İCMAL • REVIEW

The Roles of Suture Materials and Suturing Techniques in Periodontal Surgery

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In periodontal surgery, the ultimate goal of any soft-tissue manipulation is to achieve stable, tension-free wound closure. Because dental surgeons must adapt highly delicate, vascularized soft tissue onto varying hard surfaces, the choice of suturing materials and techniques directly dictates the success of primary-intention healing. This review summarizes essential periodontal suturing techniques, suture materials (absorbable and non-absorbable), sizing and needle selection, and the fundamental rules for flap apposition.

Keywords: *periodontal surgery, suturing techniques, suture materials, flap apposition, wound closure*

36. Introduction

In periodontal surgery, the ultimate goal of any soft-tissue manipulation is to achieve stable, tension-free wound closure (Davis, 2023). Because dental surgeons must adapt and stabilize highly delicate, vascularized soft tissue onto varying hard surfaces—such as bone, cementum, and titanium implants—the choice of suturing materials and techniques directly dictates the success of primary-intention healing (Davis, 2023; Silverstein, n.d.). Inadequate flap management or incorrect suture choice allows blood and serum to pool beneath the tissue, creating dead spaces that separate the flap from the underlying bone, delaying healing and increasing the risk of infection or bone loss.

Periodontal surgery corrects anatomical, traumatic, or developmental defects in the periodontal area (alveolar bone, gingiva) and comprises several sophisticated procedures, including frenectomy, soft-tissue grafting, mucogingival surgery, and osseous surgery. Surgical methods are among the modalities for treating periodontal disease; after surgical treatment of periodontal tissues and alveolar bone, it is necessary to close the surgical field or reposition the formed flap. The selection of a suturing technique depends on whether the surgical flaps must be repositioned to their original height, displaced apically or coronally, or stabilized across multiple teeth.

37. Essential Periodontal Suturing Techniques

37.1 Interrupted Sutures

The simple interrupted suture is the baseline standard for closing isolated, clean incisions. Each stitch is placed and tied independently. While highly dependable—because the failure of one knot will not compromise the entire surgical line—placing multiple individual knots is time-consuming and can unevenly distribute tension across a long incision.

37.2 Continuous Sling Sutures

When surgical flaps span multiple teeth, a continuous sling technique utilizes the stable necks of the teeth as anchor points to pull and adapt the soft tissue tightly against the bone. *Advantages:* it minimizes the total number of knots, distributes forces evenly, and permits independent tension adjustment of the buccal and lingual flaps. *Disadvantages:* it requires a high degree of clinician dexterity, and if the suture thread snaps or a knot unravels at any point, the entire flap can lose stability.

37.3 Mattress Sutures (Horizontal and Vertical)

Mattress techniques are highly specialized for structural tension management and eversion. The *horizontal mattress* spans a wide horizontal area, ideal for adapting flaps tightly against interproximal spaces or resisting heavy muscle pull. The *vertical mattress* penetrates the tissue at two different depths, acting as a powerful tool for lifting or coronally advancing a tissue flap while ensuring precise edge-to-edge alignment of the outermost margins.

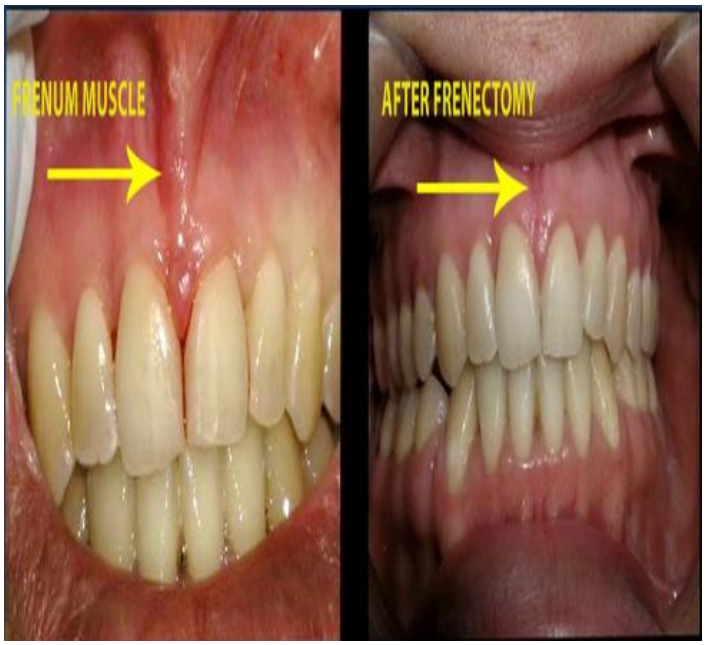


Figure 1. Interrupted and continuous sling suturing techniques used to adapt periodontal flaps against the underlying bone.



Figure 2. Horizontal and vertical mattress sutures for structural tension management and tissue eversion.

