

Interactions between Restorative Dentistry and Periodontics: Surgical Procedure (Part I)

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ABSTRACT

The best way to enhance gingival health and minimize trauma is to avoid contact of the gingivae with restorative materials. Subgingival finish lines are not periodontally advantageous. Crown lengthening is a periodontal resective procedure, aimed at removing periodontal tissue support to increase the clinical crown height. Periodontal health is of paramount importance to understand the concept of biologic width, indications, techniques and other principles as well as some possible limitations. This article aims to discuss these concepts and its relationship to periodontal health and restorative dentistry. The importance of restorative margin location and contours related to periodontal health are also addressed in order that the restorative dentist can use crown lengthening as part of an overall treatment plan in a controlled and predictable manner, taking into account biological factors.

Keywords: Crown lengthening surgery, Biologic width, Restorative margins location.

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CLINICAL RELEVANCE

A correct diagnosis and planning of the case may influence the final restorative result. Thus, it is necessary to properly establish the restorative margins location even when surgical procedures may be required to it. If these principles were carefully fulfilled they will increase the longevity of the restoration and maintenance of periodontal health and adjacent tissues. Furthermore, there is a crescent concern of the patient in which the services performed by the dentist should present lasting quality. This article discusses the surgical procedure to increase the clinical crown as a vehicle in which the dentist can meet both medical demands.

INTRODUCTION

Proximal caries or the presence of leaks in old restorations often becomes a serious health problem due to delayed clinical diagnosis.¹ The most common auxiliary means for performing interproximal caries diagnosis is bitewing radiography.² However, when there is the presence of amalgam restorations, for example, this diagnosis may be masked by the intrinsic radiopacity of the material.

Thus, initial treatment plans that were indicated a simple replacement of the restoration can be modified during the execution of clinical restorative technique when proximal restorative margin location became subgingival after complete caries removal. The inter-relationship between periodontics and restorative dentistry is present in several ways, including adequate placement of the margins restoration, contours of the tooth crown and gingival tissue response to restorative preparations.³⁻⁵

So, periodontal health is an important factor in determining the prognosis of a restored tooth. The proper management of periodontal tissues during restorative procedures is an integral part of long term success.³⁻⁵ It is well-established that clinical crown augmentation is an oriented restorative procedure to permit the correct placement of restorative levels above the gingival margins. Thus, it is widely accepted and demonstrated that subgingival restorations can negatively affect not only the treated tooth, but also the adjacent teeth, and it is impossible to predict when an unfavorable reaction will occur over the surrounded tissue.⁶

It is the responsibility of the professional to understand the clinical periodontal procedures to crown lengthening surgery. This article aims to review the indications, contraindications, biological and surgical techniques for the implementation of crown lengthening surgery, in addition to reporting a case to exemplify this technique.

INDICATIONS

Before choosing the surgical procedure the condition of the remaining tooth should be evaluated clinically and radiographically to determine whether the element in question is restorable. If this presupposition was met, clinical crown augmentation surgery may be prescribed.

Clinical crown lengthening surgery is indicated for teeth with reduced clinical crowns. Some examples of causes for it are: caries with subgingival extension, fractures, root perforations, excessive wear of teeth, presence of previous subgingival margins, location of the restoration.^{7,8} So, this surgery procedure is indicated to gain additional dental structures to meet the mechanical need of the restorative procedure. Teeth shortened by incomplete exposure of the anatomic crown are all candidates for surgical lengthening and esthetics procedures.^{9,10}

Additionally, clinical crown lengthening surgery may also be indicated to re-establish the biologic width. At avoid violating this space, we are providing enough tooth structure to result in biologically healthy and functional restorations.⁶

CONTRAINDICATIONS

Despite clinical crown lengthening surgery should be considered an integral part of restorative treatment; it should be prescribed with caution avoiding overtreatments, because this procedure presents a nonreversible nature. Teeth with deep carious lesions or fractures that could not be restorable are contraindicated. But even if the teeth are restorable, crown augmentation is contraindicated when there is an unfavorable crown-to-root ratio due to short roots or reduced bone support. Without enough periodontal support, any restoration will likely fail along with the possible dental loss.

