

# CROWN LENGTHENING PROCEDURE-A CASE SERIES

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## ABSTRACT

**Introduction:** Crown lengthening is the process by which the extent of supragingival tooth structure is increased. It is used for aesthetic or functional (retention) purposes.

**Method:** Various techniques are used for crown lengthening purpose. It is important to choose which technique should be employed for that particular patient. Techniques such as gingivectomy, flap with osseous reduction, apically positioned flap with or without osseous reduction have been used for crown lengthening procedure.

**Case Report:** This article consists of a series of 3 cases highlighting the technique used and its need according to the demand of the situation.

**Discussion:** Crown Lengthening is a surgical procedure that requires exposure of adequate tooth structure for restorative procedures. The cases discussed here have been treated with different techniques. All cases discussed here were treated in such a way so as to avoid any violation of Biologic Width that can have deleterious effect on periodontium leading to gingival inflammation, loss of attachment and alveolar bone resorption.

## INTRODUCTION

### Crown lengthening

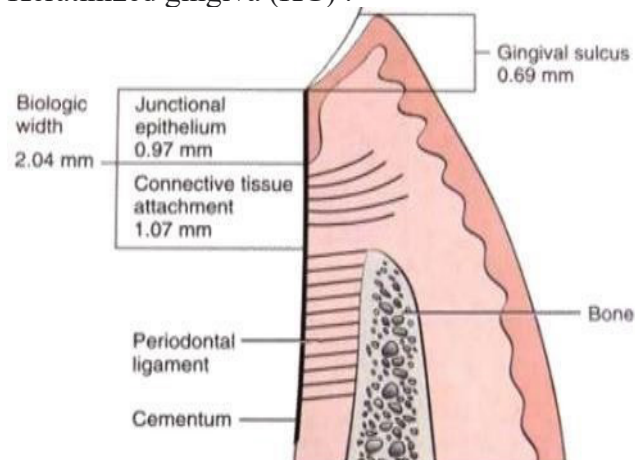
Crown lengthening is a surgical procedure designed to increase the extent of supragingival tooth structure for restorative or esthetic purposes by apically positioning the gingival margin, removing supporting bone, or both. This may be accomplished by orthodontic tooth movement also. [1] The concept of tooth lengthening was first introduced by D. W. Cohen in 1962. The procedure is based on two principles: BIOLOGIC WIDTH (BW) establishment and maintenance of adequate KERATINIZED GINGIVA (KG) around the tooth.

### BIOLOGICAL WIDTH (BW)

The BW is defined as the dimension of soft tissue that is attached to the portion of the tooth coronal to the alveolar bone crest. It was first described by Sicher 1959 and later by Gargiulo and colleagues in 1961.

[2] Vacek and colleagues in 1994 suggested that, BW increases antero- posteriorly (1.75mm-2.08mm). [3] Kois in 1994 and Spear 1999 suggested that the Interproximally BW is around 4.5mm-5.5mm.

Keratinized gingiva (KG) :



The keratinized gingiva is the part of the oral mucosa which covers the gingiva and hard palate. It extends from the free gingival margin to the mucogingival junction and consists of the free gingiva as well as the attached gingiva. The band of keratinized tissue

around natural dentition and implants is vital in maintaining periodontal health, preventing gingival recession, and maintaining the esthetics.

## CROWN LENGTHENING PROCEDURES

### Initial treatment phase:

Oral prophylaxis and oral hygiene instructions along with the caries control are mandatory in the initial treatment phase.

If endodontic therapy is indicated, it should be completed, before surgery.

Initial tooth preparation should be completed if possible and a provisional restoration placed to determine the amount of crownlengthening required. General principles in crown lengthening procedure. Regardless of the surgical technique chosen, the final result should provide an adequate amount of tooth exposure to meet the restorative requirements. [4]

The actual amount will vary depending on the demands placed on the tooth.

A tooth that will serve as an abutment for a fixed partial denture or a removable partial denture generally will require more tooth length for greater retention than receiving a simple restoration

The minimal amount of tooth length needed supracrestally is 3-5mm.

The surgical crown lengthening procedure depends mainly on the band of attached gingiva and the thickness of marginal alveolar bone.

It is important to maintain an adequate dimension of gingiva around the tooth being surgically lengthened. If there is a sufficient band of attached gingiva and thick gingival tissue on the marginal bone then only the soft tissue is removed.

However if the band of the attached gingiva is insufficient then apically positioned flap surgery is used.

Ideally there should be 5mm of gingiva (3mm attached and 2mm free) in an apicocoronal dimension, when restoration margins will be placed subgingivally.

