IN VIVO	ABSORPTION RATE	TISSUE REACTION	COLOUR CODE OF PACKET
Surgical gut suture	Plain	Yellowish tan Blue dyed	Individual patient characteristics can Affect rate of tensile strength loss.	Absorbed by proteolytic Enzymatic digestive Process	Moderate reaction	Yellow
Surgical gut suture	Chromic	Brown Blue dyed	Individual patient characteristics can Affect rate of tensile strength loss.	Absorbed by proteolytic Enzymatic digestive Process	Moderate reaction	Beige
Coated VICRYL * RAPIDE (polyglactin 910) Suture	Braided	Undyed (natural)	Approximately 50% remains at 5 days. All tensile strength is lost at Approximately 14 days.	Essentially complete Between 42 days. Absorbed by hydrolysis	Minimal to moderate Acute inflammatory Reaction	Red
MONOCRYL* (poliglecaprone 25) Suture	Monofilament	Undyed (natural) Violet	Approximately 50-60% (violet: 60-70%) Remains at 1 week. Approximately 20- 30% (violet: 30-40%) remains at 2 weeks. Lost within 3 weeks (violet: 4 weeks).	Complete at 91-119 Days. Absorbed by Hydrolysis.	Minimal acute Inflammatory reaction	Coral
Coated VICRYL * Plus Antibacterial (polyglactin 910) Suture	Braided Monofilament	Undyed (natural) Violet	Approximately 75% remains at two Weeks. Approximately 50% remains At three weeks, 25% at four weeks.	Essentially complete Between 56-70 days. Absorbed by hydrolysis.	Minimal acute Inflammatory reaction	Violet
Coated VICRYL * (polyglact	Braided Monofilament	Violet Undyed (natural)	Approximately 75% remains at two Weeks. Approximately 50% remains	Essentially complete Between 56-70 days.	Minimal acute Inflammatory reaction	Violet

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in 910) Suture			At three weeks, 25% at four weeks.	Absorbed by hydrolysis		
'2PDS* II (polydioxanone) Suture	Monofilament	Violet Blue Clear	Approximately 70% remains at 2 weeks. Approximately 50% remains at 4 weeks. Approximately 25% remains at 6 weeks	Minimal until about 90th Day. Essentially complete Within 6 months. Absorbed By slow hydrolysis.	Slight reaction	Silver

Table 2 : Properties of absorbable suture materials

Suture needles :

The precise selection and management of the needle is one of the most crucial factors in the success of periodontal surgery. The surgical needle is comprised of 3 parts: the needle point, the needle body, and the swaged end. Suture needles usually are classified according to their curvature, radius, and shape. The 3/8 and 1/2 circular needles are the most often used suture needles in dentistry.

Suture needles also are classified in to two types : conventional cutting and reverse cutting. In periodontal surgery, the clinician should always prefer to use reverse cutting needle to prevent the suture material from tearing through the papillae or surgical flap edges, which is referred to as "cut out." conventional suture needle causes the cut out, because it has an sharpened inside concave curvature, 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 needle and thread combinations in dentistry are the 3/8 reverse cutting needle with a 3-0 or 4-0 thread diameter and the 1/2 reverse cutting needle with the thinner and more delicate 5-0 or 6-0 thread diameter.

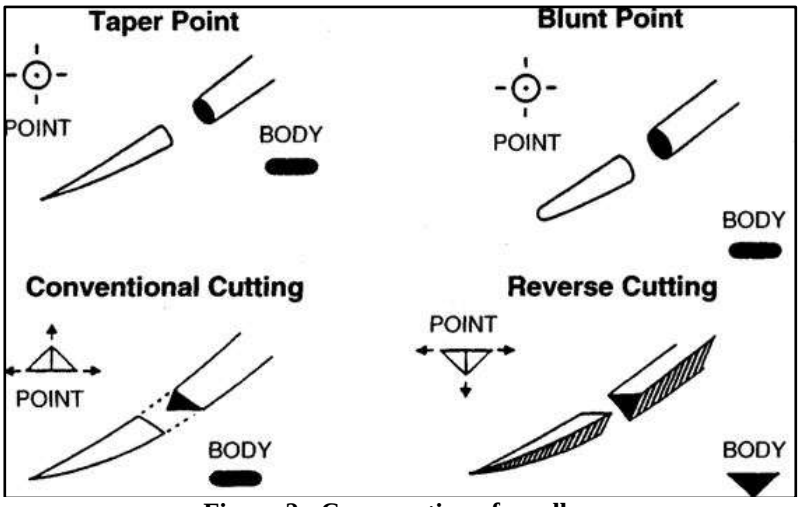

Figure 2 : Cross section of needles

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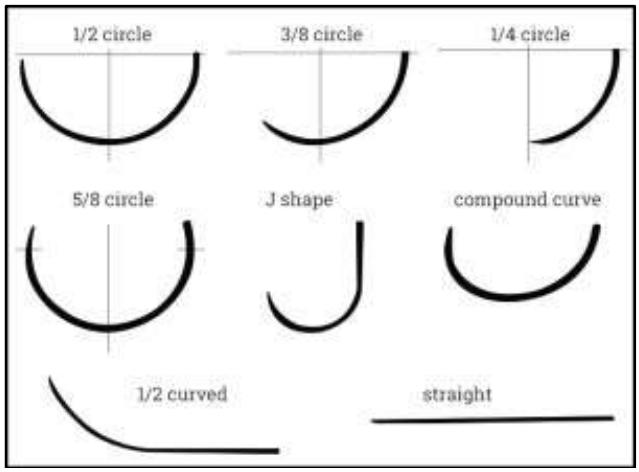

Figure 3 : Curvature of needle

PRINCIPLES OF SUTURING:

1. Needle holder should grasp the needle approximately three-fourth the distance from point.[4]
2. Needle should enter the tissue perpendicular to the surface.
3. The needle should pass through the tissue along the course of its curvature.
4. Suture should be placed at an equal distance from incision on both sides and at an equal depth.
5. Needle should be passed from free to fixed side.
6. Needle should be passed from the thinner to the thicker side.
7. If one tissue plane is deeper than the other ,needle should be passed from deeper to superficial side.
8. The distance that the needle is passed in to the tissue should be greater than the distance from the tissue edge.
9. The tissue should not be closed under tension,it will lead to tearing of the tissues or necrosis.
10. Suture should be tied so that tissue is merely approximated and not blanched.
11. Suture should not be placed over the incision line.
12. Suture should be approximated 3-4 mm apart.
13. In the interdental papilla,a suture should enter and exit the tissue at a point located below the imaginary line that forms the base of the triangle of the interdental papilla.
14. For the palatal flap, the location of sutures depends on the extent of flap elevation. The flap is divided into four quadrants. The suture should be placed in the quadrant closest to the tooth when the elevation of the flap is slight but when the elevation of the flap is substantial ,the sutures are placed in the center position.[5]

DIFFERENT SUTURING TECHNIQUES :

SIMPLE INTERRUPTED SUTURE:

Most commonly used technique. This suture starts from buccal side of the flap to the lingual side and the knot is placed . When multiple adjacent interrupted sutures are placed ,they should be spaced about 1 to 1.5 cm apart.