Another factor that must be considered is the furcation exposure that demonstrates a potential periodontal breakdown and puts the prognosis of the tooth in a delicate situation.¹¹ A recent study shows that a preoperative distance of 4 mm between the crest bone and the furcation, in molars, is required to avoid the risk of furcation exposure.¹²

This surgery is contraindicated in patients with a high smile line, mainly if the procedure will be executed just in one of the incisors and cases that present anterior teeth with long clinical crowns. In both of them the irregular gingival contour will be esthetically displeasing.^{5,7}

It is noteworthy that the crown lengthening is a surgical procedure and the risk of damaging anatomical surrounding structures need to be evaluated. When the risks outweigh the benefits, the procedures are contraindicated. The patient’s health is also an important factor to be considered. Patients with debilitating systemic diseases with poor plaque control and difficulties on hygiene may compromise the complete regeneration of surgical procedures, featuring a contraindication.¹²

CASE REPORT

A 36 years old woman searched for clinical treatment to replace an amalgam restoration on tooth #16 (Fig. 1). The patient reported a slight sensitivity to eat sweet foods, which may indicate the presence of infiltration under the restoration.

After the removal of the old restoration and also the small caries lesion, the cervical margin location of the tooth in question, found itself slightly subgingival. With a periodontal probe it was observed a distance of 7 mm between the bone crest and the cervical margin demonstrating that although the carious lesion is significant, there is still sufficient amount of tooth structure left for it be restored (Figs 2 and 3).



Fig. 1: Amalgam restoration #16 tooth



Fig. 2: Complete removal of the amalgam restoration and the carious lesion



Fig. 3: Verification of the biological width before surgery using the probe (model)

Then, to allow an adequate restorative technique, it was decided to perform a crown lengthening surgery in the region aiming at further longevity of the final restorative work besides a clean margin on sound tooth structure. According to the Anamnesis, the patient presented good health, with no significant systemic complications that might interfere with the surgery.



Fig. 4: Sulcular vertical incisions

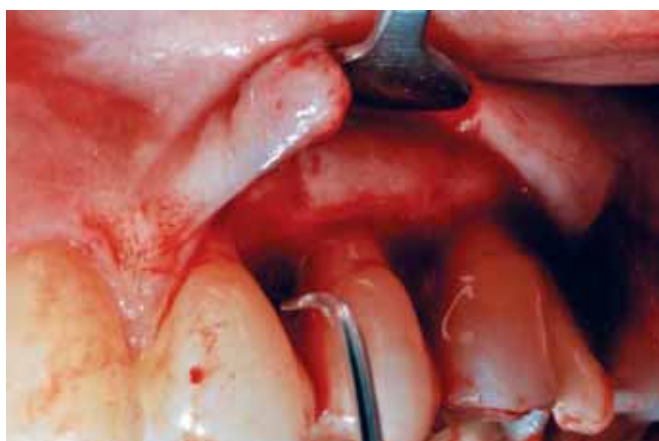


Fig. 6: Elimination of the fibers and ligaments with periodontal curettes



Figs 5A and B: Vertical incisions and confection of the full mucoperiosteal flap



Fig. 7: Osteotomy performed by Ochsenbein Chisels



Fig. 8: Finishing done by the use of an endodontic Hedström file type no. 60

After anesthesia and local antiseptics using a 2% chlorhexidine solution, full thickness intrasulcular incisions were done to expose the interproximal bone crest between teeth #15 and #16, maintaining the shape of the papilla. To improve the final flap repositioning, the incision usually includes a tooth before and after the region in question (Figs 4 and 5). All fibers and ligaments were removed with the assistance of periodontal curettes (11-12 Gracey) to expose the hard tissue area that will be under osteotomy (Fig. 6).

The osteotomy was performed through the Ochsenbein chisels and finally, finishing was done by an endodontic Hedström file type size 60, by means of back-and-forth movements to regularize the region (Figs 7 and 8).

The new parameters of biologic width obtained were checked with the probe (Fig. 9), soft tissues were repositioned to osseous surface and trimmed. Single interrupted sutures were made with a 4-0 silk suture (Technofile) (Fig. 10).



Fig. 9: Measurement of the new biologic width



Fig. 12: Control after 2 months



Fig. 10: Replacement of the flap and sutures



Fig. 11: Placement of the temporary light-cured resin material for protection of the tooth preparation

We have placed a temporary light-cured resin material for protection of the tooth preparation (Fig. 11). This temporary restoration will provide a good prognosis in the regeneration of the involved surrounding tissues and it will influence the quality of the final work.

