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Clinical crown lengthening: A case report

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Abstract

Clinical crown of the tooth is the distance from gingival margin to incisal edge or occlusal surface of the tooth. Crown lengthening is a surgical procedure designed to increase the extent of the supragingival tooth structure, so that the clinician can restore the tooth. The crown lengthening procedure (CLP) is commonly used to maintain the dentogingival complex in optimal conditions and to correct aesthetic defects through a smile design. CLP in an anterior aesthetic driven region could be challenging. Hence, a multidisciplinary approach for better surgical and prosthetic outcomes should be practised. The current case report emphasises the need for prosthodontic-perio interdisciplinary approach while restoring anterior esthetics and function.

Keywords: crown lengthening procedure (CLP), biologic width, dentogingival complex, prosthodontic-perio, esthetics

Introduction

Crown lengthening is a surgical procedure designed to increase the extent of supragingival tooth structure for restorative or aesthetic purposes by apically positioning the gingival margin, removing supporting bone or both [1]. Indications for crown lengthening include teeth with subgingival caries or extensive caries that shorten the tooth, fractures, and short clinical crowns caused by incomplete exposure of the anatomic crowns. Several techniques such as gingivectomy, undisplaced flap with or without osseous surgery, apically repositioned flap with or without resective osseous surgery, and orthodontic forced eruption with or without fibrotomy have been proposed for clinical crown lengthening. The selection of one technique over another depends on several patient-related factors such as root proximity, root morphology, furcation location, individual tooth position, the width of attached gingiva, periodontal phenotype, occlusion and aesthetics; 'effective crown', which is the distance of the occlusal plane from the alveolar bone are preferred over 'anatomic crown' while considering the crown to root ratio. Therefore, a multidisciplinary approach that fulfils the surgical and prosthetic requisites should be adopted.

Case Report

A 32-year-old male was referred to the department of Periodontology for an opinion regarding the inadequate clinical crown height of upper central incisors. The patient, professor by profession, was a non-smoker with no contributing medical history. Extraoral examination revealed no significant findings with a normal lip line and minimal gingival display while smiling.

Dental examination revealed inadequate clinical crown height with 11 and 21 [Figure1] Patient had a history of endodontic treatment with upper central incisors due to extensive dental caries. Periodontal examination revealed good oral hygiene with minimal plaque and calculus deposits. The gingiva was pigmented and firm; interdental papillae were intact. Clinical examination revealed probing depths of 3 mm-4 mm with no pathologic mobility. The maxillary frenal attachment was of mucosal type with attached gingiva of 5mm. Radiographic examination with 11 and 12 revealed root canal obturation material and mild horizontal alveolar bone loss. The root length was found to be adequate [Figure:1].

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Fig 1: Preoperative view showing inadequate crown height with 11,21. IOPA showing mild alveolar bone loss

A treatment plan was formulated in consultation with the restoring dentist and crown lengthening was recommended to increase the amount of supragingival tooth structure so as to allow a healthy, optimal relationship between the restoration and the periodontium. The patient was given an alternative of orthodontic extrusion, however, due to time constraint, he opted for surgical correction. Written informed consent was obtained.

mm of soft tissue above the alveolar crest. The level of incision was marked by placing bleeding points. With adequate width of attached gingiva, using a no. 15 blade, the initial internal bevel incision was performed 2 mm above the gingival margin to achieve the ideal contour on both labial [Figure 3] and palatal aspect [Figure 4]. A full-thickness mucoperiosteal flap was raised [Figure 5]. Osseous resection was performed using low-speed handpiece and carbide bur under copious saline irrigation to maintain the biologic width (BW).



Fig 2: Transgingival probing using UNC 15 probe under Local anaesthesia

After giving adequate anaesthesia, transgingival probing was done [Figure 2] around the intended tooth which revealed 5



Fig 3: External bevel incision on the labial aspect



Fig 4: External bevel incision on the palatal aspect



Fig 5: Reflection of full-thickness mucoperiosteal flap



Fig 6: Continuous sling suture to secure and apically reposition the flap

The flap was repositioned and sutured [Figure 6]. Chlorhexidine rinse 0.2% bid was prescribed for 2 weeks, along with analgesics and the patient was given appropriate postoperative instructions.