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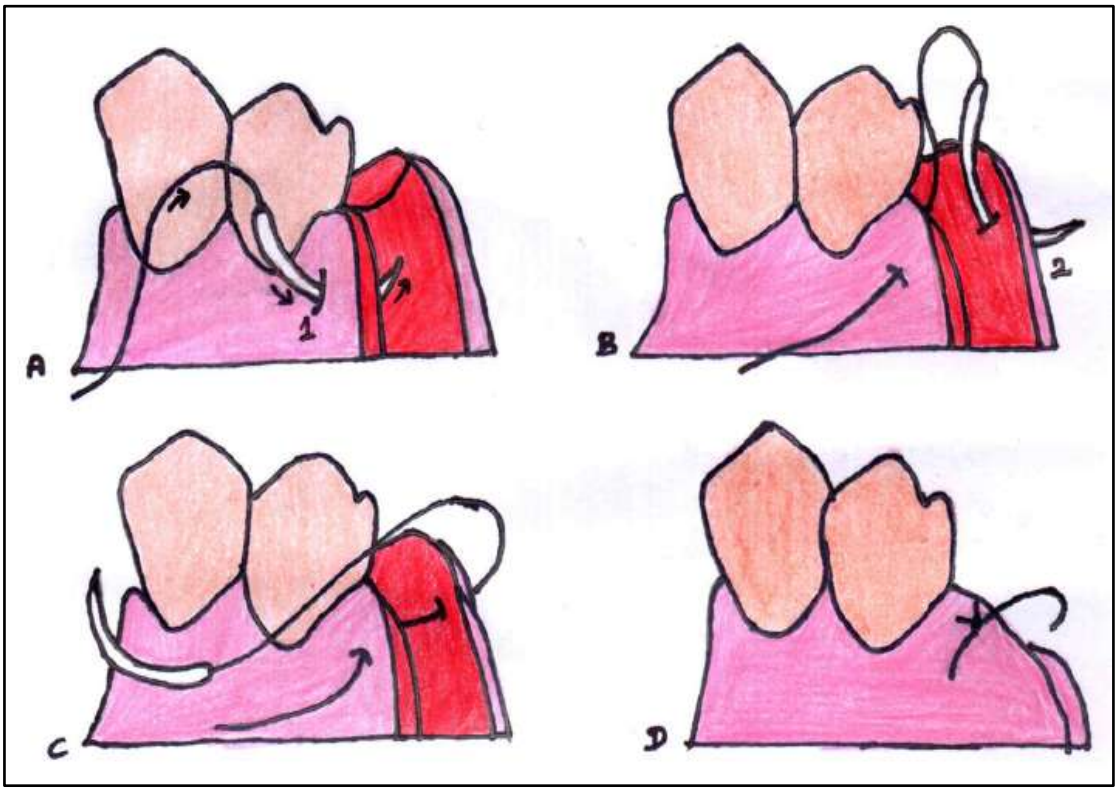

Figure 4 : Simple interrupted suturing technique . Point of needle entry is denoted in the order 1-2

Advantage :

- It can be used in area of stress .
- Each is independent of the other, and loosening one will not loosen the other.
- Removal of one suture does not affect the other in case of infection or hematoma.
- There are no interference between each stitch, and it's simple to clean.

Disadvantage :

A single cut at one place could result in the entire surgical site to be opened.

Indication :

- It is commonly used technique in periodontal flap surgery.
- It is used in bone regeneration procedures with or without use of guided tissue regeneration.
- In Widman flaps procedure [6], open flap curettage, unrepositioned flap, or apically positioned flap where maximum interproximal coverage is required simple interrupted suture technique can be used.
- It is indicated in partial or split thickness flap.
- It can be used around osseointegrated implants.
- It can be used in single tooth extraction and in case of third molar extraction .

SIMPLE CONTINUOUS SUTURE TECHNIQUE:

This suture technique is similar to the simple interrupted sutures, except knots are not tied at every stitch. Knotting is only used to secure the first and last stitches. It is a popular suturing technique that produces eversion and is simple to use.

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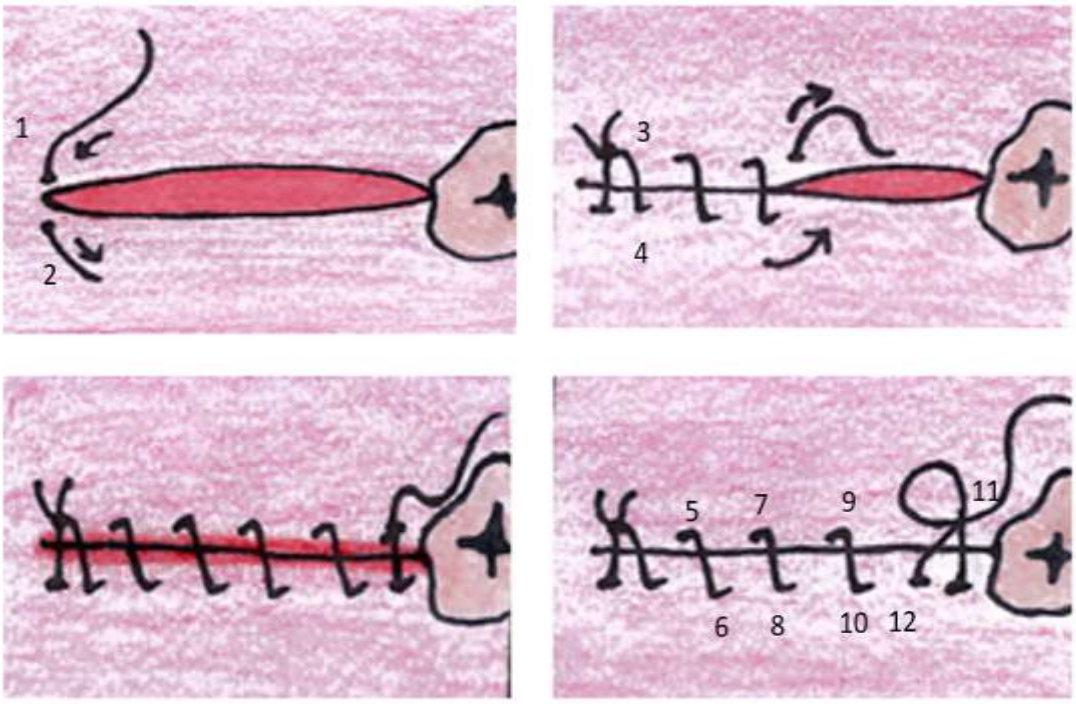

