BRIDGING THE GAP: A CASE REPORT OF APICALLY POSITIONED FLAP FOR FUNCTIONAL AND ESTHETIC REHABILITATION

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ABSTRACT

The Apically Positioned Flap (APF) is a periodontal surgical procedure used to lengthen the crown, expose the subgingival tooth anatomy for restoration, and improve the aesthetic appearance of the surrounding gums. It is a surgical technique that involves altering the shape of either soft tissue or both soft and hard tissue around one or more teeth for cosmetic or restorative reasons. Patients with excessive gingival show (a gummy smile) or gingival overgrowth may benefit from esthetic crown lengthening. Functional crown lengthening is a resective operation that exposes healthy tooth material to support a fresh restoration and re-establishes a biologic width at a more apical location than before the surgery. The current technique calls for judicious amount of removal of surrounding hard and soft tissue structures, leaving a tooth exposure that is about 4 mm above the osseous crest. This amount of tooth exposure is needed to restore the biological width and make it easier to prepare the tooth, ferrule, and marginal seal correctly. Both techniques add more supra gingival tooth structure for cosmetic and/or restorative reasons.

Keywords: Apically Positioned Flap, periodontal surgery, biological width, attached gingiva, pocket elimination, crown lengthening.

INTRODUCTION

The Apically Positioned Flap (APF) is a widely used periodontal surgical procedure aimed at increasing and preserving the width of attached gingiva, reducing periodontal pocket depth, and facilitating oral hygiene.[1] One of the first authors to describe a technique for the preservation of the gingiva following surgery was Nabers (1954).[2] The surgical technique developed by Nabers was originally denoted "repositioning of attached gingiva" and was later modified by Ariaudo and Tyrrell (1957).[3] In 1962, Friedman proposed the term apically repositioned flap to describe more appropriately the surgical technique introduced by Nabers.[4]

Friedman emphasized the fact that, at the end of the surgical procedure, the entire complex of the soft tissues (gingiva and alveolar mucosa), rather than the gingiva alone, was displaced in the apical direction.[4]

There are two primary categories of crown lengthening: Functional and aesthetic. D.W. Cohen first suggested this idea in 1962. Functional crown lengthening may be executed to reveal subgingival caries, a fracture, or both conditions. The goal of Functional crown lengthening to gain retention and resistance form of sound tooth structure above the alveolar crest level in cases of subgingival caries, subgingival restorative margins, or tooth fracture.[5] When we place the restorative margin below the gingival sulcus, impingement of the supracrestal fibers attachment occurs which infringes upon the biologic width. The biologic width pertains to the soft tissue component, specifically the dentogingival complex, that is affixed to the tooth above the alveolar bone. It consists of the connective tissue connection, the epithelial attachment, and the gingival sulcus.[6]

Gargiuloet al.[6] defined the term "biologic width," comprising a connective tissue attachment of 1.07 mm and an average epithelial attachment of 0.97 mm, resulting in an average biologic width of 2.04 mm. Rosenberg et al.[7] advanced this notion by integrating the

average biologic width of 2.04 mm with the 1 mm to 2 mm necessary for restorative dentistry, determining that 3.5 mm to 4 mm of intact supra osseous crest tooth structure is requisite to meet the overall demands of restorative dentistry.

The indications for crown lengthening surgery encompass, Deep periodontal pockets with sufficient attached gingiva caries, fractures, altered passive eruption, root surface preparations, and restorative needs in preprosthetic surgery. While the Contraindications include inadequate width of attached gingiva (may require a free gingival graft instead& Poor oral hygiene or uncontrolled systemic conditions.[7]

Apically positioned flap presents numerous benefits compared to the gingivectomy method for surgical crown-lengthening treatments. This encompasses the of postoperative keratinized connected tissue, enhanced access to the alveolar bone, expedited and more comfortable wound healing, and more reliable positioning of the gingival edge.[8]

CASE REPORT

A 66-year-old male presented to the department of periodontology with a faulty prosthesis that was mobile on examination. The patient requested its replacement with a fixed prosthesis.

Clinical examination shows significant loss of coronal tooth structure particularly with maxillary anterior and premolar teeth, exhibit significant mutilation, retaining just a minimal piece of the crown. [Fig.1] Probable causes include caries, secondary decay, and fracture associated with age old faulty prosthesis. Subgingival margins were inadequate for appropriate prosthesis installation. Insufficient or absent sound tooth structure above the gingival edge jeopardizing the success of future crowns or prostheses. Redness and edema of the marginal gingiva were present suggestive of inflammation, due to soft and hard tissue deposition around improperly fitted prosthesis.

SURGICAL PROCEDURE

Prior to the surgical procedure, complete medical and dental history and vital signs were taken to determine the patient's health and general well-being. Routine blood investigation done and they were in physiological limit. In an aseptic condition local anaesthesia 2% lignocaine with 1:80,000 adrenaline was given. The patient face swabbed with povidone-iodine 0.5% for avoiding any infection during surgical procedure. Patient instructed to rinse his mouths with a mouthwash (0.12% of chlorhexidine di-gluconate) for a minute prior to the surgery.

