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Soft Tissue Management In Periodontal Surgery To Achieve The Best Treatment: Factors Related To The Technique

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Abstract

To successfully perform periodontal surgery, clinicians must consider several prognostic factors when managing soft tissue conditions. There are factors related to the patient, factors related to the tooth or site, and factors related to the technique that can be used better to estimate the patient's response to specific treatment and describe the overall result and predictability of the surgical process. To determine the level of factors related to the technique that affect the achievement of soft tissue management in periodontal surgery. The gingival tissue's vascular supply during and after periodontal surgery is essential to the tissue's ability to heal. Early group of blood formation and developing a clot binding that can survive mechanical forces operating on the interface between are essential for wound healing. Since soft tissue treatment directly impacts how wounds heal, it is the most critical component of successful plastic periodontal surgery. Technique-related factors are one of the keys to successful periodontal surgery. They can affect the blood supply and wound solidity, resulting in good soft tissue management.

Keywords: Periodontal surgery; wound healing; blood solidity; thickness of the flap

1. Introduction

Periodontal disease treatment, which includes many methods and treatments, depends on the disease status and the desired outcome. Successful nonsurgical (phase I) therapy, which consists of daily biofilm removal by the patient, scaling, and root instrumentation when needed, may correct early issues. Many moderate to advanced cases cannot be treated without surgically accessing the root surface for root instrumentation to reduce or eliminate pocket depth to assist the patient in removing biofilm [1,2].

The phrase "periodontal surgery" typically excludes debridement and root planing. It refers to certain operations on the periodontal soft tissues and bone. However, the outcome of these subsequent surgeries will probably determine whether the surgical treatments are successful [3,4,5,6,7].

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The American Academy of Periodontology described periodontal surgery as surgical operations to prevent abnormalities of the gingiva, alveolar mucosa, or bone caused by awful, structural, growth-related, or disease-related issues [10]. Gingival augmenting, Coverage of roots, gingival conservation at the ectopic eruption of teeth, crown lengthening, adjustment of mucosal deficiencies at implants, elimination of an aberrant frenum, and avoiding the ridge collapse related to tooth extraction are all included in a variety of soft- and hard-tissue operations referred to as edentulous ridge augmentation [8,9,10].

1.1. Soft Tissue Management in Periodontal Surgery

A circumstance, state, or feature of the patient that is useful to more accurately predict the patient's ultimate course of events or reaction to a certain treatment is known as a prognostic factor. While prognostic factors may not solely determine the result, they significantly impact how well the therapy works or how predictable it is. Potential predictive factors in periodontal surgery are best explored for root-coverage treatments. They can be categorized into three groups: factors related to the patient, the tooth or site, and the technique [8,9,12].

The most critical factors for success in periodontal surgery are those related to technique because they allow the clinician to have A quick influence on the surgical procedure context's overall result and accuracy. Factors related to the patient, such as overall health, smoking patterns, dental health, or using a toothbrush traumatizingly, as well as factors related to the tooth or site, such as location of the defect, defect formation, or the clinical attachment level, are generally managed by carefully choosing every situation, or possibly additionally by treatment relevant to what caused it [8,9,12].

Based on these considerations, the author wanted to analyze further the factors related to the technique that affect the achievement of soft tissue management in periodontal surgery [8,9,12]

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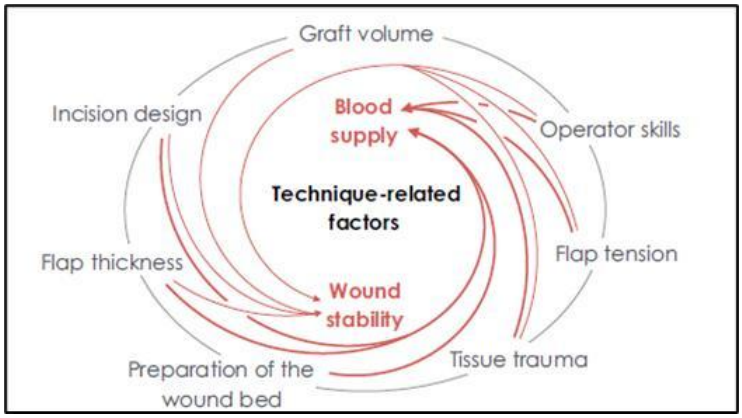

Figure 1 To achieve soft tissue management in periodontal surgery, factors related to the technique may be predictive. The red arrows show the complexity of surgical variables associated with oral mucosal healing [8].