If less than this amount is present, there is risk for future gingival recession and restoration margin exposure. In cases with minimal gingiva, care should be taken to retain the entire band of marginal gingiva.

Various Techniques For Performing The CrownLengthening : [5] [6]

## NON-SURGICAL

Orthodontic Treatment Combined

## SURGICAL

Gingivectomy- Conventional (Surgical), Laser, Electrocautery.

## FLAP WITH OSSEOUS REDUCTION

Apical positioning of flap with or without ostectomy

## DECISION TREE FOR SURGICAL CROWNLENGTHENING

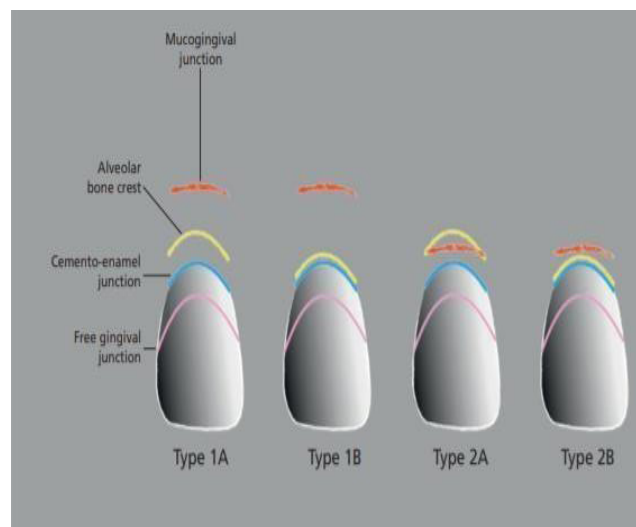


FIGURE 1: COSLET'S CLASSIFICATION

Coslet's APE classification	Crown lengthening procedure
Type 1A	Gingivectomy
Type 1B	Gingivectomy with ostectomy and osteoplasty
Type 2A	Gingivectomy and apically positioned flap
Type 2B	Intra-sulcular incision with ostectomy and osteoplasty and apically positioned flap

TABLE 1: CROWN LENGTHENING OPTIONS DEPENDING ON THE TYPE OF ALTERED PASSIVE ERUPTION(APE)

## CASE SERIES

### Case 1: Flap With Osseous Reduction

A 42 year old female patient was referred to the Department of Periodontics and implant dentistry , CSI college of dental sciences and research, Madurai, for crown lengthening procedure. On clinical examination pocket depth was 4mm, the width of keratinized gingiva was Adequate [keratinized gingiva  $\geq 2\text{MM}$ ] (fig 1.a) ;but the distance from finished restorative margin to bone margin was  $< 2\text{mm}$ , hence flap procedure with osseous reduction was preferred.[7] (ACCORDING TO

### COSLET'S CLASSIFICATION - TYPE 2B )

Technique: After adequate anesthesia, Internal bevel incision was made 2–3 mm apical to the gingival margin, following a scalloped pattern. This was followed by a second incision, intracrevicularly. A third incision is then placed interproximally to release the interdental papillae, after which a full thickness flap is raised to allow bone exposure(fig1.b, fig1.c). The underlying bone was reduced using a diamond bur with ample irrigation with saline. The bone was contoured in such a way to expose required tooth length and to achieve a proper dimension of biological width (fig 1.d,fig 1.e). The flap was placed in close adaptation to the bone margin and sutured with 3-0 silk suture (fig 1.f). The patient was recalled after 10 days for suture removal. The temporary crown was placed immediately. The gain in supragingival tooth structure was about 2mm after 1 month. A final crown was placed in relation to 36 after 1 month (fig 1.g).

**Things to be considered:** Furcation involvement and width of keratinized tissue.



incision on buccal aspect issue.



1.C) Incision On Lingual Aspect



1.d Osseous Reduction



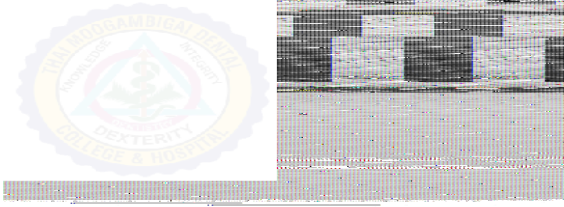
1.e After Osseous Reduction



1.f Sutures Placed In 36



Pre-Operative



1.G) Crown Placement In 36 Region

**Case 2:** Apical positioned flap without osseous reduction

A 32 year old male patient reported to the Department of Periodontics and implant dentistry, CSI college of dental sciences and research, Madurai, for crown lengthening procedure in 25 region. On clinical examination, the width of keratinized gingiva was inadequate, (KG <2mm) (fig 2.a) and the distance from Finished restorative margin to bone margin was > 2mm, hence apically displaced flap without osseous reduction was preferred. (ACCORDING TO COSLET'S CLASSIFICATION - TYPE 2A)

