

The Crown Lengthening Surgery: Two Case Reports**Mrinal Kanti Dholey¹, Samiran Sinha^{2*}, Daliya Kole³, Sukanta Sen⁴**¹*MDS in Department of Periodontics, West Bengal Dental Services, GN-29, GN Block, Sector V, Sector-V, Kolkata, West Bengal, India*²*MDS in Department of Endodontics and Conservative Dentistry, West Bengal Dental Services, GN-29, GN Block, Sector V, Sector-V, Kolkata, West Bengal, India*³*Associate Professor, Department of Pedodontics and Preventive Dentistry, Department of Dentistry, JNM Hospital and College of Medicine, Kalyani, Block A, Post Office Kalyani, Near Silpanchal Station, Block A2, District Nadia, West Bengal, India*⁴*Professor & Head, Department of Pharmacology, ICARE Institute of Medical Sciences and Research, Banbishnupur, PurbaMedinipur, Haldia, West Bengal, India*

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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. The aim of the current case reports is to evaluate the implications of CL in routine dental practice. The diagnosis requirements, procedures of crown lengthening, importance of crown lengthening and esthetic improvements after crown lengthening are discussed in different sessions.

Keywords: Clinical Crown, Crown Lengthening, Dentogingival Complex, Aesthetic.**Introduction**

The crown lengthening procedure (CLP) is commonly used to expose dental structure when an inadequate clinical crown is available for the placement of a restoration and subsequently achieve an esthetic smile. This procedure is also used to maintain the optimal conditions of the dentogingival complex. A short clinical crown is defined as any tooth with less than 2 mm of sound, opposing parallel walls remaining after occlusal and axial reduction[1].

A CLP should be indicated after having performed a periodontal analysis, indispensable aspects in aesthetic dentistry[2]. The evaluation of certain elements such as a facial analysis, dento-facial analysis (maxillo-mandibular relationships to the face and the dental midline relationship to the face), dento-labial analysis

(the relationship of the teeth to the lips), dento-gingival analysis (the relationship of the teeth to the gingiva) and dental analysis are prerequisites[3].

This paper discusses two different situations where crown lengthening may improve the esthetic appearance of upper anterior teeth and two different surgical techniques will be explained as well[4].

Goals of Crown Lengthening**Facilitating an ideal restorative results**

- To gain access to subgingival caries, root resorption and /or post /pin restoration.
- To increase clinical crown height that lost from caries, fracture or excessive wear.
- To provide additional tooth structure for a —ferrule effect beyond post or core, etc.
- To improve axial retention and resistance form for better long term predictability.

Preserving the health of the periodontium

- Adjust bone height and soft tissues position away from the proposed crown margins to prevent biologic width impingement after crown cementation.
- To eliminate chronic irritation/ inflammation, tissue discomfort and pain, and bone loss

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around an existing crown causing biologic width impingement.

- To avoid worsening tooth prognosis while maintaining a crown to root ratio of at least 1:1 and while minimizing the reduction of bone and soft tissues of the adjacent teeth.

Contraindications of Crown Lengthening

When there is an unfavorable crown/ root ratio because of short roots or reduced bone support. Without sufficient periodontal support, it seems unreasonable to achieve appropriate results. Another related factor to the failure of the procedure deemed to be the presence of furcation in a multi-rooted tooth. Single anterior tooth CL causes uneven gingival contour, which is esthetically unpleasing, especially on patients with a high smile line. Moreover, CL is contraindicated on anterior teeth with long clinical crowns since it causes already long crowns to be even longer and results in an inappropriate esthetic view[5].