1.2. Factors Related to The Technique

1.2.1. Factors Related to The Technique

Clinicians' clinical backgrounds may impact their decision-making, case selection, and surgical proficiency [13]. Variations in the results of the same surgical treatment performed by different clinicians could be explained by the impact of their particular surgical talents [14]. It would be logical to expect that the level of knowledge and experience would impact the choice of technique, even though the clinician's preferences might not play a significant role [15,16].

1.2.2. Graft Volume

To encourage periodontal regeneration, bone or bone substitutes have been inserted into the debrided periodontal defect in addition to surgical access. The idea behind this strategy is that by encouraging bone growth, new attachments would also form along the adjacent tooth root surface. Autograft, allograft, xenografted, and alloplastic materials were the sorts of grafts that were used [17,18]

The primary benefit of using GTR in conjunction with bone grafts is the support provided by resorbable membranes, which frequently lack the stiffness required to preserve space and prevent collapse into the defect. GTR, in combination with bone substitutes, produced results comparable to GTR alone in the therapy of intrabony defects [19,20].

In clinical practice, soft tissue grafts have become more frequently utilized to improve the appearance of teeth and dental implant sites by improving tissue dimension, restoring an acceptable width of keratinized tissue, repairing mucogingival abnormalities, and enhancing appearance [10,21]. In addition to offering insights into the developing field of peri-implant soft tissue plastic surgery, the current publication provides the most recent evidence about periodontal surgery treatments performed after the 2015 AAP Regeneration Workshop [22,23].

1.2.3. Incision Design

The design of surgery, at least from a clinical perspective, flap management for enhanced flap survival and graft coverage, as well as suturing technique to maximize primary closure, can all significantly impact the greater predictability of reconstructive procedures. This guarantees that the prerequisite for stabilizing and maturing a group of blood in a biological environment protected from biomechanical and microbiological challenges is met [24,25].

1.2.4. Thickness of the flap

Mucous membranes are made up of the lamina propria underneath and the surface epithelium above. Beneath the lamina propria is the submucosa, which serves as a bridge between it and the subjacent structures below. Epithelium and connective tissue are typically cut inward from the oral epithelium during surgical operations. In contrast, the tissues are punctured in the reverse sequence when flaps are released to accomplish primary closure. In that order, the submucosa, periosteum, and maybe a segment of the muscle layer are sutured. It is avoided to cut into the epithelium [30]. Keeping the tissues being incised in mind from a microscopical standpoint is useful when doing flap advancement. The periosteum is the first layer to break through, which covers the bone like a sheet of cellophane. Keeping the tissues being incised in mind from a microscopical standpoint is useful when doing flap advancement. The periosteum is the first layer to break through, which covers the bone like a sheet of cellophane. This is a slim layer of thick connective tissue wrapped in two layers. The inner cambium stratum contains progenitor cells and Sharpey's fibers, which embed into the bone. The outer fibrous layer contains innervation and blood vessels. The periosteum is bound and can have a maximum thickness of 0.375 mm or numerous cells [31].

Initially, the main idea was establishing primary wound closure in intrabony defects following regenerative surgery while maintaining the interdental papillae by flap design. Since then, these flap designs have been refined to improve primary flap closure further. Two approaches to papilla preservation have been developed: one that is more complex and the other that is simpler. When these two approaches were used in many regenerative trials, it became evident that these designs outperformed earlier access flap procedures regarding clinical attachment level gains. The benefits were ascribed to better flap closure that persisted throughout the healing process. This progress has led to the emergence of papilla preservation as a fundamental ideal in access flap surgery [15,34].

1.2.5. Flap Tension

Reliable information on the distribution pattern and architecture of the human oral mucosa's arterial vascular system can be used to make the following recommendations for the best way to prepare flaps and release incisions: (a) incise the sulcular area surrounding the teeth without making marginal or para-marginal incisions; (b) make midcrestal incisions in edentulous areas; (c) refrain from making releasing incisions; (d) if one must be made, make it as short and asmedially as possible; and (e) avoid making releasing incisions on the prominences of the buccal roots because the mucosal tissues covering the roots are typically slim and delicate. This improves the vascular network wislim the flap and makes it easier to modify the hard flap [16,35].

1.2.6. Tissue Trauma

To optimize regenerative processes in intrabony defects, the paradigm of establishing primary flap closure was further developed using minimally invasive procedures. Magnification was required for this function to improve visualization. As a result, doing periodontal surgery now typically involves using microsurgical tools and magnifying glasses [36]. As a result of decreased trauma, micro thrombosis, and vascular collapse, minimally invasive procedures that involve careful tissue handling and the use of sharp cuts rather than laceration and contusion hold the potential to improve treatment outcomes significantly. Thus, periodontal surgery may now be performed primarily using microsurgical equipment, magnifying glasses, and lighting [16,37].

