



CROWN LENGTHENING PROCEDURES: AN OVERVIEW

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**ABSTRACT**

It is a procedure to gain clinical crown length for restorative purpose and to recapture biologic width, can also be performed to overcome esthetic problems usually associated with excessive gingival display coupled with insufficient crown length, gingival asymmetry or flat marginal contours. A short clinical crown may lead to poor retention form thereby leading to improper tooth preparation. Surgical crown lengthening procedure is done to increase the clinical crown length without violating the biologic width. Several techniques have been proposed for clinical crown lengthening which includes gingivectomy, apically displaced flap with or without resective osseous surgery etc.

**KEYWORDS** : Biological width, Flap surgery, Gingivectomy, Osseous reduction.

**INTRODUCTION:**

Tooth with short clinical crown height requires crown lengthening procedure prior to restorative treatment. Clinical crown lengthening refers to procedures designed to increase the extent of supragingival tooth structure for restorative or esthetic purposes. The concept of crown lengthening was first introduced by D.W. Cohen and is presently a procedure that often employs some combination of tissue reduction or removal, osseous surgery, and / or orthodontics for tooth exposure<sup>(1)</sup>. The amount of tooth structure exposed above the osseous crest (about 4mm) must be enough to provide for a stable dentogingival complex and biologic width to permit proper tooth preparation and account for an adequate marginal placement, thus ensuring a good marginal seal with retention for both provisional and final restorations.

**INDICATIONS OF CROWN LENGTHENING<sup>(2)</sup>**

1. Gain of retention for prosthetic reconstruction
2. Accessibility for restorative treatment.
3. Correction for esthetic reasons.
4. To increase clinical crown height lost due to caries, fracture or wear

5. To access subgingival caries
6. To produce a ferrule for restoration
7. To access a perforation in the coronal third of the root
8. To relocate margins of restorations that is impinging on biological width.
9. Short teeth
10. Uneven gingival contour
11. Gummy smile.

**CONTRA-INDICATIONS & LIMITING FACTORS<sup>(3)</sup>**

1. Inadequate crown to root ratio
2. Non restorability of caries or root fracture
3. Esthetic compromise
4. High furcation.
5. Inadequate predictability.
6. Tooth arch relationship inadequacy.
7. Compromised adjacent periodontium or esthetics.
8. Insufficient restorative space.
9. No maintainability.

**CLASSIFICATION OF CROWN LENGTHENING PROCEDURE<sup>(4)</sup>:**

CLASSIFICATION	CHARACTERISTICS	ADVANTAGES	DISADVANTAGES
TYPE I	Sufficient soft tissue allows gingival exposure of the tooth without exposure of the alveolar crest and violation of the biologic width.	May be performed by the restorative dentist. Provisional restorations of the desired length may be placed immediately	
TYPE II	Sufficient soft tissue allows Gingival excision without exposure of the alveolar crest but in violation of the biologic width.	Will tolerate atemporary violation of the biologic width. Allows staging of the gingivectomy and osseous contouring procedures. Provisional restorations of the desired length may be placed immediately	Requires osseous contouring. May require a surgical referral.
TYPE III	Gingival excision to the desired clinical crown length will expose the alveolar crest.	Staging of the procedures and alternative treatment sequence may minimize display of exposed subgingival structures. Provisional restorations of desired length may be placed at second stage gingivectomy	Requires osseous contouring. May require a surgical referral. Limited flexibility.
TYPE IV	Gingival excision will result in inadequate band of attached gingiva		Limited surgical options. No flexibility. A staged approach is not advantageous. May require a surgical referral.

**Type I :** sufficient gingival tissue is present coronal to the crestal bone. Gingivectomy of gingivoplasty is required.

#### **Type II**

Usually done in two stages. In stage one, a gingivectomy procedure is done and required amount of crown is exposed. Once the tissues are healed stage 2 procedure is done, in which, a flap surgery is done n required amount of ostectomy is done to maintain the biologic width.

#### **Type III:**

Here gingivectomy along with bone recontouring is done according to surgical template made before. Flaps should also be repositioned coronally, rather than apically, in order to maximize tissue preservation and allow the anticipated revisions to the gingival margins that will follow once the healing from the osseous surgery has been completed. Following adequate healing, a gingivectomy may be performed to establish the definitive gingival position without the risk of violating the biologic width.

**Type IV-** This type is reserved for scenarios where the degree of gingival excision is compromised by an insufficient amount of attached gingiva. Ideal margin position, therefore, can only be achieved by an apically position mucoperiosteal flap, with or without osseous contouring<sup>(5)</sup>.

#### **Role Of The Provisional Restoration In Crown Lengthening<sup>(6)</sup>**

Provisional restorations can be used as powerful communication tools, visually demonstrating how the final restoration would look if the crown lengthening were not accomplished or, even better, how the restoration will look after the crown lengthening is complete. The provisional can produce the illusion of a longer tooth if the clinician creates a flange on it from the finish line over the free gingival margin. Obviously, this appliance is meant to be used only a short time because of the patients difficulty in performing oral hygiene under the flange. Provisional restoration are also extremely useful in the initial treatment plan for crown lengthening. Provisionals made with the gingival flanges to the ideal tooth length can also be used as surgical stints, providing the periodontist a template to follow in the creation of the new gingival margin.

