

Review Article

Esthetic Crown Lengthening: A Review

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Abstract

Esthetic Crown lengthening involves surgical procedures utilized to increase clinical tooth crown height, address uneven gingival margins and excess gingival display and correct gingival overgrowth. Excessive gingival display known as “Gummy Smiles” can occur for a number of reasons including altered passive eruption, high lip line, hypermobile upper lip and maxillary vertical excess. The goal of this article is to provide a review on Esthetic Crown lengthening.

Keywords: Surgical Crown; Gingival Margins; Teeth; Cemento-Enamel Junction

Introduction

Crown lengthening involves procedures that are performed to increase clinical tooth crowns, improve access to caries, address excessive gingival display and prevent biologic width violation. Surgical Crown lengthening is divided into Functional Crown lengthening and Esthetic Crown lengthening [1]. Functional crown lengthening involves procedures that are utilized for restorative purposes to increase retention of crowns, expose subgingival caries, restorative margins and fractures by increasing tooth structure above the alveolar crest [1]. Esthetic crown lengthening involves procedures used to correct altered passive eruption and excessive gingival display, increase clinical crown height and address uneven gingival margins and gingival enlargement for anterior teeth [1].

Factors that impact surgical Crown lengthening procedures include the presence or absence of excessive gingival display, amount of supra-gingival tooth structure present, presence of

altered passive eruption, access available for restorative purposes to remove bone and soft tissue and the periodontium around adjacent teeth [1]. In some instances, in order to prevent damage to the periodontium of adjacent teeth in teeth with limited support, extraction might present as the best option rather than performing Crown lengthening procedure. The extent to which these factors when present are addressed affects success of the procedure. The major goal of Crown lengthening procedure is to reestablish biologic width and maintain keratinized tissue around teeth. The purpose of Crown lengthening is to have 3 mm of attached gingival tissue apical to sub-gingival margins, if that amount of tissue is not present the goal is to utilize apically positioned flaps rather than gingivectomy procedure in order to conserve gingival tissue around teeth [1].

In reviewing the Esthetic Crown lengthening procedure, altered Passive eruption which can be diagnosed by an alveolar bone crest which is 2 mm or less from the CEJ is one of the major conditions corrected by the procedure [2]. Eruption of teeth involves active and passive eruption [2]. Active eruption involves eruption of teeth clinically into their positions in the mouth, while Passive eruption involves a process where the epithelial attachment around teeth migrates apically from coronal enamel to a stable position slightly coronal to the Cemento-Enamel Junction (CEJ), with fibrous connective tissue attachment at the base of the gingival sulcus [1]. It involves apical migration of the dento-gingival unit consisting of junctional epithelium and connective tissue after tooth eruption. In assessing teeth with altered passive eruption, the most common clinical sign of altered passive eruption is short clinical crowns due to location of gingival tissue with regard to the Cemento-Enamel Junction (CEJ) [3].

Garguilo and colleagues identified four phases with altered passive eruption [4]:

Phase I: Epithelium attachment located at the enamel surface

Phase II: Epithelium attachment located at the enamel and cementum surface

Phase III: Epithelium attachment located to the cementum surface

Phase IV: Epithelium attachment located further apically on the cementum surface

During the phases of passive eruption, the epithelium attachment reduces in size from phase I to phase IV while the connective tissue attachment remains constant as the dento-gingival unit migrates apically [4]. While the first phase is physiologic, the other three phases result from pathologic periodontal destruction [2]. According to Foley and colleagues, altered Passive eruption occurs when eruption does not progress past Phase I and II [5].

Coslet and colleagues classified altered passive eruption into two major types including Type I and Type II based on the amount of gingival tissue and into subtypes A and B based on the relationship of the CEJ to alveolar crest [6]. Mele and colleagues in 2018 reviewed Altered Passive eruption and classified Type I to involve the gingival margin being incisal or occlusal to the CEJ where there is a noticeable wider band of attached tissue extending from the gingival margin to the CEJ than the usual 3.0-4.2 mm for the maxilla and 2.5mm-2.6 mm in the mandible [2]. They defined Type II Altered Passive eruption as the presence of a band of attached gingiva from the gingival margin to the CEJ that is within normal width with all the attached tissues located on the anatomic crown and with the mucogingival junction located at the level of the CEJ [2].

