 DOI: 10.18231/2455-8486.2017.0010

Surgical lengthening of the clinical crown: Report of two cases

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Abstract

Maintenance of periodontal health is critical to the long term success of endodontically treated and restored teeth. Many teeth suffer from significant structural defects that jeopardize coronal reconstruction. Extensive caries, tooth fracture, previous restorations, perforations and external resorption can destroy tooth structure at the level of the periodontal attachment.

Placement of a restoration margin subgingivally may encroach upon the periodontal attachment zone or biologic width. Whenever the biologic width is violated, there is a reaction by the periodontium in the form of gingival inflammation, loss of attachment and alveolar bone resorption. Where orthodontic extrusion cannot be done to provide sufficient tooth structure for a restoration, a clinical crown lengthening can be considered as an alternative.

Discussed here are two cases of short clinical crowns with compromised gingival health. Surgical crown lengthening was done subsequent to which posts were placed followed by fabrication of porcelain fused to metal crowns, all leading to the results that were profoundly satisfying for the patients as well as the clinician. Four years follow-up in one case showed stable gingival margins and excellent esthetics.

Keywords: Biologic Width, Clinical Crown Lengthening, Post and Core.

Introduction

The primary goal of restorative therapy is to replace the form, function, esthetics and comfort of the dentition. Equally important is to establish a physiologic periodontal climate and facilitate the maintenance of periodontal health. Thus a thorough understanding of relationship between periodontal tissue and restorative dentistry is paramount to ensure the maintenance of the tooth or teeth being restored.(1)

One of the challenges of the restorative dentistry is the restoration of teeth with insufficient supragingival tooth height. Clinical situations that require a decision to restore or extract such teeth are-

- Short clinical crown
- Root caries
- Subgingival perforation
- Fractures (subgingival crown or root fracture)
- Pathologic wear
- Altered passive eruption

If these teeth are restored without regard to biologic principles, a periodontal lesion characterized by gingival inflammation, loss of attachment and alveolar bone resorption will result.(2)

In these cases, it is necessary to evaluate the gingival biologic width (GBW). GBW is the area of gingiva attached to the surface of tooth coronal to alveolar bone. The average biologic width is 2.04 mm. An additional 1-2 mm of the sound tooth structure should be available coronally to the epithelial attachment to place the margin of a restoration. Starr in 1991 recommended that a distance of 3-4 mm should exist between the margin of a restoration and the alveolar crest to preserve a healthy gingival sulcus.(3)

In order to facilitate restorative procedures and to prevent periodontal injuries in teeth with structurally inadequate clinical crowns surgical exposure followed by orthodontic extrusion has been recommended. However, there are times when orthodontic extrusion is not possible because of some preexisting underlying cause like poor bone support or even factors like patients economic status. In such cases clinical crown lengthening procedures simplifies prosthetic treatment by providing sufficient tooth structure for a restoration that can meet the requirements of retention and proper form without jeopardizing the periodontium.

Surgical treatment is faster and more favorable for indirect restoration when higher clinical tooth crown is necessary.(4)

This article presents two cases of short clinical crowns treated successfully using crown lengthening procedure.

Case I: A 21 year old female patient reported to the department of Periodontics, Seema Dental College, Rishikesh with the complaint of unaesthetic upper anterior crowns. Gingiva in relation to 12, 11, 21, and 22 was swollen. Bleeding on probing was present. Examination of crowns revealed that all the four crowns were joined together.

History revealed root canal treatment of 12, 11, 21, and 22 and placement of crowns in these teeth. Radiographic examination revealed insufficient obturation in 12, 11, 21, and 22.

On removal of crowns, it was found that 12, 11, 21, and 22 had short clinical crowns [Fig. 1]. In 11 and 21, more than 50% of crown structure was lost. Since, the

patient wanted immediate esthetic management, therefore orthodontic extrusion was ruled out.

Fig. 1: Pre-Operative

Henceforth, conservative approach was opted for this case. The following treatment plan was formulated.

a. Root canal treatment in 12, 11, 21, and 22
b. Clinical crown lengthening in relation to 12, 11, 21, and 22
c. Fiber post placement in 12 and 21, composite core build up and
d. Full coverage restoration.

After root canal treatment in 12, 11, 21 and 22 was completed, the patient was referred to the department of Periodontics for the crown lengthening.

Crown Lengthening Procedure: Before starting the procedure, a careful evaluation of location and thickness of underlying bone in relation to 12, 11, 21, and 22 was done. Bone sounding after administration of local anesthetic was performed to rule out the necessity of osseous surgery.

In this case, gingivectomy was performed in relation to 12, 11, 21 and 22. The pocket on each surface of the teeth were explored with a periodontal probe and marked with a pocket marker.

Pockets were marked in several areas to outline its course on each surface. Kirkland gingivectomy knife was used for incisions on the facial and palatal surfaces. The external beveled incision was started apical to the point marking the course of the pockets and was directed coronally to a point between base of the pocket and the crest of the bone. An Orban knife was used to complete the excision interdentally.