#### **GINGIVAL RECONTOURING**

The most basic of cosmetic crown lengthening procedures is the removal of excess gingival tissue by gingivectomy or gingivoplasty. One begins by creating bleeding points at the level the gingiva is to be excised as determined by the tooth length analysis. To preserve his or her perspective and prevent the removal of too much tissue initially the surgeon should remove the excess tissue by scalpel, one tooth at a time, rather than in large segments. This is typically accomplished with a no.15 blade.

To create a natural-looking gingival contour, the surgeon must place the gingival height of contour for central incisors and cuspids just distal to the midline of the tooth and for lateral incisors at the midline of the tooth. This practice allows the surgeon to avoid the common mistake of making the gingival contour of all the anterior teeth elliptical, which yields a poor cosmetic result. Once all of the contours have been created, the new gingival margin can be blended into the adjacent tissue with a chisel or diamond bur. The clinician may wish to recontour the gingival margins as far as the mesial of the maxillary first molar, depending on the horizontal limit of the smile.

#### **EVALUATING THE BIOLOGIC WIDTH**

The crown lengthening procedure is not complete until one has determined the relationship between the newly created gingival margin and the osseous crest, by sounding the bone with the periodontal probe<sup>(7)</sup>. As previously mentioned, approximately 2 mm is needed between the base of the sulcus and the alveolar crest to provide room for the attachment apparatus. That distance, the biologic width, is violated if it is necessary to move the gingival

margin so that the sulcus is any closer than 2 mm from the osseous crest. If through sounding it is found that there is 2 mm between the two, the procedure is complete, if there is less than 2 mm between the newly created gingival margin and the alveolar crest osseous resection is indicated to provide the room needed for the attachment apparatus.

#### **FLAP DESIGN**

If the clinician determines that the removal of bone is necessary to preserve the biologic width, he or she must begin planning the incisions and flap design. Without careful preplanning and atraumatic surgical technique, one can lose the interproximal papilla, creating an esthetic problem of much greater magnitude than the gummy smile that was the initial cosmetic concern. Damaged or destroyed interproximal papillae are nearly impossible to regenerate. In many instances, the crown lengthening, for esthetic reasons, involves the interproximal papilla. Instead, a sulcular incision is made on the facial aspect of the teeth, feathering the incision into the interproximal but leaving the bulk of the papilla untouched.

If one must perform crown lengthening on the facial and lingual to gain clinical crown length for retention, special flap designs should be implemented to preserve as much of the normal papillary form as possible. One such technique was suggested by Evian et al in which the entire papilla is elevated to the facial. For the procedure to be successful, there must be enough space interproximally to allow the surgeon to elevate the papilla atraumatically through the interproximal space. If there is insufficient space through which to elevate the papilla, the surgeon must retain as much papillary connective tissue as possible with the flap.

#### **OSSEOUS RESECTION**

After determining the appropriate flap design, the clinician elevates a full-thickness mucoperiosteal flap, removing sufficient bone following the contour of the CEJ, to create the 2 mm necessary for the attachment apparatus. If the teeth are to be restored, the clinician should allow 3mm of root surface between the newly created gingival margin and the alveolar crest. This provides the 2mm necessary for the biologic width and 1mm for the margin of the restoration<sup>(8)</sup>.

The osteoplasty or ostectomy is generally performed with chisels. If exostoses are present or if the alv. Bone is heavy, rotary instruments may be used to thin the bone before the use of hand instruments.

The position of the interproximal bone determines the position of the interproximal papillae, any osseous reduction in the area must be judicious. As a rule of thumb, the height of the interproximal bone should always be 3 to 4mm coronal to the height of the newly created alveolar crest on the facial aspect of the teeth undergoing crownlengthening. When only the facial aspect of the teeth is flapped, the osseous recontouring is feathered into the interproximal areas, but one is careful not to remove interproximal bone.

#### **SLOW ERUPTION OF TEETH:**

Orthodontic tooth movement can be used to Erupt teeth in adults. If moderate eruptive force are used, the entire attachment apparatus will move in union with the tooth.

#### **INDICATION**

1. Crown lengthening at sites where removal of attachment and bone from adjacent teeth must be avoided.
2. To decrease pocket depth at sites with angular bony defects.

#### **CONTRA INDICATIONS**

This technique requires the use of fixed orthodontic appliances. Thus in patients who only have few teeth remaining and alternative to be selected.

### **RAPID ERUPTION OF TECHNIQUE**

In this technique the problem tooth is moved coronally and out of its socket. The crestal Bone & the gingival margin are retained of the pre treatment locations. Fibrotomy must be performed at 7-10 days interval

### **INDICATION**

Crown lengthening at sites where removal of attachment and bone form adjacent teeth must be avoided.

### **CONTRA – INDICATION**

Not done in those tooth with Angular Defects.

### **CONCLUSION**

Marginal periodontal tissue showed a tendency to grow in coronal direction form the level defined at surgery. This pattern of coronal displacement of the gingival margin was more pronounced in patients, with thick tissue biotype and also appeared to be influenced by individual variation in the realign response not related to age or gender.

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