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# Crown Lengthening for The Treatment Of Gummy Smile Associated With Altered Passive Eruption: A Case Report

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## Abstract

A harmonious smile is considered a beautiful image in today's society. An appealing smile can enhance the look so that someone is more effortlessly popular in society. In making plans for dental remedies to be carried out, aesthetic issues are very applicable due to the connection between smile and facial beauty. Altered passive eruption (APE) is a condition where the gingival margin rises due to excessive tooth wear, leading to an increased display of gingival tissue. Crown lengthening is a surgical procedure that can help address these issues. Case Report: A 34 year old female came to the Department of Periodontology at RSGM USU with a chief complaint of not being confident with her smile because of excessive gingival display (gummy smile) because of APE. Case Management: This case report presents a gummy smile treatment with crown lengthening involving bone reduction. Discussion: The patient's gummy smile was significantly improved after the crown lengthening procedure, with the gingival margin now at the same level as the incisal edge of the teeth. The procedure effectively addressed the APE, enhancing the patient's oral aesthetics and self-confidence. Conclusion: Crown lengthening is a viable treatment option for patients with gummy smiles associated with APE. This case report highlights the importance of a thorough diagnosis and treatment planning to achieve optimal outcomes in such cases.

Keywords: Gummy Smile; Crown Lengthening; Altered Passive Eruption; Case Report

## 1. Introduction

A harmonious smile is considered a beautiful image in today's society. An attractive smile can enhance one's appearance to make one more popular in society. In making a dental treatment plan, aesthetic issues are very influential because of the relationship between the smile and facial beauty. The concept of an aesthetic smile basically depends on three main components: the anatomy of the gingiva, teeth, and lips. Meanwhile, the increasing awareness of beauty and physical appearance has become a motivation for every doctor to evaluate the important aspects of the patient's smile and create a dynamic relationship between the teeth, gingiva, and lips when smiling.[1]

Altered passive eruption can cause disturbances to periodontal tissue health, ranging from gingivitis to periodontitis, because excessive gingival can interfere and obstruct the oral cleaning process and contribute to plaque accumulation, thus requiring further treatment.[2] APE management is carried out with various approaches, one of which is periodontal surgery in the form of crown lengthening, which can reduce excessive gingival display tissue, expose the entire anatomy of the clinical crown, and re-establish proper biologic width. Crown lengthening includes gingivectomy or apically repositioned flap with or without surgical bone resection, depending on the etiology. This case report aims to determine the Aesthetic crown lengthening procedure with bone reduction as a treatment for APE.[1], [3], [4]

## 2. Case Report

A 34-year-old woman came to the Periodontics Department of the University of North Sumatra Dental and Oral Hospital, complaining that the gum height on the front teeth was not the same height and was considered less aesthetic when smiling. The patient also complained of short maxillary front teeth (Figure 1). The patient had no systemic disorders, was not taking any medications, and had no history of allergies. The objective examination included measurement of the golden proportion of the teeth using a Chu gauge (Figure 2), measurement of the bone sounding distance, and taking preoperative photographs at rest and smiling broadly. A supporting examination in the form of taking x-rays was also performed (Figure 3).



Figure 1. Initial clinical photograph of the patient

Based on the clinical examination that has been carried out, the patient is diagnosed with mucogingival disorders and conditions around the teeth (excessive gingival display) with plaque etiology and accompanying conditions in the form of altered passive eruption (APE) with a bone sounding examination result of 1mm. The treatment plan in phase 1 is dental health education (DHE) and tooth scaling in the upper and lower areas. The phase II treatment plan was crown lengthening with bone reduction (gingivectomy with bone reduction) in areas 14, 13, 12, 11, 21, 22, 23, and 24. The crown lengthening surgical design was carried out with a "digital smile design" to communicate with the patient and describe the incision to be performed. To obtain better aesthetic results, a surgical guide was used in the surgical process and was produced from the anatomical model printing procedure and then made from a transparent vacuum retainer in which the incision area was perforated with a bur and smoothed, then the surgical guide was tried on and positioned on the patient. The treatment plan in Phase III was diastema closure, and Phase IV treatment was the maintenance phase.