Treatment Options for Crown Lengthening Procedures

Surgical

A. Gingivectomy

Conventional (Scalpel or Kirkland knife)

Laser

Electrocautery

B (i). Internal Bevel Gingivectomy with or without ostectomy (also referred as flap surgery with or without osseous surgery)

(ii)Apical positioning of flap with or without ostectomy

C. Combined (Surgical &Non Surgical) - Orthodontic Treatment.

Sequence of Treatment (Allen, 1993)[6]

Clinical and radiographic evaluation

1-Caries control

2- Removal of defective restorations

3- Placement of provisional restorations:

- a. Control of inflammation
- b. Better assessment of crown lengthening required
- c. Improved surgical access, especially interproximally
- d. Enhanced predictability of margin placement postsurgically

4- Endodontic therapy

a. Precedes surgery

b. If not possible, then completion is 4 to 6 weeks postsurgically

5- Control of gingival inflammation

a. Plaque control

b. Scaling and root planning

6- Re-evaluation for

a. Orthodontic treatment

b. Surgical therapy

7- Surgery

Case Report

Case- 1: A 41 year old female patient complains of decayed tooth in upper front teeth region since two years, the patient presented to us with a broken upper two central incisor in which root canal treatment was completed. Healthy gingival biotype present. After determining the problem, the surgical technique was determined. Gingivectomy was performed by surgical blades to make a external beveled incision which is about 45 degrees towards the long axis of tooth with an apico-coronal direction (Figure 1C). In this case, only soft tissue was excised without any bone resection. Some clinicians prefer to use diode laser instead of sharp instruments for gingivectomy/ gingivoplasty due to its advantage of having more delicate strokes and intraoperative hemostasis.



FIG -1A



FIG -1B



FIG -1C



FIG -1D



FIG -1E



FIG -1F



FIG -1G



FIG -1H

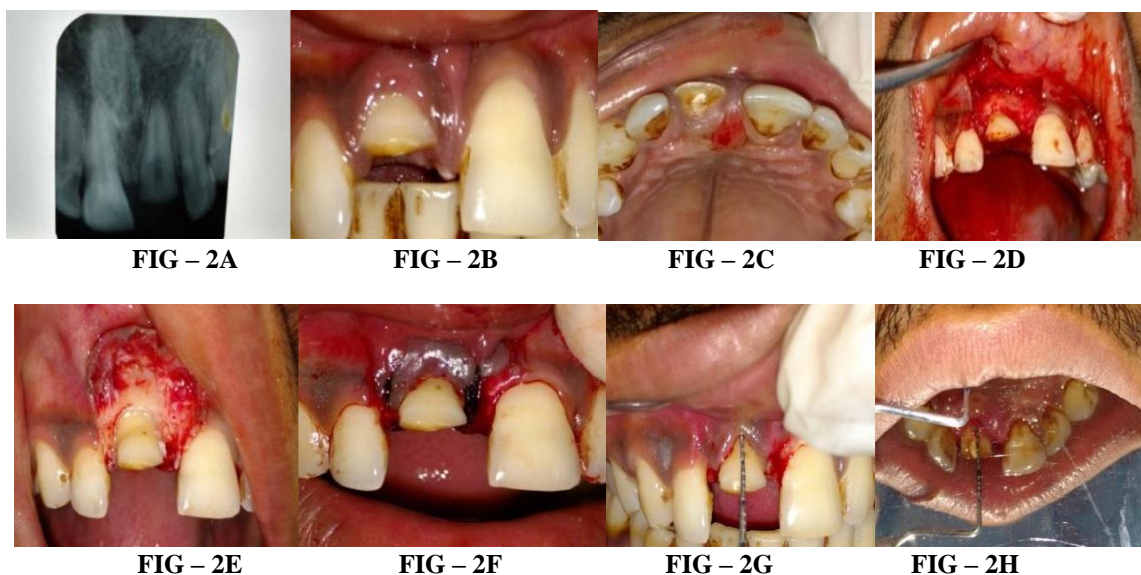
Case -2

A 23-year-old male patient presented to the Haldia Institute of Dental Sciences and Research with a broken 11 (Ellis and Davey – class III) due to trauma and requesting —better-looking teeth. His medical history was noncontributory, and he denied a history of smoking or alcohol consumption. Extraoral examination revealed no significant findings. His face was symmetric and had a straight profile.

