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RESEARCH ARTICLE

PERIO-ENDO-PROSTHO INTERACTIONS: MANAGEMENT OF CLINICAL SHORT CROWNS

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ABSTRACT

The restoring dental professionals are often in a dilemma regarding the restoration of clinically short crowns. To successfully restore a short clinical crown, an understanding of the periodontal parameters involved in restoration is necessary. To achieve a satisfactory result, a comprehensive treatment plan and sequencing of therapy is required. The following case series of clinically short crowns aim to review the guidelines for management of the same.

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INTRODUCTION

During the restoration of a decayed carious tooth or the missing teeth, the importance of the periodontal tissues is often underestimated. To maintain esthetics, function of mastication and patient comfort, preparation of the periodontal tissues prior to the restorative treatments is important. To avoid any imbalance in the relationship with the periodontium, any restoration has to be perfect, as even a precise restoration can at times induce inflammation. Crown lengthening procedures are often needed for restoring grossly decayed teeth which present as clinically short crowns while maintaining the biological width simultaneously. There is a need for communication between the restorative dentist and the periodontist to assess the periodontal tissues and to decide the appropriate procedure needed to expose a clinically short crown.This article aims to review the importance of these aspects during restoration of a decayed tooth or missing teeth, and presents a case series of the same.

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The Biologic width and Clinical crown

The area of the gingiva attached to the surface of the tooth coronary from the alveolar bone is known as gingival biologic width (Gargiulo *et al*., 1961). Garguilo *et al*. (1961) and Vacek (1994) studied the relationship between the gingival sulcus, epithelial attachment, connective tissue attachment and the marginal alveolar bone. They found that biological width was the total width of the epithelial attachment and the connective tissue attachment and the mean value was found to be 2mm (Gargiulo *et al*., 1961; Vacek, 1994).Gingival inflammation, loss of connective tissue and an unpredictable bone loss are caused due to alterations in biologic width owing to improper restoration margins (Gunay *et al*., 2000). According to studies conducted by Lanning *et al*. (2003) and Padbury *et al*. (2003) to keep periodontal tissues healthy, a minimum of 3mm should be maintained between the restoration and the alveolar bone. The minimal width needed for the gingiva to attach to bone is 2 mm, which is also the minimum needed to maintain the gingival biologic width.The periodontium response to an altered biological width schematically was discussed by Liudvikas P *et al* (Figure 1) (2006). A reparative response happens whenever there is encroachment of the biological width, to create space for gingival attachment.

To form the appropriate space between the restoration and alveolar bone, the reparative response happens by bone resorption (Padbury, 2003)

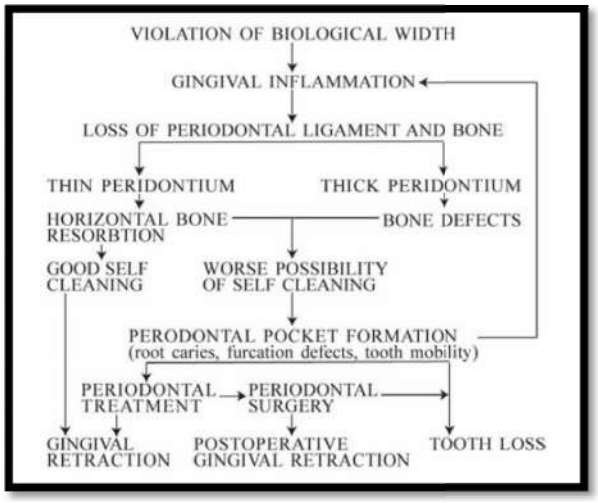


Figure 1. Periodontium response to an altered biological width (Planciunas, 2006)

The distance from the gingival margin to the occlusal surface of the tooth forms the clinical crown. Following conditions lead to a need to increase this:

- Too short a crown for retention of restorations
- Subgingival margins of caries lesion
- Subgingival location of tooth crown fracture margin
- Anatomical crown is only partially visible because of excessivegingiva (Planciunas, 2006)

In all these conditions,to obtain a suitable clinical crown height,crown lengthening procedures need to be performed and the biologic width needs to be maintained.

The Crown Lengthening procedures:

The different methods of crown lengthening are:

- Gingivectomy
- Apically Displaced Flap
- Apically Displaced Flap with bone reduction

The attached gingiva width and the periodontal biotypedecide the criteria for choosing one of these procedures (Wennstrom *et al*., 2003)

- Gingivectomy is recommended when there is sufficient width of attached gingiva and a thin biotype.
- Apically displaced flap is advised when there is insufficient width of attached gingival and thin biotype.
- Apically displaced flap with osteoplastic-bone reduction is to be done when there is thick biotype.

Recommendations prior to Restoration

To increase retention of restorations, the crown lengthening procedure should be done prior to prosthetic procedures. Preparation should be done to increase the distance 1-3 mm to marginal bone, the surgeon should use the margins of the primary preparation as a reference point.Thedistance between the final restoration and the marginal bone should be 3mm.