Figure 2. Clinical proposition with Chu measuring device, Bone sound examination before crown lengthening surgery

Table 1. Calculation of the aesthetic crown lengthening plan

Measurement	13			12			11			21			22			23		
	D	Mid	M	D	Mid	M	D	Mid	M	M	Mid	D	M	Mid	D	M	Mid	D
Sulcus Depth	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Bone Sounding	4	3	3	3	4	4	4	2	4	3	3	3	4	3	4	4	3	4
Gingivectomy	2	2	2	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1
Ostectomy	1	2	2	1	0	0	0	2	0	2	2	2	0	1	0	0	1	0

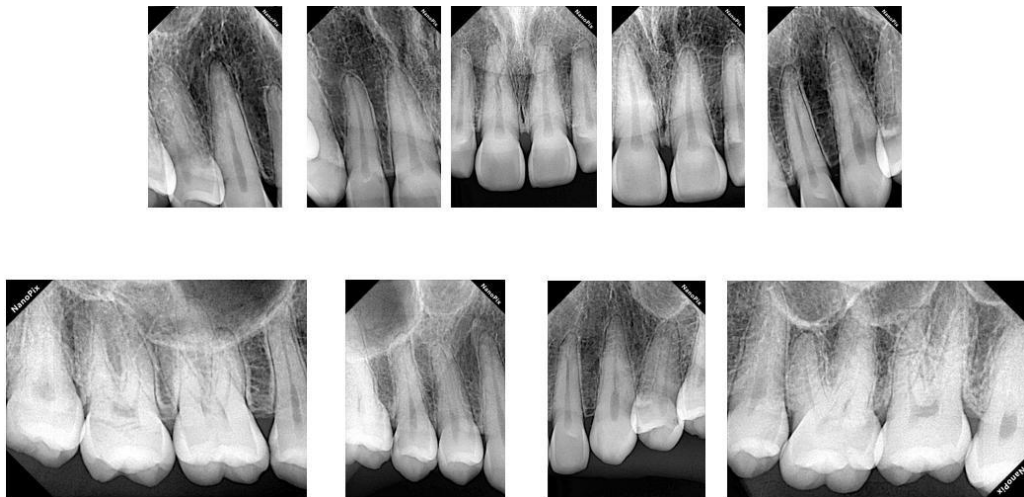


Figure 3. Radiograph examination



Figure 4. Digital smile design

### 3. Case Management

Crown lengthening of the teeth with ostectomy (gingivectomy with bone reduction) is an appropriate treatment option for APE due to its predictable outcome and minimal inside effects on the patient compared to other treatments. Before the surgical guide is adapted to the patient, a disinfecting procedure is performed to ensure sterile conditions. When adapted to the patient, the surgical guide must be fully adherent and adjust well to the contours of



the patient's teeth and gingiva. The initial procedure in crown lengthening procedure began with asepsis to the patient by administering povidone-iodine and continued with local anesthetic infiltration using Articaine 4% on the mucobuccalfold of teeth 14, 13, 12, 11, 21, 22, 23, 24 (Figure 5).

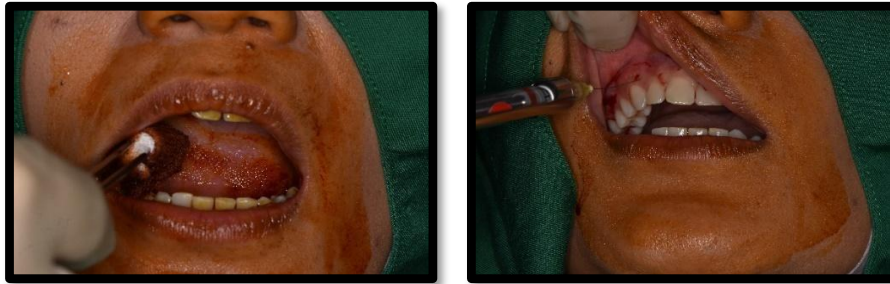


Figure 5. Extra oral and intra oral asepsis, Infiltration anesthesia

Gingivectomy was performed with an internal bevel incision using a No.15c blade following the existing template guide of the tooth gingiva, gingival excision was performed with the help of a grace curette, and then gingivoplasty was performed using a laser (Figure 6).