Technique: After adequate anesthesia, Crevicular incision (fig 2.b) was given, followed by vertical incisions, that were placed distal to 24 region and mesial aspect of 16 region which extends beyond the mucogingival junction and a trapezoidal, like full thickness flap was raised (fig 2.c). As the distance from the finished restorative margin to the alveolar bone was more than 2 mm there was no need for osseous reduction. The flap was apically repositioned. The flap was placed in close adaptation to the bone margin and sutured with 3-0 silk sutures (fig 2.d). Periodontal pack was placed (fig 2.e). Patient was recalled after 10 days for removal of sutures and periodontal pack. The increase in supragingival tooth structure was about 2mm. Permanent crown was done in relation to 25 after 3 weeks (fig 2.f).

Things to be considered: Furcation involvement and width of keratinized tCrown Placement In 36 Region



2.A Pre-Operative



**Case 3:** Gingivectomy

2.b Crevicular Incision On Buccal Aspect



2.c Full Thickness Flap Elevated



2.d Sutures Placed



2.d Coe-Pak Placed



2.e Crown Placed In 25 Region

A 23 year old female patient came to the Department

of Periodontics and implant dentistry, CSI college of dental science and research, Madurai with a chief complaint of excessive gingival display(gummy smile) (fig 3.a). On extra-oral examination the patient showed a high upper lip line. On clinical examination, Probing Depth(PD) was about 5mm and with an adequate width of keratinized gingiva. Distance from CEJ to bone margin was >2mm (fig 3.b). Hence a gingivectomy procedure was preferred. [11] (ACCORDING TO COSLET'S

CLASSIFICATION - TYPE 1A) This case was classified under esthetic crown lengthening procedure.

Technique: Pockets were marked using a pocket marker. Bard-parker blades no. 11 and 12, was used for the incisions on the facial surfaces. External bevel incision following bleeding points was made (fig 3.c). Excess gingival tissue was removed using periodontal knives (fig 3.d). Scissors were used to contour the gingiva. After copious irrigation, periodontal pack was placed (fig 3.e). Patient was recalled after 10 days for removal of periodontal pack, and then after 1month for follow-up. The increase in supragingival tooth structure was about 3mm after 1month(fig 3.f, fig 3.g).

**Things to be considered:** Patients lip line, adequate crown to root ratio and width of keratinized tissue.



3.A Short Clinical Crowns



3.b Pre-Operative



3.c Incisions Made



3.d Removal Of Excess Gingiva



3.e Coe-Pak Placed



3.f Before Treatment



3.G) After Treatment

## DISCUSSION

According to the definition of the American Academy of Periodontology, Crown lengthening 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.

Careful clinical assessment and identifying the right technique is essential for successful crown lengthening procedure.[8]

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.[9]

Anatomical considerations need to be taken into account when a patient is being assessed for crown lengthening, including: Length and shape of root; Furcation position; Lip line (at rest and smiling); Width of interdental bone; Local soft/hard tissue anatomy and muscle insertions; Amount of attached gingival tissue. There needs to be a favorable crown: root ratio after treatment, as well as adequate tooth tissue to allow the accommodation of the restoration. [10] All cases discussed here were treated in such a way so as to avoid any violation to Biologic Width that can have deleterious effect on periodontium leading to gingival inflammation, loss of attachment and alveolar resorption.

The case 1 was treated with flap with osseous reduction as the width of keratinized gingiva was adequate but the distance from FRM to the alveolar bone was  $\leq 2$ mm. The case 2 was treated with apically positioning the flap as the width of keratinized gingiva was inadequate, but the distance from the FRM to the alveolar bone was  $\geq 2$ mm, so there is no need for osseous reduction. The case 3 is treated by gingivectomy procedure since the width of keratinized gingiva was adequate and the distance from the CEJ/ Finished restorative margin (FRM) was more than 2 mm, so there is no need for osseous reduction.

## 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. [12] Restorative procedures should consider the periodontium also, failing to do will lead to failure of restoration. When a restoration is placed, the preservation of an intact, healthy periodontium is necessary to maintain the tooth or teeth being restored.

Surgical Crown lengthening can be a viable option for facilitating restorative therapy or improving esthetic appearance. So, it can be concluded that crown lengthening procedures help in improving esthetics and functional outcomes of restorative procedures

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