1.2.7. Preparation of wound bed

The group of blood attachments to a firm, non-shedding surface, such as a root or implant surface, might vary significantly from that of the blood attached to a soft tissue wound bed. The attachment to the latter is more complex. Inadequate clot adherence to these hard surfaces may reduce the breaking strength of the wound during the early stages of the healing phase, increasing the likelihood of ripping at the interface between the mucosal flap and the wound bed compared to the tensile forces that generally occur in the wound margins. [38]

Inadequate clot adherence to these rough surfaces may reduce the wound's tensile strength during the early stages of the healing period, making the interface between the mucosal flap and the wound bed more prone to tearing than occurring naturally in the wound margins. The constancy of the blood group and the wound bed's mechanical and biological characteristics are the two main factors affecting tensile force variations. Theoretically, wound healing following flap surgery at challenging, non-shedding surfaces is more complex than wound healing at most other oral cavity sites [38,39].

1.3. Achievement of Factors Related to The Technique

1.3.1. Blood supply

Microcirculatory tracts, blood vessels, and lymphatic vessels play an essential role in the drainage of tissue fluid and the spread of inflammation. The vascular supply of gingival tissues during and after periodontal surgery is critical to tissue healing. Most studies of the blood supply of gingiva have been done in animals or on human

cadavers and have shown that the blood supply to the free and attached gingiva is derived mainly from the supraperiosteal vessels. In contrast, the periodontal ligament is supplied by vessels that properly perforate the alveolar bone. Anastomoses between gingiva and periodontal ligament vessels, though the capillaries were arranged differently in each of these two networks. In the normal periodontium of different laboratory animals, connections between gingival and periodontal ligament vessels were seldom observed. The independence of the gingival and periodontal ligament blood supplies has also been demonstrated functionally. Occlusion of vessels in the periodontal ligament does not affect the blood supply of the gingiva, and occlusion of arterioles supplying the gingiva does not appear to alter the blood supply of the periodontal ligament [1,9,29].

1.3.2. Wound Stability

In an attempt to develop cutting-edge healing techniques and treatment modalities, wound management has drawn much attention. One of the most critical steps in the healing of wounds is the creation of an attachment of the group of blood that can withstand mechanical stresses occurring on the interface between the flap and opposing wound surfaces and that avoids pollution by bacteria [8,16]. The four distinct but overlapping stages of the wound healing process are hemostasis and coagulation, inflammation, cell proliferation, and wound remodeling and maturation (Figure 2). This basic wound-healing concept also governs the healing of periodontal wounds [40].

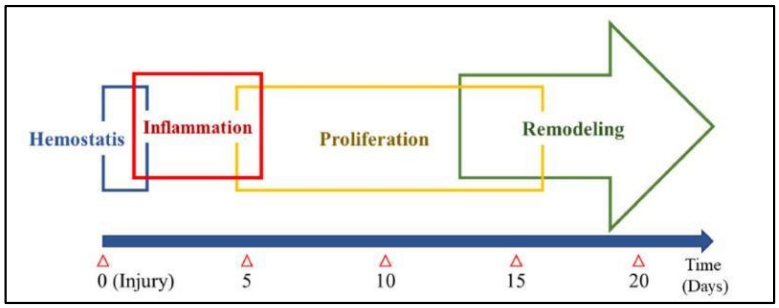

Figure 2. The process of wound healing : hemostasis and coagulation, inflammation, cell proliferation, wound remodeling, and wound maturation are the first four stages of wound healing after an injury [40].

2. Discussion

Meormann and Ciancio assessed changes in gingival blood circulation after experimental surgery using different mucogingival flap designs and fluorescein angiography techniques in humans. Based on their observations at the time, they concluded that the supraperiosteal network originating from the apical features of flaps provides the flaps with their primary blood supply. As a result, it is advised that flap bases be sufficiently wide to include the main gingival veins [29]. According to Zuhr et al., flaps should be adequately wide at their base to include main gingival veins, and flap preparations should be tight enough to include more blood vessels in the elevated tissues. It would seem sensible that a wider flap at the base would support a more extended flap because it would increase blood flow. However, current research on oral wound healing indicates that the flap's outline shouldn't be planned purely practically by attempting a favorable flap length-to-width ratio [8]. Flap design in periodontal surgery is mostly determined by the oral mucosa and the vascularization of the periodontal tissue that is to be operated on. The anatomical structures and blood circulation play a critical role in this context. Using cadavers, recommendations for suitable incision design have been provided [16]. To make it easier to modify the surgical plan if necessary, it is advised that flaps be reflected by at least one tooth. Keep in mind that long incisions heal just as quickly as short ones. The primary goals of flap design should be simplicity and avoiding needless complications [15].