Before the crown lengthening procedure, it is advisable to make temporary crowns or tray guide with margins of final restoration. The relationship between the margins of the final restoration and the marginal bone are defined by the surgeon during the procedure (Walker, 1998; Bragger *et al*, 1992). According to Bragger *et al*, to avoid a possible retraction of the gingival margins, further dental treatment at the final restoration should not be done earlier than 4 weeks, and 6 weeks in esthetical areas (Bragger *et al*, 1992). Ideally, the margins for tooth preparatios should be kept subgingivally for esthetic areas and supragingivally in posterior region. The reference point for subgingival tooth preparation is gingival sulcus (Spear, 2002). According to Spear FM, the following rules are to be followed when subgingivaltooth preparation is to be done (Spear, 2002)

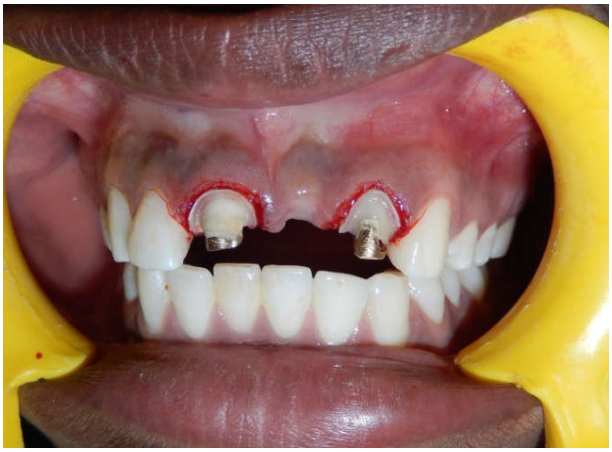
- The margins of the restoration is to be prepared 0.5mm subgingival, when the gingival sulcus is 1.5mm or less
- The margins of the restoration is to be prepared 0.7mm subgingival, when the gingival sulcus is 1.5-2mm
- Gingivectomy should be done and the margins of the restoration should be 0.5mm subgingival, when the gingival sulcus is more than 2mm.

Case ReportI: Gingivectomy

A 22 year old male patient was referred for the management of clinically short crown in relation to 11 and 22.Gingivectomy was done using a temporary restoration as template following endodontic management. Tooth was restored after four weeks after seeing satisfactory healing.

Case Report I: Picture 1: Preoperative View of 11 and 23

Case Report I: Picture 2: Temporary restoration prepared to be used as a template



Case Report I: Picture 3: Gingivectomy done

Case Report I: Picture `4: Postoperative View after 2 weeks

Case Report II: Picture 1: Preoperative View of 16

Case Report II: Apically displaced flap

A 42 year old female patient was referred for the management of clinically short crown in relation to 16. Crown lengthening was done by an apically displaced flap following endodontic management. Satisfactory healing and adequate crown height was seen after two weeks, and after four weeks, the restoration was done.

Case Report II: Picture 3: Flap sutured apically

Case Report II: Picture 4: Postoperative view after two weeks

Case Report III: Picture 1: Preoperative View:

Case Report III: Apically Displaced flap with osseous contouring

A 44 year old female patient was referred for the management of clinically short crown in relation to 26. Crown lengthening was done by apically displaced flap with osseous contouring following endodontic management. Satisfactory healing and

adequate crown height was seen after two weeks, and after four weeks, the restoration was done.

Case Report III: Picture 2: Flap elevation done

Case Report III: Picture 3: Osseous contouring done:

Case Report III: Picture 4: Flap sutured apically:

Case Report III: Picture 5: Postoperative view after two weeks

Case Report III: Picture 5: Postoperative view after two weeks:

Case Report IV: Picture1: Preoperative View 13:

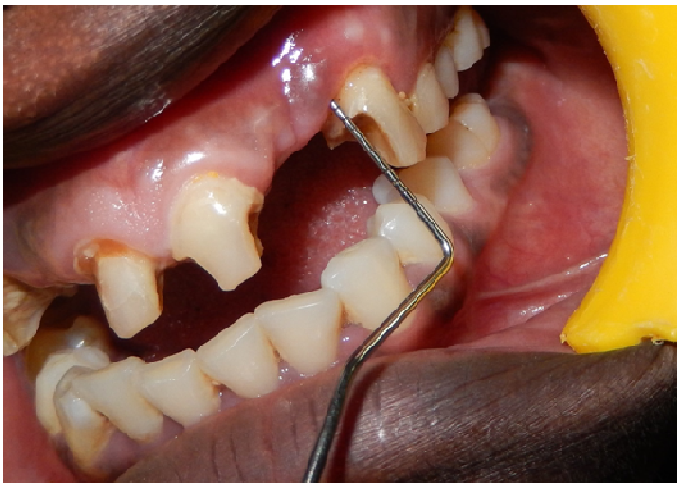
Case Report IV: Picture2: Preoperative View 23:

Case Report IV: Picture3: Crown Lengthening done using soft tissue diode laser in 13

Case Report IV: Crown lengthening using laser

A 32 year old female patient was referred for the management of clinically short crown in relation to 13 and 23. Crown lengthening was done using laser. Satisfactory healing and adequate crown height was seen after two weeks and after four weeks, the restoration was done.

Case Report IV: Picture5: Postoperative View 13 after two weeks



Case Report IV: Picture6: Postoperative View 23 after two weeks

Conclusion

To expose inadequate tooth structure, crown lengthening procedures are done for the purpose of restoration. The restorative dentist has sufficient clinical crown to permit optimum restoration of a tooth by doing so. The restorative dentist and the periodontist should work as a team to prepare the tissues appropriately for restoration. Crown lengthening procedures can give satisfactory results for both function as well as for purpose of esthetics.

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