Fig 7: Temporary crown cemented

Immediately after surgery, a temporary crown was cemented to maintain aesthetics [Figure 7]. Care was taken to ensure that the margins of the temporary crown were coronal to the gingival margin to ensure gingival health. Uneventful healing was noted 15 days post-op. [Figure: 7] Final insertion of the porcelain-fused metal crowns with subgingival margin was performed 3 months after the crown-lengthening surgery [Figure 9].



Fig 8: Post-operative view with an increased clinical crown height



Fig 9: Prosthetic rehabilitation with PFM crowns

Discussion

Crown lengthening treatment is based on two principles: the establishment of BW and maintenance of adequate keratinized gingiva (KG) around the tooth. The BW, now referred to as the supracrestal tissue attachment is defined as the dimension of soft tissue that is attached to the portion of the tooth coronal to the alveolar bone crest [2]. Studies show that a minimum of 3 mm of space between restorative margins and alveolar bone would be adequate for periodontal health, allowing for 2 mm of BW space and 1 mm for sulcus depth [3]. Whenever possible, an adequate width of KG (≥ 2 mm) should be maintained around a tooth for gingival health [4]. According to Nevins and Skurow, when subgingival margins are indicated, the restorative dentist must not disrupt

the junctional epithelium or connective tissue apparatus during preparation and impression taking. They recommended limiting subgingival margin extension to 0.5–1.0 mm because it is impossible for the clinician to detect where the sulcular epithelium ends and the junctional epithelium begins [3]. When the restoration margin is placed too far below the gingival tissue crest, it impinges on the gingival attachment apparatus and creates a violation of BW. Two different responses can be observed from the involved gingival tissues. One possibility is that bone loss of unpredictable nature and gingival tissue recession occurs as the body attempts to recreate room between the alveolar bone and the margin to allow space for tissue reattachment. This is more likely to occur in areas where the alveolar bone surrounding the tooth is very thin. Trauma from restorative procedures can play a major role in causing this fragile tissue to recede. The other possibility is that the bone level appears to remain unchanged, but gingival inflammation develops and persists.

In this case, internal bevel gingivectomy was taken as the treatment of choice, to maintain the periodontal health and postoperative aesthetics of the patient. An internal bevel incision can thin down the gingival margin to a knife-edge contour while preserving the maximum amount of attached gingiva. At the same time, it gives maximum comfort to the patient rather than external bevel gingivectomy because of open wounds in the latter.

The position of the lip on smiling is very important as it will determine the amount of tooth and gingiva on display affecting the final aesthetic outcome [5]. In regions of the mouth where aesthetics is important, wound healing after crown lengthening surgery must be allowed to proceed to completion if optimal results are to be achieved. After crown lengthening surgery, the periodontium continues to remodel and mature. Bragger *et al.* reported that gingival recession can occur between 6 weeks and 6 months after the surgery [6]. Hence, if restorations are planned, recessions must be closely observed during the healing phase. Temporary crowns should be retained until the wounds are completely healed (possibly up to 6 months), after which final crown preparation and insertion can be done. If these guidelines are followed, the gingival recession can be minimized. In this case, we have delivered the permanent restoration within 3 months and follow-up shows no recession at all.

The health of the periodontal tissues is dependent on properly designed restorative materials. Overhanging restorations and open interproximal contacts should be corrected during the disease control phase of periodontal therapy. Subgingival margin placement is often unavoidable, but care must be taken to involve as little of the sulcus as possible. Evidence suggests that even minimal encroachment on the subgingival tissue can lead to detrimental effects on the periodontium. If restorative margins need to be placed near the alveolar crest, crown lengthening surgery or orthodontic extrusion should be considered to provide adequate tooth structure while simultaneously assuring the integrity of the BW. 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 BW space and 1 mm for sulcus depth.

Conclusion

Crown lengthening is a viable procedure that enables restoration of teeth having a short clinical crown, extensive subgingival caries, and subgingival tooth fractures at dentogingival junction. When performed in ideal clinical

conditions, crown lengthening gives satisfactory results both from a functional as well as esthetic point of view.

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