According to Zuhr et al. that the survival of the flap, especially the marginal gingiva, the portion of the flap furthest from the base of the pedicle, depends critically on a more stable vascular network, which may be linked to

thicker flaps [8]. According to research by Hwang and Wang, there are numerous further studies that link improved clinical results following Coverage of root surgery to thicker flaps. The result of the study was that the flap's thickness could be considered when treating gingival recession abnormalities as a potential prognostic factor [42].

The thickness of flap margins is significantly influenced by the incision design, so care should be taken during the surgical process to ensure that the initial incisions are made with the scalpel running perpendicular to the tissue surface [26]. Regarding incisions along the gingival margin, intracellular incisions are preferred over marginal or para-marginal incisions [27]. Because the flap edges may contract after surgery, incisions should always be made far from the grafted region to prevent graft exposure. In this regard, precise presurgery bone sounds on both the tooth displaying the defect and the adjacent teeth are necessary to evaluate the bone contour. An envelope flap should be chosen if good access to the osseous defect can be obtained, reducing the need for vertical or oblique releasing incisions [26,28]. When treating gingival recession problems, thickness of the flap may be regarded as a potential prognostic indicator. The type of flap elevation, that is, full thickness vs. partial or split-thickness preparation, directly affects the flap's thickness. The thickness of a full-thickness flap is determined only by the thickness of the pre-existing gingival dimensions because it includes all layers of soft tissue that cover the bone, including the periosteum, connective tissue, and epithelium. Therefore, compared to a split-thickness flap preparation, the elevation of a full-thickness flap typically permits thicker flaps. Yet, more osteoclastic activity and, thus, more Resorption of bone is to be expected due to the exposure of hard tissues [8,33].

According to research by Burkhardt and Lang, the significance of blood flow, irrespective of the particular incision and flap configuration who, examined the efficacy of macrosurgical and microsurgical tunneling flap procedures in treating gingival recession.[8] According to Meormann and Ciancio, due to compromised vascularity, the flap's remaining tension may raise the possibility of flap retraction in the initial stages of wound healing [29]. Appropriate flap design and incision positioning are crucial to accomplish full flap closure and flap-to-root seal during sutures and after surgery rehabilitation [8,25].

Periodontal regeneration depends on the integrity of the delicate attachment at the gingival flap-tooth root interface, which is made feasible by the expanding fibrin clot. Several investigations have established the significance of clot adherence following flap surgery. Regular clot maturation and granulation tissue production persisted. In a different experiment on animals, heparin combined with gingival flap surgery for supra-alveolar abnormalities resulted in significantly less connective tissue healing than control teeth. The process of fibrin clot adherence is impacted by heparin treatment, which increases the risk of mechanical forces tearing the gingival flap-tooth root contact, breaking the integrity of the wound and causing a lengthy junctional epithelial layer to form [8,6,41]. The solidity of the clot is just as vital as its adherence. A study clarified the significance of suturing in periodontal and implant surgery and the use of appropriate suturing material. Monofilament threads that are synthetic and non-resorbable seem to be advantageous. Biological and physical properties are unaltered by use, and they appear to encourage passive wound closure, especially when employed in small diameters or with low breaking resistance. The steps of healing an incision in a hard, non-shedding portion of the mouth are more complicated than the process in most other areas. The flap firm adaption and stabilization ensure fibrin clot adherence to the non-shedding surface through appropriate suturing. The group of blood's initial development and the structural integrity between the wound bed and the mucosal or mucoperiosteal flap are of the greatest importance. Thus, precise suturing techniques are essential to getting the best surgical results [26,41].

3. Conclusion

Factors related to the technique allow the clinician to influence the surgical intervention's predictability and final result immediately. In this case, soft-tissue handling is essential for periodontal surgery outcomes since it influences the healing process of wounds. Therefore, The clinician should carefully analyze the entire procedure before surgery, from the positioning of the incisions and flap design to the closure of the wound. The clinician must concentrate on achieving the finest blood supply and most prevalent level of wound solidity.

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