Figure 5 : Simple continuous suturing technique . Point of needle entry is denoted in the order 1-12

Advantage :

- Its simplicity and ease of suture placement.
- The suture line has a uniform distribution of tension.
- It's useful for extensive wounds when well placed deep sutures would reduce wound strain.

Disadvantage :

- only two ends of the suture line are knotted, the risk of tissue dehiscence may be increased in tissues closed with this approach.
- The entire suture line will be harmed if one of the knots is destroyed or opened.
- One of the downsides of continuous suturing is that infection might spread along the suture line.
- A major disadvantage of this this technique is that if the suture enters or breaks through tissue, the entire suture must be loosened or removed.

Indication :

- It can be used after bone graft placement as it gives a tight closure.
- It can be used in long edentulous area
- It can be used in retromolar and tuberosity area.[7]

FIGURE OF EIGHT:

The buccal surface of the flap is pierced and the needle is passed along its curvature and brought it on the lingual surface without piercing it. The second bite is taken from the outer surface of the lingual flap and the suture is passed beneath the contact area and the knot is placed.

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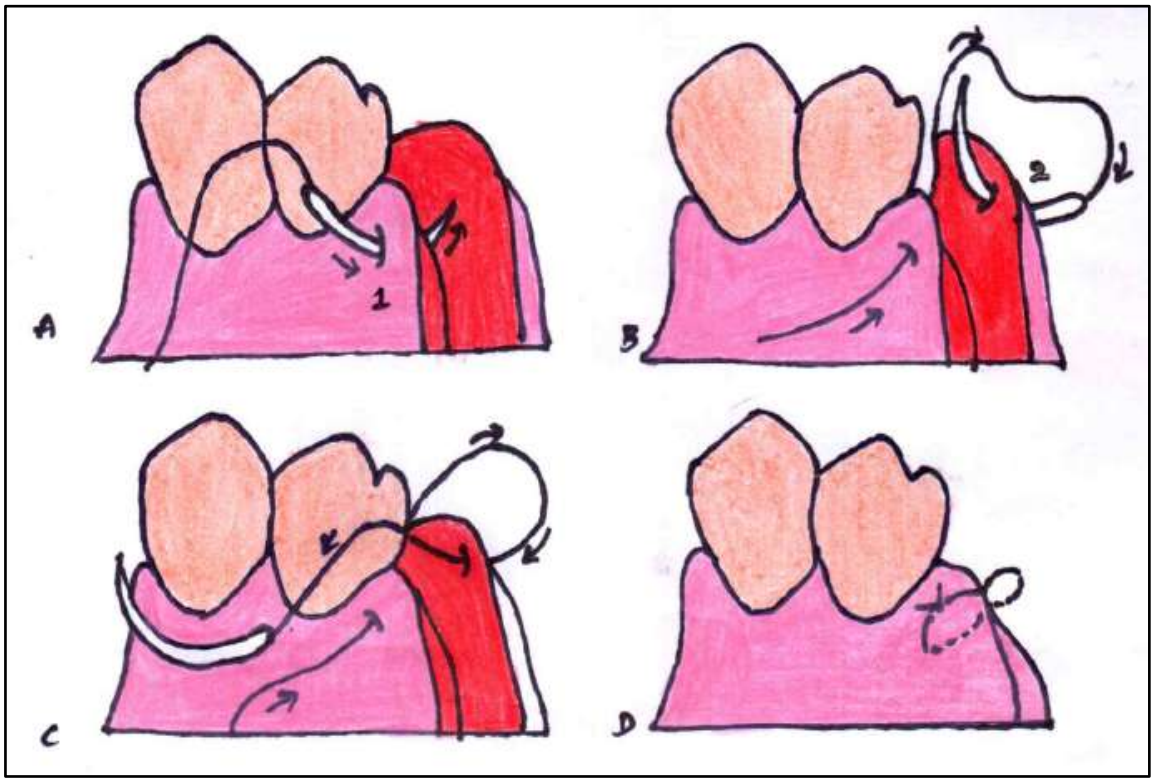

Figure 6 : Figure of eight suturing technique . Point of needle entry is denoted in the order 1-2

Advantage :

- It is the easiest technique to perform.
- Rapid closure of the flap can be obtained.

Disadvantage :

- Suture remains in between the flap and so precise adaptation of the socket may be prevented.
- Because of its orientation ,chances are there for the suture material to be left inside the socket during the suture removal.

Indications :

- It is used for the precise Adaptation of the gingival papilla around the tooth.
- It Can be used during bone graft placement in the socket.
- It is used for the closure of extraction socket.[8]

VERTICAL MATTRESS SUTURE:

It has two degrees of penetration, one deep to provide support and adduction of wound surfaces at a depth, and another superficial to draw the edges together and Evert them. It's used to close severe wounds. Needle transferred from one edge to the other, then from the latter edge to the fist, with a knot placed. When the needle is carried back from the second flap to the first, the penetration depth is shallower.