Dental examination revealed that the crown of tooth 11, which had been treated endodontically, had a fracture crown and the anterior maxillary teeth looked asymmetric with respect to their contra lateral counterparts (e.g., tooth 11 was dissimilar to tooth 21 in terms of length and width), they were not proportionate in size. Clinical examination revealed shallow probing depths, no mobility and presence of adequate amounts of keratinized attached gingiva. The

crestal bone level was within normal limits, and the crown to root ratio was favourable. After discussion with the restorative dentist, esthetic crown-lengthening was recommended to allow a healthy, optimal relationship between the teeth and the periodontium. The papillae were raised in a split-thickness fashion, and this process was followed by creation of a full-thickness flap apically. Thus, the papillae were kept intact palatally to avoid tissue recession. Osseous resection performed only on the buccal surface, exposed 3 mm of root surface from the gingival margin to the alveolar crest; this allowed for attachment of the junctional epithelium and connective tissue (**Fig. 2D**).

The flap was apically repositioned and suture (**Fig. 2F**). Chlorhexidine rinse 0.2% bid was prescribed for 2 weeks, and the patient was given appropriate postoperative instructions.

**Discussion**

There are few conditions which can be corrected by crown lengthening procedure but before that proper identification and analysis of the problems are essential. Position of gingival tissue, alveolar bone height and clinical crown length are the determinant factors to identifying the problems.

Usually a gingival exposure of more than 3 mm, apical to the gingival margin of upper teeth, could cause an unwanted —gummy smile appearance[7]. If only soft tissue removal was needed (no bone resection) then there are two options; gingivectomy (beveled incision) or apically positioned flap (reverse beveled incision). If the crest of alveolar bone was less than 3 mm away

from the anticipated gingival margin, then bone resection is necessary, which requires a full-thickness flap to be raised[8]. That's why, in our first case, only gingivectomy was done but in second case, a full thickness flap was raised and placed apically and osseous resection was done to achieve the anticipated position of the gingival margin.

According to the definition of the American Academy of Periodontology, CL is —a surgical procedure designed to increase the extent of the supragingival tooth structure for restorative or esthetic purposes by apically positioning the gingival margin, removing supporting bone or both[9].

In 1988, Edward P. Allen has suggested that the ideal relationships of upper anterior teeth are achieved when: 1) The gingival margins of the central incisors are symmetric, and are either even with or 1 mm apical to the margins of the lateral incisors. 2) The gingival margins of the canines should be 1 mm apical to the level of the lateral incisors. 3) A line drawn horizontally at the level of the canine gingival margins should be parallel to the inter-pupillary line. 4) The smile should expose a minimal amount of gingiva apical to the centrals and canines, and should be in harmony with the smile line. 5) The lateral incisors should be exposed 1.5 mm less than the length of the centrals. He also suggested that the crowns of central incisors and canines could be exposed to an overall length of 11 to 12 mm to attain the maximal gingival reduction[10]

Altered passive eruption may be present on all or some of the upper anterior teeth. Such patients are most of the time unaware of that they have —short teeth till they are examined. Attrition of the incisal edges of teeth needs to be compensated when estimating the level of the cemento-enamel junction of —worn teeth[11].

Evaluation of the alveolar bone level is obtained by —probing to bone or —sounding under local anesthesia where the periodontal probe is forced through the periodontal tissues apical to the sulcus and up to the level of the alveolar bone[12-15].

Conclusion

Gingival contour and tooth abnormalities play an important role in the social life of the patients. Predictable long-term restorative success requires a combination of restorative principles with the correct management of the periodontal tissues. Improper management of the periodontal tissues during restorative procedures is a common cause of failure. When a restoration is placed, the preservation of an intact, healthy periodontium is necessary to maintain the tooth or teeth being restored. Surgical CL can be a viable option for facilitating restorative therapy or improving esthetic appearance. CL is a common periodontal surgery in routine dental practice. It is safe to conclude that the success rate of the treatment is high if appropriate case selection is considered.

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