38. Suture Materials

38.1 Absorbable Sutures

Absorbable sutures are indicated for rapidly healing intraoral tissues or when postoperative removal would stress a delicate site. *Natural absorbables* (plain and chromic gut), derived from sheep or beef intestines, are broken down by proteolytic enzyme digestion; plain gut loses tensile strength within 24–48 hours, while chromic gut extends it to 5–7 days, though natural origin causes notable tissue reactivity and stiff handling. *Synthetic absorbables* (PGA and Polyglactin 910/Vicryl) degrade via predictable hydrolysis, independent of intraoral pH, and resist muscle pull over 14–28 days; being braided, they offer excellent handling and knot security but can exhibit a wicking effect.

38.2 Non-Absorbable Suture Materials

Non-absorbable sutures are constructed from inert materials and must be manually removed, typically 7–10 days post-surgery. *Surgical silk*, historically the gold standard due to its low cost and knot security, has a braided structure that acts as a capillary wick for saliva, plaque, and bacteria. *Synthetic monofilaments* (nylon and polypropylene) eliminate the wicking effect and provide high tensile strength with minimal tissue reaction, but have high memory, requiring extra throws. *Expanded polytetrafluoroethylene (e-PTFE)* is an inert monofilament widely preferred in guided tissue regeneration, bone grafting, and implant therapy; it causes virtually zero tissue irritation but has a higher cost and lower knot security than silk.



Figure 3. Suture materials, needle curvature (3/8 circle) and correct flap apposition for tension-free wound closure.

39. Suture Sizing and Needle Selection

The United States Pharmacopeia (USP) system measures suture thickness, where adding zeros indicates a progressively smaller diameter. **3-0:** thick, heavy-gauge thread for high-tension areas or initial mattress anchors over broad edentulous areas. **4-0:** the general workhorse diameter for standard periodontal mucoperiosteal flaps and routine implant closures. **5-0 to 6-0:** ultra-fine diameters for periodontal plastic surgery, mucogingival esthetic procedures, and micro-surgical free grafts. Periodontal needles are manufactured from corrosion-resistant stainless steel alloys containing at least 12% chromium; a 3/8 circle curvature is standard, offering optimal rotational clearance in the limited access of the oral cavity.

40. Materials and Methods: Fundamental Rules for Flap Apposition

The biological key to predictable healing is maintaining macro-stability without choking the micro-circulation of the soft tissue.

1. **Perpendicular penetration.** Always drive the needle into the soft tissue at a strict 90-degree angle to the surface; oblique passes create a thin, compromised margin that tears under tension.
2. **Symmetrical suture bites.** The distance from the entrance to the incision line must equal the distance from the incision line to the exit; bite depth should ideally measure 1.5 times the tissue thickness.
3. **Layer-to-layer alignment.** Adapt periosteum to periosteum and epithelial margins to epithelial margins; misaligning layers leads to secondary-intention healing and heavier scarring.
4. **Tension-free knotting.** Pull the thread just tightly enough for passive adaptation; the tissue must never blanch, as excessive tension causes ischemia, marginal necrosis, and flap failure.

Suture properties. *Tension strength* is the weight required to break the thread and must be evaluated in wet sutures. For absorbable threads, *biological strength* is the period during which the thread retains 10–20% of its original strength in the body. *Knot strength*—the least reliable component—requires at least three throws with 3 mm ends, and additional throws for smoother monofilaments. *Capillarity* (fluid distribution along the length) is absent in monofilaments but variable in multifilaments; coating braided sutures with Teflon, silicone, or paraffin can reduce it. *Elasticity* allows the material to stretch with swelling and return to its original length. *Tissue reaction*: as a foreign body, suture material may interfere with healing; polyglecaprone-25 shows positive effects on wound healing compared with silk, which elicits a more intense inflammatory response.

41. Results

Suturing techniques are related to flap design. In regenerative surgeries, a monofilament, 5-0 diameter suture on a reverse-cutting, 3/8 circle needle was preferred; the same was favored for mucogingival surgery. Four important properties common to all suture materials are: (1) the intensity of the inflammatory response evoked; (2) behavior in the presence of infection; (3) durability; and (4) handling ability. During wound healing, leukocyte migration causes tissue swelling; therefore the final knot should not be tied too tightly, leaving free space so the sutures do not cut through the swelling tissue.

42. Conclusion

In regenerative surgeries, a monofilament, 5-0 diameter suture on a reverse-cutting, 3/8 circle needle was preferred, as it was for mucogingival surgery. Polypropylene (PP) showed the highest mechanical properties compared with polyglactin (PG) and silk (SL); within the limitations of this study, PP is the best suture material for wound closure after oral and periodontal surgical procedures, followed by PG and SL respectively. Tissue reactions to suture materials may vary depending on the surface properties and bacterial adherence of the material.

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