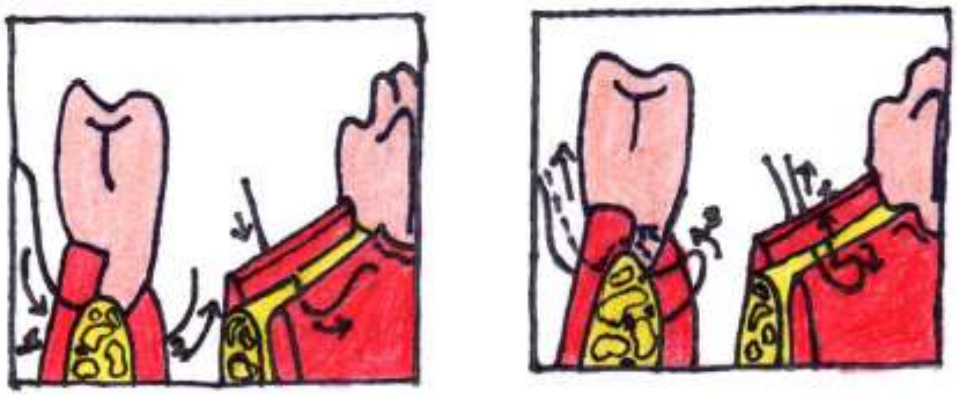

Figure 7 : Vertical matress suturing technique . Point of needle entry is denoted in the order 1-4

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Advantage:

- Improvement in the approximation of interdental soft tissue has been reported to be successful. [9]
- Reduces the dead space and it increases the strength across the wound.
- Reduces the suture gap apicocoronally, resulting in a larger and more intimate adaptation of the mucoperiosteal flap to the underlying bone and root surfaces, decreasing healing disruption.[10]
- Reduced blood clot thickness, achieved by close contact of wound surfaces, also encourages coronal migration of periodontal ligament cellular elements.[11]

Disadvantage :

- More precise skill is required for it
- It is a time consuming technique .

Indication:

- Vertical internal mattress sutures are commonly employed to resist muscle strain, evert wound margins, and adapt tissue flaps to the underlying structure more broadly and intimately where deep periodontal pocket is present.[12]
- It is used in case of resective osseous surgery.[13]

HORIZONTAL MATTRESS SUTURE:

The horizontal mattress suture is a suture technique for suturing two adjacent papillae using a single stitch. The needle penetrates the tissue on the buccal/labial side and exits on the lingual side, distal to the implant or distal papilla , then the needle continuously enters lingual side of the implant's mesial side and exits on the buccal/labial side, where the knot is tied.

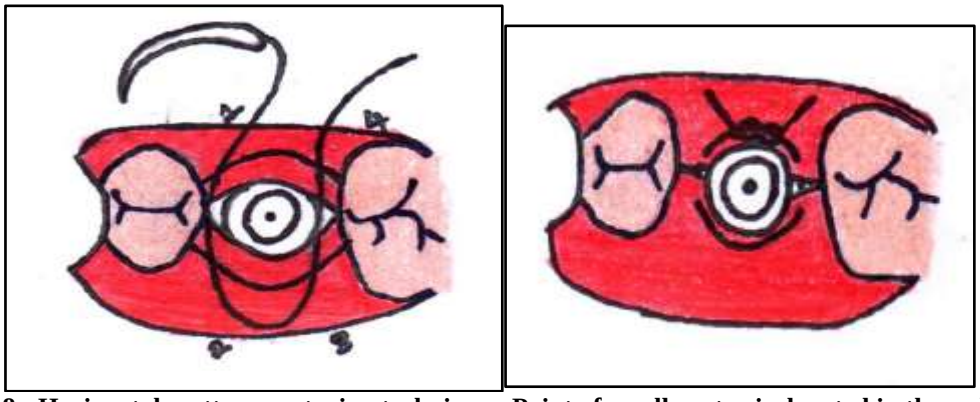

Figure 8 : Horizontal mattress suturing technique . Point of needle entry is denoted in the order 1-4

Advantages:

- When the suture is tightened properly, the wound edges will evert .
- It does not cut through tissue and is therefore useful in situations where tissue is under tension.
- It prevents inversion of the flap .

Disadvantage:

- The needle penetration distance and depth are the same for each entrance site, however the horizontal distance between the places of penetration on the same side of the flap changes.
- If applied incorrectly, it can cut off the blood supply to the incision, resulting in wound necrosis and dehiscence.

Indications:

- It is mainly indicated where the edges of the papilla is very fragile ,because here the suture needle enters farther away from the wound borders.
- It can be utilised to close bone defects, including oro-antral fistulas and cystic cavities, as well as extraction socket wounds and around implant placement.

SLING SUTURE :

In this method of suturing only side of the flap would be elevated in single tooth.The buccal flap is pierced at the distal end of the tooth and the suture is passed beneath the contact area to the mesial side of the tooth and the bite is again taken buccally from outside and the needle is passed below the contact point and reaches the initial site and knot is placed. Similar to this technique is the continuous sling suture where one quadrant would be involved .