Mele and colleagues defined Altered Passive eruption subgroup A as the alveolar crest being at a normal distance from the Cemento Enamel Junction (CEJ) [2]. In Altered passive eruption subgroup B the alveolar crest is at the level or tissue coronal to the CEJ junction thereby affecting the space for the connective attachment. This relationship is observed during the active eruption phase of transitional dentition [2].

According to Mele and colleagues, while Altered Passive eruption Type I and Type II subtype A is caused by failure of the passive eruption phase, Type I and Type II subtype B Altered Passive eruption is caused by failure of the active eruption phase preventing the tooth from erupting completely from the alveolar bone, leaving the CEJ positioned in close proximity to the alveolar crest, preventing apical migration of the gingiva during the passive eruption phase and encroaching the space for connective tissue fibers to inhabit [2].

Their recommendations for treatment of patients with Type 1 subtype A who have excess gingival keratinized tissue and adequate distance from CEJ to bone crest involves Gingivectomy, while their recommendation for Type 2 subtype A patients that present with normal keratinized tissue and adequate distance between the CEJ and bone crest, their recommended therapy is apically positioned flap only [2]. For Types 1 and 2 subtype B, they recommend a surgical flap with variable thickness and ostectomy procedure to establish correct distance between the CEJ and bone crest and osteoplasty to reduce bone thickness [2].

Esthetic Crown lengthening is also utilized to correct excessive gingival display (gummy smile). Reasons that excess gingival display (gummy smile) occurs include skeletal deformity from overgrowth of the maxilla in the vertical dimension, severe attrition of clinical crowns, short upper lip or hyperactivity of the orbicularis oris muscle, altered passive eruption, compensatory extrusion of maxillary incisors and gingival overgrowth [2]. Prevalence of excess gingival display involves ranges from 10.57% to 35% of adults between ages 20-30 years of age and it presents with predominantly a female predilection [8,9]. Etiological causes of excessive gingival display are divided into gingival causes including altered passive eruption, skeletal causes involving vertical maxillary excess and muscular causes involving upper lip hyperactivity [10].

Indications for use of Esthetic Crown lengthening include to re-establish clinical crown length, treat gingival asymmetry and create gingival harmony, resulting in complete exposure of clinical crowns and restoration of biologic width dimensions [10]. Adequate dimensions for biologic width, include 0.69 mm for the sulcus depth, 0.97 mm for epithelial attachment and 1.07 mm for connective tissue width, the goal is to establish a distance of 3 mm between the gingival margin and bone crest to prevent supra-crestal fiber attachment encroachment [10]. According to Levine and colleagues, if 3 mm for biologic width is not attainable

for patients treated with Esthetic Crown lengthening, for patients with thick gingival phenotype that have Esthetic Crown lengthening, over time the gingival tissue can respond by having a rebound of tissue to its original position and for patients with thin gingival phenotype, the response of the tissue is gingival recession [10,11].

Conclusion

Esthetic crown lengthening procedure is indicated for addressing esthetic problems caused by excess gingival display, altered passive eruption, uneven gingival margins and short clinical crowns. The ability to correctly identify the type of condition causing a need for Esthetic crown lengthening impacts the ability to correctly treat it. Mele noted that different causes existed for classification of Altered Eruption with Type 1A and 2A caused by altered Passive eruption and Type 1B and Type 2B classification caused by altered Active eruption, as a result, the therapy to treat both conditions are different with bone removal required for patients with Type B classification in order to establish correct distance between the CEJ and bone crest and only gingivectomy and apically positioned flap needed for Type 1A and Type 2A respectively. Additionally, as with Functional Crown lengthening avoidance of biologic width impingement by having 3mm distance between CEJ and bone crest is also important for Esthetic crown lengthening in addition to having adequate amounts of keratinized tissue at the surgical site.

Conflict of Interests

The author has no conflict of interest to declare.

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