Following completion of the surgery [Fig. 2], the area was covered with surgical pack. Patient was provided with 0.2% chlorhexidine gluconate oral rinse. The patient was recalled after one week post surgically for removal of the dressing [Fig. 3]. After four weeks post-surgery, the case was referred back to the department of Conservative Dentistry.

Fig. 2: Post-Operative

Fig. 3: One Week Post-Operative

In teeth no. 12 and 21, post space was prepared using peeso-reamer no. 1-2. Fiber posts were cemented using glass ionomer cement [Fig. 4] followed by composite core build up in 12 and 21. Crown preparation was done in 12, 11, 21, 22 teeth[Fig. 5]. Rubber base impression was made and Porcelain fused metal crowns were fabricated. The processed crowns were luted in position [Fig. 6].

Fig. 4: Fiber Post Placed

Fig. 5: Crown Preparation Done

Fig. 6: Final Restoration

The patient's four years follow up shows good results with stable gingival margins as can be seen in the Fig. 7.

Fig. 7: Four years followup

Case II: A twenty five year old male patient reported in the Department of Conservative and Endodontics, Seema Dental College and Hospital, Rishikesh, with the complaint of fractured upper anterior tooth [Fig. 8]. Clinical examination revealed carious fractured 11. Fracture was extending subgingivally. Since the patient wanted immediate esthetic management, therefore orthodontic extrusion was ruled out once again. A conservative approach was opted for this case as well. The following treatment plan was formulated.

a. Root canal treatment in 11,
b. Clinical crown lengthening in relation to 11,
c. Metal cast post in 11, and
d. Full coverage restoration

Complete treatment plan was explained to the patient and the treatment was started after obtaining his consent.

Root canal treatment was done in 11. The case was then referred to the Department of Periodontics for surgical crown lengthening.

Fig. 8: Pre-Operative

Fig. 9: Cast Post & Core

Fig. 10: Final Restoration

Crown lengthening procedure

Careful evaluation of location and thickness of underlying bone in relation to 11 was done. Bone sounding was done to rule out necessity of osseous surgery. Gingivectomy was performed in relation to 12, 11, and 21. Pockets on each surface of teeth were explored with a periodontal probe and marked with pocket marker. Gingivectomy was performed with the help of Kirkland and Orbans knives.

After the surgical procedure, the area was covered with surgical pack. After one week the surgical dressing was removed. After four weeks, this second case was also referred back to the Department of Conservative Dentistry.

In 11, post space was prepared using peeso-reamer no. 1-2. Post space impression was taken using inlay wax. Cast metal post and core was prepared. The casting was cemented in 11 followed by crown preparation [Fig. 9]. Thereafter, porcelain fused to metal crown was cemented in 11 [Fig. 10].

Discussion

When a restoration is placed, the preservation of an intact healthy periodontium is mandatory to prolong the life of the teeth being restored. The dentist must attempt to eliminate all factors that could lead to the accumulation of bacterial plaque and its subsequent effects on the gingival tissues and underlying bone.[(1)]

The two cases discussed here presented with short clinical crowns. In case I, inadequate crown length of maxillary incisors resulted from previous improper treatment. Case II had subgingival carious fracture in relation to 11.

The goal of surgical crown lengthening is to provide the restorative dentist with sufficient clinical crown to permit optimum restoration of a tooth.[(5)]

The indications of surgical crown lengthening are subgingival caries, subgingival fracture, teeth shortened by extensive caries, or fracture, naturally short clinical crown due to non-exposure of anatomical crown.[6]

The methods of surgical clinical tooth crown lengthening are:

1. Gingivectomy,
2. Apically positioned flap,
3. Apically positioned flap with bone reduction:
   a. Osteoplastic – bone reduction without altering periodontal ligament,
   b. Ostectomy – bone and periodontal ligament reduction.[7]

In these cases, gingivectomy was performed, as soft tissue reduction alone provided the additional length needed and at the same time retained adequate width of attached gingiva.

In case I, the surgical procedure was performed in relation to all the anterior teeth of the upper arch in order to blend the soft tissue margin position, else the periodontal tissue of the treated teeth would be precipitously more apical than the adjacent teeth, predisposing the site to plaque retention and development of periodontal disease. The blending with adjacent teeth not only enhances plaque control but also esthetics.[8,9]

In case I, prefabricated glass fiber posts were used. The advantages of fiber post include minimal chances of root fracture, better retention, root reinforcement and esthetics. But the cost of treatment was increased.

Whereas in the second case, metal cast post and core was used. Cast post has the advantage of replication of canal anatomy with less preparation. But the disadvantage is that it shows higher rate of root fracture than pre-fabricated post.[10,11]

But as the cast post was economical to the patient, it was used.

Finally, the porcelain fused to metal crowns were cemented with crown margins on sound tooth structure.

Conclusion

If the restorative margin does not encroach the biologic width area then in such a case gingivectomy can be considered a viable treatment option to achieve adequate crown length to enhance retention for post and core along with a full coverage ceramic crown.

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