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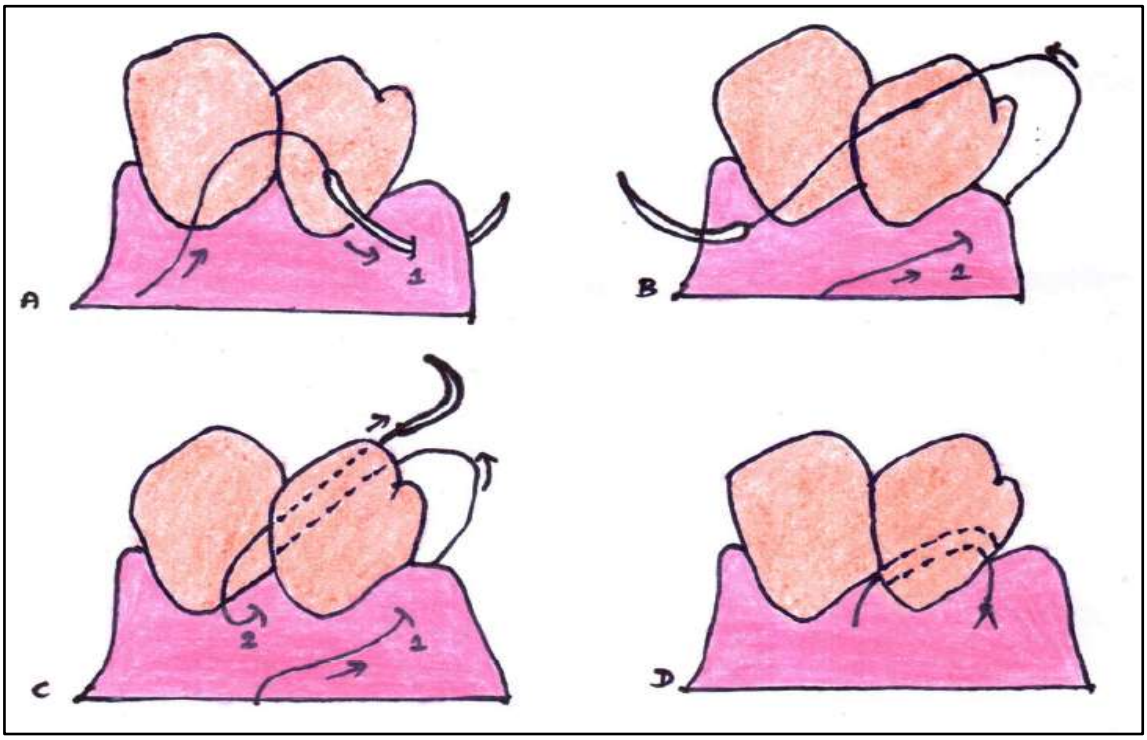

Figure 9 : Sling suturing technique . Point of needle entry is denoted in the order 1-2

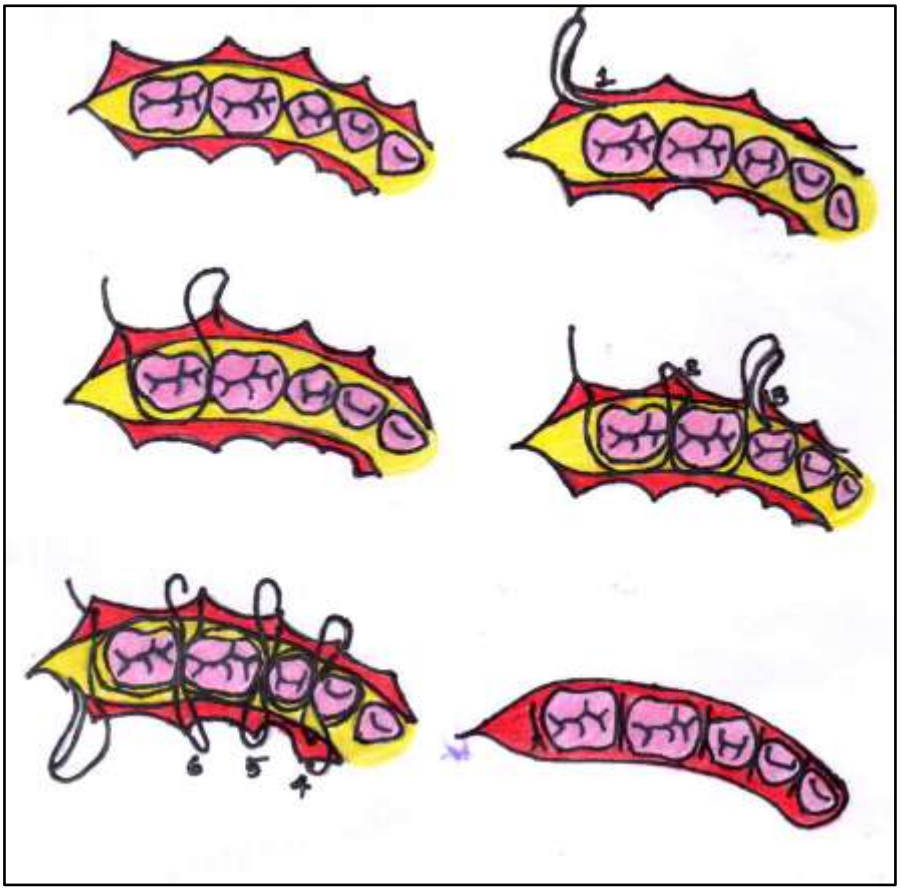

Figure 10 : continuous sling suturing technique . Point of needle entry is denoted in the order 1-6

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Advantage:

- Major advantage of this technique is avoidance of trauma to the uninvolved flap.
- It gives a precise and good stabilization the flap.

Disadvantage :

- It is not a versatile technique.

Indication :

- It can be used in areas where only one side of the flap is elevated.
- It can be used in coronally advanced flap procedure technique.
- It is also indicated in laterally displaced flap procedures .
- Root coverage procedure with lateral pedicle flap can be performed.[14]
- It is the suture technique of choice when buccal or lingual flap are repositioned at different levels and to place a barrier membrane on to the tooth surface.

Minimally invasive single papilla sling suture technique:

The needle enters the buccal papilla and is carried around the neck of the mesially located adjacent tooth without penetratıng the lingual flap ,then the suture is passed under the contact area of the dıstally located neighbouring tooth. Then, the suture is passed through the lingual surface of the dıstal tooth from interproximal area and the suture is passed through facial surface of involved interdental area and the knot is placed without creating tension on the flap.[15]

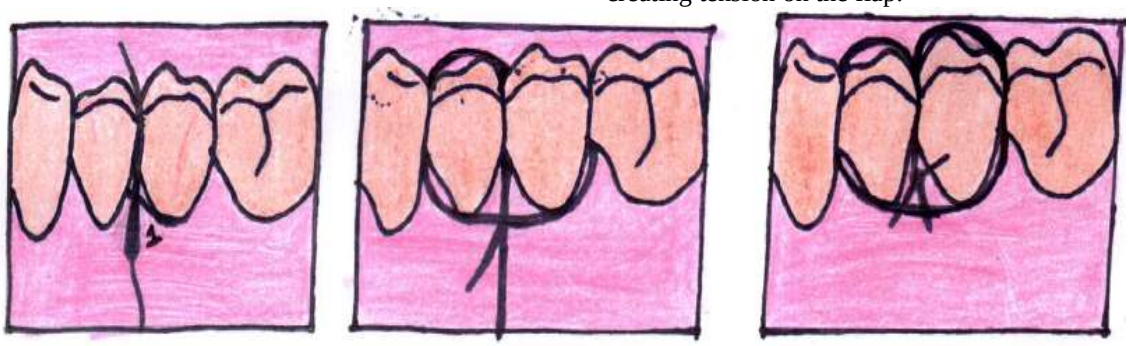

Figure 11 : Minimally invasive sling suturing technique . Point of needle entry is denoted as 1

Advantage :

- The main advantage of this technique is that without involving the unelevated side of the papilla the suture can be placed.
- In this technique less anesthesia is required .
- Flap stabilization can be better handled.