Figure 6. Gingive gingivoplasty blad no. 15c and laser

Then, a sulcular incision was performed in areas 14, 13, 12, 11, 21, 22, 23, and 24 with blade no. 15c and confirmed the gingival margin using a Chu-gauge. The full- thickness flap was then elevated, and measurement of the size of the bone to be osteotomy (bone reduction) was made with a probe in the teeth of areas 14, 13, 12, 11, 21, 22, 23, 24 using a round bur. Irrigation of the surgical area was done using saline. Then the flap was repositioned and sutured using the vertical mattress suture technique with 5-0 nylon thread. (Figure 7)



Figure 7. Flap elevation, ostectomy, and suturing

The patient has been prescribed amoxicillin 500 mg 3 times a day for 5 days, mefenamic acid 500 mg 3 times a day and taken if pain occurs, and chlorhexidine gluconate 0.2% twice a day. Routine postoperative instructions were given to the patient not to consume hot and spicy food or hot drinks for 3 days after surgery. The patient came for control 7 days postoperatively and denied any pain, and the sutures were in good condition; the sutures were

opened on day 14. The patient returned 2 months later and was referred to the conservation department for diastema enclosure I (Figure 8).



Figure 8. a. 7 days control, b. 14 days control, c. 2 months control, d. Final result

#### 4. Discussion

In this case report, crown lengthening with bone reduction was a phase II treatment performed after scaling and root planing. Identifying the etiology of excessive gingival display is important because proper identification leads to an inappropriate and structured treatment plan [5]. In this case, the patient was diagnosed with excessive gingival display and the etiology of APE type I because the gingival margin was located at the incisal of the CEJ, and the mucogingival junction (MGJ) was apical to the alveolar crest, the gingival width dimension and the clinical crown of the tooth was short. Based on bone- sounding and radiographic examination, the case was classified into subgroup B because the alveolar crest was close to the CEJ.[6][7] Lucia C et al. 2017, consider careful analysis and management of incorrect diagnoses to achieve success.[1], [8]

Excessive gingival display due to APE can be corrected with periodontal surgical interventions, including gingivectomy or crown lengthening with or without bone reduction. The surgical procedure choice depends on the gingival anatomy, bone level, gingival biotype, and the width of the keratinized gingiva [9]. All these surgical procedures aim to expose the clinical crown structure. Therefore, the gingival margin is more incisal than the CEJ [10], [11], [12].

Several studies have suggested that APE contributes to the occurrence of periodontal disease through the maintenance of oral hygiene, which may be compromised due to excessive gum enclosure over the teeth and the absence of inadequate connective tissue adhesion into the root cementum. Thus, it affects periodontal tissue defense. APE also affects the aesthetics of the patient's smile as teeth appear small in size, and gums are wide [2], [6], [13].

The ultimate goal of crown lengthening is to improve inadequate crown dimensions for a stable dentogingival complex and for placement of restorative margins, thus achieving the best marginal ideal and an aesthetically pleasing final restoration. Some studies have also shown that an adherent gingival width of 2 to 3 mm is preferred if successful retention of restored teeth<sup>4,5</sup>. Due to the repair character of this procedure, there is a risk of reducing the attached gingival width; thus, this width should be carefully diagnosed and evaluated when planning the crown lengthening procedure<sup>2,6,7</sup>. Oliveira P et al. 2015 said that an inaccurate diagnostic and interdisciplinary approach is mandatory for obtaining improved, conservative, and pre-indictable results in aesthetic areas.[2]

Care must be taken to maintain the biological width when correcting the position of the gingival margin. Often, bone reshaping is essential to maintain the integrity of the biological width and allows proper margin placement<sup>1</sup>. According to a pilot study by Gargiulo et al., biological width (BW) is defined as the physiological dimensions of the junctional epithelium and connective tissue attachment. In this study, the authors showed that humans, on average, exhibit connective tissue attachment of 1.07 mm above the alveolar bone crest and connective epithelium below the floor of the gingival sulcus of 0.97 mm<sup>5</sup>. Combining these two measurements results in an average biological width of 2.04 mm.[3], [4], [14], [15]

## 5. Conclusion

In this case, the crown lengthening treatment's results were satisfactory for the patient, with a gingival margin that matched the gingival crest and an improved smile profile. APE, which is the etiology of the patient's gummy smile was corrected. After the procedure, there were no complaints of excessive pain and complications. Crownlengthening surgery is a viable option to facilitate restorative therapy or improve aesthetic appearance. However, an inaccurate diagnostic and interdisciplinary approach is mandatory to obtain better, conservative, and desirable results in the aesthetic area.

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