Surgical Treatment started with bone sounding to guide restorative margin placement and detection of alveolar crest level. Bone Sounding was performed under local anesthesia by measuring from the free gingival margin (FGM) to the alveolar crest using a periodontal probe and found that bone was low crest type i.r.t.#12 #21 #22.

A horizontal scalloped submarginal internal bevel incision was made along the teeth#13#12 #21 #22 #23using a scalpel with a Bard–Parker® blade (No. 12B or No. 15).Incision made as close to the tooth to preserve maximum attached gingiva. Two vertical releasing incisions extending out into the alveolar mucosa (i.e. past the mucogingival junction) were made at each of the end points of the internal bevel incision, thereby making apical repositioning of the flap possible by enhancing flap mobility also enhance visibility (Fig. 2). A full-thickness mucoperiosteal flap was then carefully reflected with mucoperiosteal elevator, up to the mucogingival junction, beyond which a partial-thickness dissection was carried out to facilitate free apical repositioning of the flap (Fig. 3). Resection of collar of remaining tissue from neck of teeth with curettes and thorough debridement, including scaling and root planning, was performed to remove all debris, calculus, and granulation tissue from bone and teeth. (Fig. 4)

Osteoplasty- Irregular bone margins were contoured to gain ideal anatomic margins which enable primary closure and enhance esthethics. Recontouring done with slow speed yellow diamond bur along with copious irrigation till 2mm apical level relatively. (Fig.5)

Repositioning of flap - Subsequently, the entire mucogingival complex shifted apically to match the level of on crest of bony margins which result the preservation of tissue of attach gingiva, typically 1–2

mm above the alveolar crest (Fig.6 & Fig. 7).

Continuous sling sutures were given to secure the flap in its new position, and light pressure was applied using moist gauze to stabilize the flap and control bleeding (Fig. 8). Postoperative care included the use of chlorhexidine mouthwash (0.12%–0.2%) twice daily, along with analgesics and antibiotics were prescribed. Sutures were scheduled for removal after 7 to 10 days.

The provisional prosthetic restoration phase should start 3 weeks after the surgery in order not to interfere with the re-establishment of the biologic width and to condition the soft tissues during the period of maximal regrowth (Fig. 9).

Fig.1 Pre-op view Carious and Fractured Teeth

Fig. 2 Internal bevel incision given followed by two vertical incisions

Fig. 3: Full thickness flap reflected till MGJ

Fig. 4: Resection of tissue collar & Irregular bony Contour

Fig. 5: Osteoplasty – Recontouring in process

Fig. 6: Recontouring performed

Fig. 7 : Apical positioning of flap

Fig. 8 : Primary closure with continuous sling sutures

Fig. 9: Post prosthesis view

DISCUSSION

The attached gingiva is crucial for safeguarding periodontal tissues, since it consists of keratinized epithelium and thick collagen fibers that offer resistance to mechanical shock from inappropriate brushing techniques and aid in plaque management.[1] Inadequate width of attached gingiva leads to subgingival plaque collection due to incorrect pocket closure, resulting in attachment loss and gingival recession from apical inflammatory spread. Therefore, sufficient connected gingiva is essential for preserving periodontal health. Typically, incisors possess a wider breadth of associated gingiva compared to posteriors, whereas premolars exhibit the least width.[8] Maynard et al[9] (1979) assert that a physiological dimension of approximately 5 mm of keratinized tissue with 3 mm of linked gingiva is essential for preserving gingival health in the context of subgingival restorations. Hall indicated that regions with less than 2 mm of connected gingiva should be observed for active recession.[10]

Crown lengthening is necessary for the following reasons. Restorative Access: To show enough supragingival tooth structure for proper crown placement, making sure there is enough ferrule (ideally 1.5–2 mm of tooth structure above the finish line).and to keep the Preservation of biological width from going over the biological width (a 2–3 mm zone of connective tissue and junctional epithelium).[8] If this rules is not followed, patient can get chronic inflammation, bone loss, or formation and deepening of pocket& impaired periodontal health.[11]

Limitations include:

- **Root sensitivity:** Exposure of root surfaces can lead to hypersensitivity.
- **Postoperative discomfort:** May cause more pain/swelling than less invasive procedures. Requires sufficient keratinized tissue: Ineffective

when attached gingiva is minimal.

- **Risk of root caries:** Due to exposed cementum in the long term.[1]

The technique's success hinges on several consider ations, including the width of keratinized tissue and the pre-existing bone level relative to the cemento-enamel junction.[12] When the keratinized gingiva is insufficient (less than 2 mm), the APF becomes the preferred method over gingivectomy, as it avoids excessive tissue resection and supports postoperative stability.[2] However, challenges such as root hypersensitivity, deep infrabony defects, or esthetic limitations in the anterior region may contraindicate its use.[13] Postoperative outcomes are influenced by the flap's positioning relative to the bone crest; placement at the crest level may result in greater tissue rebound, while a more apical placement minimizes this effect, though it requires meticulous osseous recontouring.[14]

CONCLUSION

The apically positioned flap is a fundamental periodontal surgical procedure that provides reliable outcomes in the management of periodontal pockets and pre-prosthetic needs. Despite its limitations, especially in esthetic areas, it remains indispensable in clinical periodontics when properly indicated.

Conflict of Interest

The authors declare no conflict of interest with respect to the authorship, research, or publication of this article.

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