Disadvantage :

- It is not a versatile technique.

Indications :

- If periodontal destruction has occured on one surface either the facial or lingual surface of a tooth involving only single papilla and if defect was accesible, flap must be elevated only on involved surface and this suture technique is mainly indicated.

DOUBLE SLING SUTURE TECHNIQUE:

The suture begins at the buccal aspect, with the needle being directed through the entire flap thickness. The needle leaves at the palatal aspect of the flap with the same bite size as an interrupted suture . The needle is then returned to its original position and entered superficially through the buccal flap with a bite size of approximately 2 mm and passed to the palatal side piercing only superficially and knot is placed side. This layer-wise suture approach ensures perfect adaptation of the flap tissues, resulting in primary wound closure.[16] Monofilament polypropylene and polyvinylidenfluroride sutures in sizes 6-0 and 7-0 , a 3/8 circle needle is used for this technique.

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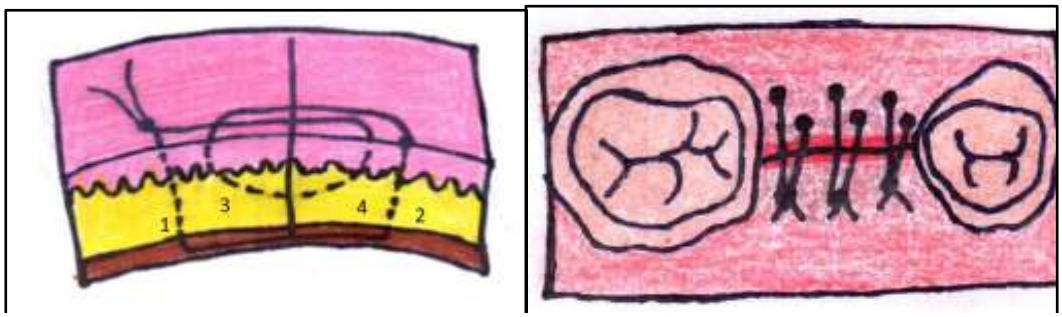

Figure 12 : Double sling suturing technique . Point of needle entry is denoted as 1-4

Advantage :

- Precise wound closure of a surgical site is achieved.
- Tension-free and perfect adaptation of the flap tissues is possible.[17]

Disadvantage:

- More skills are required for this technique ,as it is a layerwise flap closure.
- It is a microsurgical approach and so loupes and microsurgical instruments are required for it.

Indication :

- Mainly indicated in periodontal regenerative surgeries where precise wound adaptation has major influence on the treatment outcome.[18,19]

HIDDEN CRISS CROSS SUTURE:

The needle enters through the buccal flap and passes to the opposite side in a diagonal direction, then it passes again from the buccal to the lingual side, also in the diagonal direction. In hidden X sutue technique crossed X is created under the flap and two parallel lines are seen in the incision line. Hidden criss cross suture is similar to the x cross suture where X is seen on the incision line.

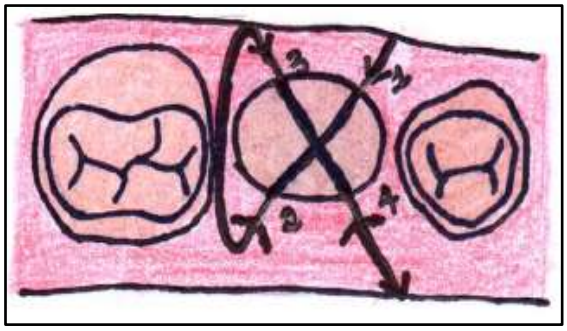

Figure 13 : hidden criss crosssuturing technique . Point of needle entry is denoted in order 1-4

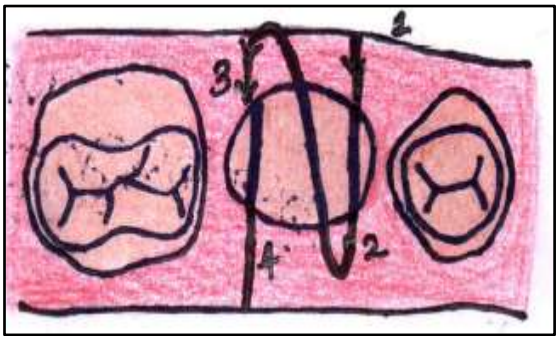

Figure 14 : X-cross cross suturing technique . Point of needle entry is denoted in order 1-4

Advantages :

- Minimize the tension along the buccolingual axis, and so the horizontal resorption of the alveolar bone is reduced. [20]
- It can secure bone grafts and membranes firmly.

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- It increases the width of the keratinized gingiva in alveolar ridge preservation procedure.

Disadvantage :

- It is a time consuming procedure.
- More precise skill is required.

Indication :

- Mainly indicated in the alveolar ridge preservation procedure.