As is routine, postoperative medication was prescribed, an analgesic and a nonsteroidal anti-inflammatory. The

patient was instructed to perform a chemical control of the plaque through a 0.12% chlorhexidine digluconate mouthrinses twice daily for 15 days.

The patient was scheduled after 7 days for suture removal and reassessment of the case. The gingiva showed normal texture and color, with no pain, swelling or exudate, indicating a framework of good healing. After 2 months the patient returned to a control. Figure 12 shows the excellent cicatrization and the great quality of soft tissues without the breakdown of the fibers. Thus, the patient was sent to continue the restorative procedures, however, now with gingival levels and restorative margins more appropriate.

DISCUSSION

For the maintenance of a good periodontal health of patients restorative procedures must be performed with criteria. Then, crown lengthening surgery should integrate the initial clinical protocol of oral environment stabilization procedures in restorative dentistry.⁷ This fact is due to the conservative philosophy in dentistry that focuses on preserving the presence of the dental element in the mouth and also because patients are becoming increasingly knowledgeable and demanding about the quality of treatments they have received.⁸

Regardless of the surgical approach, preservation of interproximal papillae is an integral part of the success. Some important factors should be considered such as patient's oral hygiene, irritation potential of gingiva, gingival thickness; width, gingival recession, biologic width, periodontal attachment, root dimensions, potential bony defect, quality of remaining tooth structure and esthetic objectives.¹³

The term biologic width is familiar to most clinicians, yet there still exists confusion regarding its meaning and relevance to clinical procedures. The biologic width is defined as the dimension of the soft tissue, which is attached to the portion of the tooth coronal to the crest of the alveolar bone.¹⁴

Gargiulo et al¹⁵ reported that the average length of the dentogingival junction to be 2.04 mm. Vacek et al¹⁶ also investigated the dimensions of the dentogingival junction in human cadaver specimens. They reported mean values of 1.91 mm of the dentogingival junction. Ingber et al¹⁷ suggested that the term 'biologic width' relates to the average value of the dentogingival junction—that is, approximately 2 mm. They also suggested that an additional 1 mm could be added coronal to the 2 mm dentogingival junction as an optimal distance between the bone crest and a restorative margin.

Although individual variations exist in the soft tissue attachment around teeth, there is general agreement that a minimum of 3 mm should exist from the restorative margin to the alveolar bone, allowing for 2 mm of biologic width space and 1 mm for sulcus depth.¹⁴ Then, in the early stages of restorative treatment planning, if the clinician believes that the margin of the final restoration will be <3 mm from the alveolar bone crest, crown lengthening should be recommended.¹⁴

The significance of biologic width to the restorative dentist has been well documented. Maynard and Wilson¹⁸ demonstrated a progressive inflammation with downgrowth of epithelial attachment and loss of connective tissue attachment as a result of violation to biologic width. When biologic width is violated, as a defense mechanism, inflammatory response triggers alveolar bone resorption to provide space for a new connective tissue attachment which results in increased pocket depth and leads to chronic inflammation and localized periodontal breakdown in susceptible patients.¹⁹

So, to avoid the violation of the biologic width, crown lengthening surgery should be performed after the complete removal of caries. This will allow the restorative dentist to observe exactly the amount of tooth structure to expose.^{5,7} If this is not accomplished at the time of provisionalization, the surgeon might have to perform additional procedures increasing the number of consultations and the clinical steps carried out in patients which results in waste of materials and supplies, patient fatigue and may raise doubts about the credibility of the professional.

CONCLUSION

A proper management of periodontal tissues during restorative procedures is part of the long-term success of restorations. It has been well established that the correct placement of the restorative margin location is related to the determination of the biological width. It is the responsibility of the professional to understand the indications and contraindications of crown lengthening surgery and check whether periodontal health is optimized. There are

advantages when the same professional restorer indicates the periodontal surgery also performs it. General clinicians should be familiar with this technique and encouraged to do it. In conclusion, the crown lengthening surgery, when indicated, should be considered an important phase of treatment and in order to obtain optimal esthetic treatment outcomes of restorations, the duration of the healing period should be respected.

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