PERIOSTEAL SUTURE:

The periosteal suture technique entails entering the periodontal tissues and periosteum all the way to the bone , then rotating the needle back in the same direction where started and penetrating through the periosteum and keratinized tissue again. After gripping the periosteum with a 180° rotation, the needle is pushed along the bone beneath the periosteum, rotating around the needle body, allowing the point to escape the periosteum and tissue.[21] Resorbable thin suture, 6-0 and a relatively small needle 10 to 13 mm 3/8 circle is used.[22]

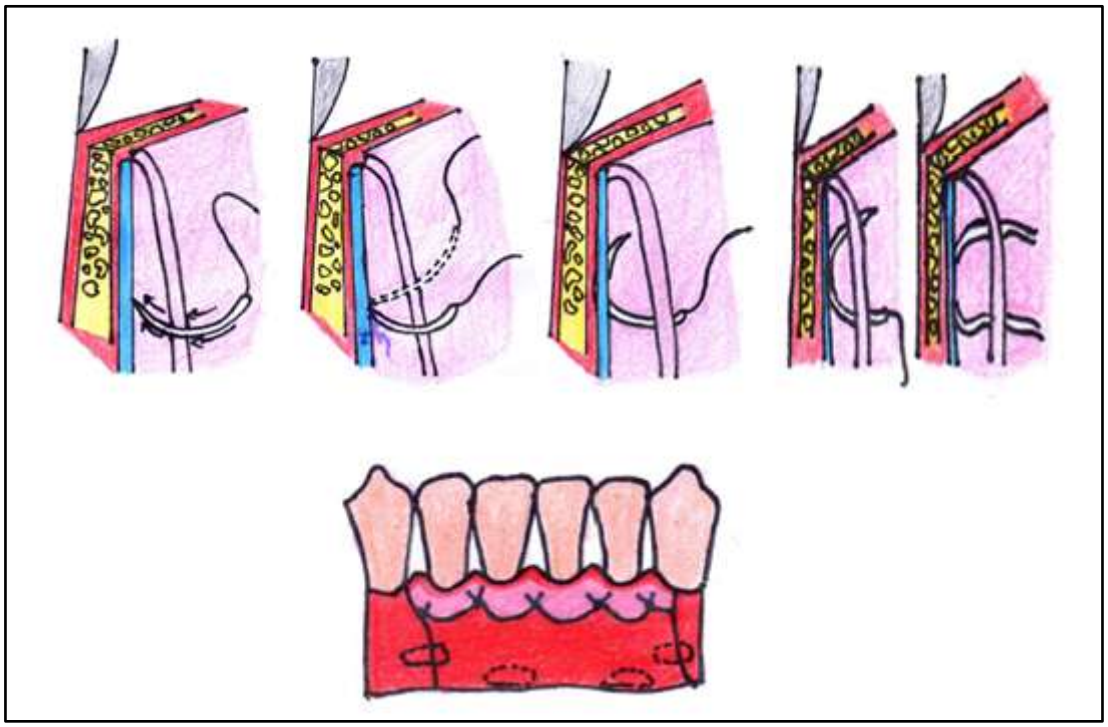

Figure 15 : Periosteal suturing technique .

Advantages :

- It is possible to place the flap in the desired position.

Disadvantage :

- The periosteal bed should be well fixed to the underlying bone and should not be easily displaced during manipulation of the flap.

Indication:

- Periosteal suturing is the technique of immobilizing a partial thickness flap, or a free gingival graft, to a new position by utilizing the adjacent periosteum to anchor the flap.[23]
- It is indicated in guided bone regeneration technique.
- Very useful around implants accompanied with bone regeneration procedures.

Suture knots :

Surgical knot tying is a important component of the art of suturing. The most commonly used knots are

Square knot : Two single ties made in opposite direction.

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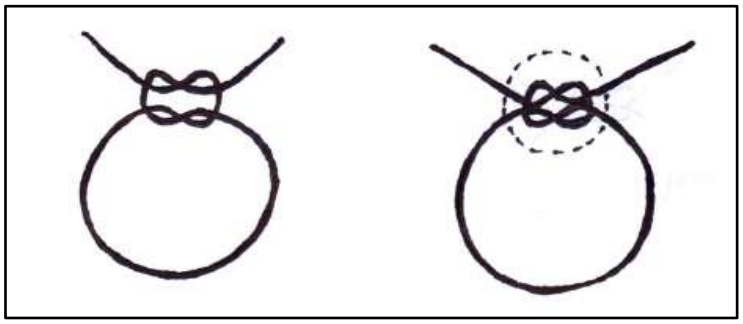

Figure 16 : Square knot

Granny's knot : Two/three ties in the same direction.

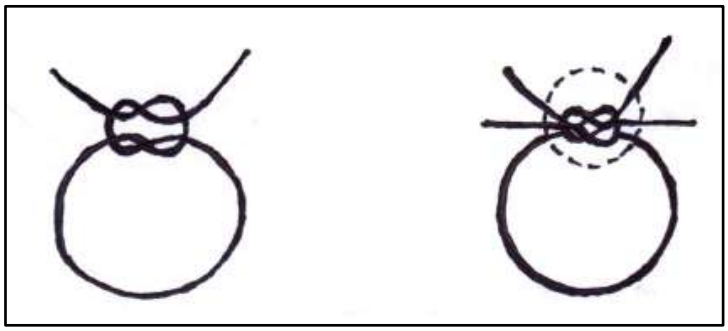

Figure 17 : Granny knot

Surgeon's knot : Two ties in one direction and third in opposite.

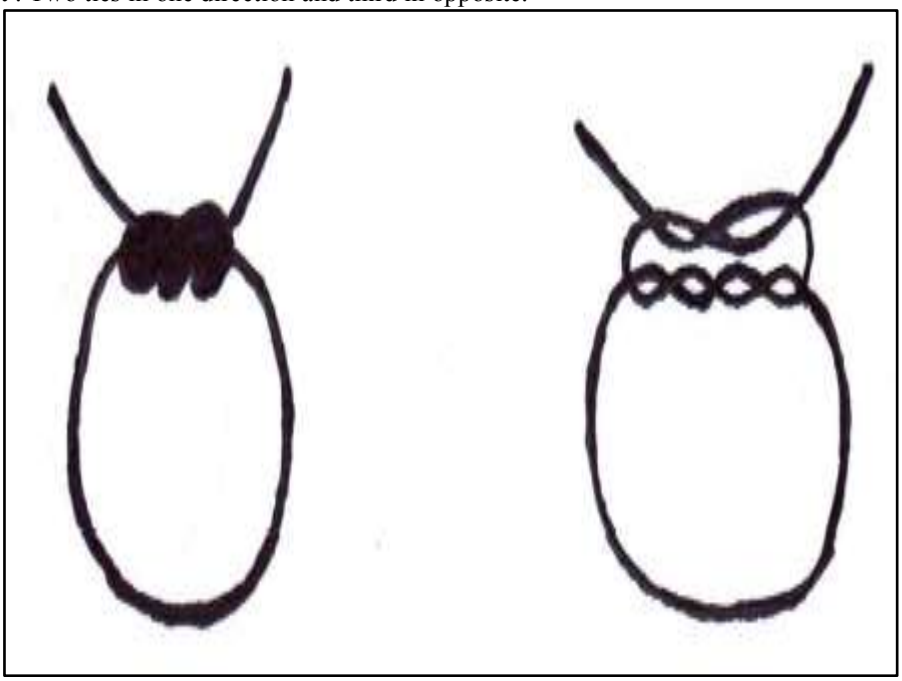

Figure 18 : Surgeon knot

Suture removal :

Sutures are usually removed after 7-10 days. The sutured area is irrigated with normal saline to remove gross debris. With the help of sharp suture scissor the suture material is cut as close as possible to the tissue to ensure that the exposed bacterial laden part is not passed through the tissue while removal. The knots are removed first so that their accidental entrapment into tissue is prevented .

Complications :

1. Loosened suture may impair healing by primary intention and increases the risk of infection.
2. Spread of infection all along the suture line – wicking effect , commonly seen with the use of braided sutures.
3. If sutures are left in place for longer time it may lead to "stitch abscess" or "epithelial inclusion cyst" in some cases.

II. CONCLUSION :

Knowledge of the suture materials and techniques are absolutely necessary in order to achieve satisfactory results. Many failures are encountered in periodontal flap / implant surgical procedures due to faulty suturing techniques employed to adapt the flap. Gentle and proper handling of soft tissues during various suturing techniques ensures optimal tissue healing and high esthetic outcomes.

REFERENCE:

[1]. Kamann WA, Grimm WD, Schmitz I, Müller KM. Die chirurgische Naht in der Zahnheilkunde. Parodontologie (Berl). 1997;4:295-310.

[2]. Siervo S, Lorenzini L. Suturing techniques in oral surgery. Quintessenza Edizioni; 2008.

[3]. Hochberg J, Meyer KM, Marion MD. Suture choice and other methods of skin closure. Surg Clin North Am. 2009; 89:627 – 641

[4]. Evaskus DS. General principles and techniques of surgery. Ln Laskin DM (Eds). Clinician's Handbook of Oral and Max1illotacidi Surgery, 1st edition. Illinois, USA: Quintessence Publishing, 2013. pp. 255-91.

[5]. Takei HH, Carranza FA.The periodontal flap. In: NewmnanMG, Takei HH, Carranza FA (Eds). Carranza's Clinical Periodontology, 8th edition. Philadelphia, PA, USA: VWB Saunders; 1996. pp. 592-604.

[6]. Kumar K, Sharma RK, Tewari S, Narula SC. Use of modified vertical internal mattress suture versus simple loop interrupted suture in modified Widman flap surgery: a randomized clinical study. Quintessence International. 2019 Oct 1;50(9).

[7]. Hupp JR, Ellis III E, Tucker MR: Contemporary Oral And Maxillofacial Surgery (ed 6). St. Louis, MO, Elsevier, 2014.

[8]. Application of figure-of-eight suture for mandibular third molar surgery: A prospective cohort study Qingtong Zhao1 , Yuqiong Zhou2 ,Mengyu Li2 , Yejia Yu2 , Shaoyi Wang2 * International Journal of Sciences & Applied Research, 7(5), 2020; 03-10.

[9]. Meyle J. Suture Materials and Suture Techniques. Periodontal Practice Today. 2006 Sep 1;3(4).

[10]. Burkhardt R, Lang NP. Influence of suturing on wound healing. Periodontology 2000. 2015 Jun;68(1):270-81.

[11]. Listgarten MA. Electron microscopic study of the junction between surgically denuded root surfaces and regenerated periodontal tissues. Journal of Periodontal Research. 1972 Feb;7(1):68-90.

[12]. Zuhr O, Akakpo DL, Huerzeler M. Wound closure and wound healing. Suture techniques in contemporary periodontal and implant surgery: Interactions, requirements, and practical considerations. Quintessence International. 2017 Sep 1;48(8).

[13]. Yeragi E, Nalawade KP, Benjamin A, Gotmare S, Mahajan K. Resective Osseous Surgery–A Review.

[14]. Mani AM, Marawar PP, Pawar BR, Anarthe RY, Hartalkar SA. Root Coverage with Lateral Pedicle Graft: A Case Report. Pravara Medical Review. 2014 Dec 1;6(4).

[15]. Minimal Invasive Single Papilla Sling Suture Technique Akkaya M1 and Karacaoglu F1* Open Access Journal of Dental Sciences ISSN: 2573-8771 September 14, 2016

[16]. Wachtel H, Ficki S, Zuhr O, Hürzeler MB. The double-sling suture: a modified technique for primary wound closure. European Journal of Esthetic Dentistry. 2006 Dec 1;1(4).

[17]. Silverstein LH, Kurtzman GM. A review of dental suturing for optimal soft-tissue management. Compendium of continuing education in dentistry (Jamesburg, NJ: 1995). 2005 Mar 1;26(3):163-6.18.

[18]. Wachtel H, Schenk G, Böhm S, Weng D, Zuhr O, Hürzeler MB. Microsurgical access flap and enamel matrix derivative for the treatment of periodontal intrabony defects: a controlled clinical study. Journal of Clinical Periodontology. 2003 Jun;30(6):496-504..

[19]. Cortellini P, Tonetti MS. Clinical performance of a regenerative strategy for intrabony defects: scientific evidence and clinical experience. Journal of periodontology. 2005 Mar;76(3):341-50.

[20]. Park JC, Koo KT, Lim HC. The hidden X suture: a technical note on a novel suture technique for alveolar ridge preservation. Journal of periodontal & implant science. 2016 Dec 1;46(6):415-25.
[21]. Urban IA, Lozada JL, Wessing B, Suárez-López del Amo F, Wang HL. Vertical bone grafting and periosteal vertical mattress suture for the fixation of resorbable membranes and stabilization of particulate grafts in horizontal guided bone regeneration to achieve more predictable results: a technical report. Int J Periodontics Restorative Dent. 2016 Mar 1;36(2):153-9.
[22]. Kramer GM, Nevins M, Kohn JD. The utilization of periosteal suturing in periodontal surgical procedures. Journal of periodontology. 1970 Aug;41(8):457-62.
[23]. Koshak HH. Dental suturing materials and techniques. Global Journal of Otolaryngology. 2017;12(2):1-1.