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Aesthetic Crown Lengthening for Gummy Smile Treatment: A Case Report

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Abstract

A beautiful smile can affect a person's appearance, aesthetics, and self-confidence. One of the aesthetic concerns that dental patients often complain about is excessive gingival display, also known as a "gummy smile." A gummy smile can be caused by several factors, including Altered Passive Eruption (APE). Aesthetic crown lengthening can correct gummy smile problems by gingivectomy or bone reduction. A 23-year-old female presented to the Department of Periodontology at RSGM USU, complaining that she was not confident with her smile because the gum tissue of her upper front teeth appeared more prominent. This case report presents the treatment of a gummy smile using aesthetic crown lengthening on teeth 14, 13, 12, 11, 21, 22, 23, and 24, with an internal bevel incision. A full-thickness flap was reflected to allow for bone reduction. A gummy smile caused by APE can be treated with aesthetic crown lengthening, which involves gingivectomy and bone reduction. This treatment effectively improves a patient's smile and boosts their self-confidence. Aesthetic crown lengthening is a suitable treatment approach for patients with gummy smiles resulting from APE. This case report underscores the crucial importance of accurate diagnosis and comprehensive treatment planning in achieving optimal outcomes for gummy smile cases.

Keywords: Gummy smile; altered passive eruption; aesthetic crown lengthening; crown lengthening

1. Introduction

Periodontal aesthetics play a crucial role in creating a beautiful smile. A person's psychological and social well-being is significantly influenced by how their teeth and face look.[1] As people seek more cosmetic dental treatments, periodontists now offer specialized procedures to enhance the look of gums and teeth, ensuring a healthy and attractive smile.[2] Many things that can affect how your gums look. Two of these things are having too much gum showing (a 'gummy' smile) or having your gums shrink (recession). Both of these problems can make your smile look less attractive.[2, 3]

Several etiologies, such as altered passive eruption, maxillary bone excess, bimaxillary protrusion, gingival enlargement, and upper lip abnormalities, can cause the condition of the gummy smile.[4] Altered Passive Eruption (APE) is a dental condition where the gingiva fails to migrate downward as teeth erupt. The gums remain too high to the crowns of the teeth, leading to excessive gingival exposure.[4, 5] Altered passive eruption was first identified by the study of Coslet et al. and classified into two types and two subtypes (Table 1) :[6–8]

Gummy smile caused by APE can be corrected with crown lengthening treatment. Where crown lengthening treatment can be adjusted depending on the type of APE and the patient's dental condition.[9] The goal of crown lengthening is to increase the clinical crown length of teeth for esthetic or restorative purposes. This can involve crown lengthening utilizing gingivectomy, gingival flaps and apically positioned flaps with or without ostectomy to increase tooth structure and prevent biologic width violation.[9][10]

Several factors contraindicate crown lengthening, such as an insufficient crown-to-root ratio (ideally 1:2), non-restorable teeth due to caries or root fractures, potential for esthetic impairment, high furcation involvement, and a poor prognosis.[11] Additionally, crown lengthening is not indicated in situations with an unfavorable tooth-to-arch relationship, a risk of compromising the adjacent periodontium or aesthetics, insufficient space for restoration, and challenges related to maintenance and root proximity.[12]

Table 1. Classification of Altered Passive Eruption

Classification	Description	Treatment
1A	<ul style="list-style-type: none"> - Osseous crest apical to cementoenamel junction - Adequate amount of attached gingival - Gingival margin incisal to CEJ 	Gingivectomy
1B	<ul style="list-style-type: none"> - Osseous crest at CEJ - Adequate amount of attached gingival - Gingival margin incisal to CEJ 	Gingivectomy and osseous surgery
2A	<ul style="list-style-type: none"> - Osseous crest at CEJ - Inadequate amount of attached gingival - Gingival margin incisal to CEJ 	Apically positioned flap
2B	<ul style="list-style-type: none"> - Osseous crest at CEJ - Inadequate amount of attached gingival - Gingival margin incisal to CEJ 	Apically positioned flap and osseous surgery

2. Case Report

An 88-year-old A 23-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 and was considered less aesthetic when smiling. The patient also complained of short maxillary front teeth (Figure 1).



Figure 1. Initial clinical photograph of the patient

The patient had no systemic disorders, was not taking any medications, and had no history of allergies. The objective examination included measuring the golden proportion of the teeth using a Chu gauge (Figure 2), measuring 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 2. The clinical proposition with Chu gauge measuring device, Bone sound examination before crown lengthening surgery

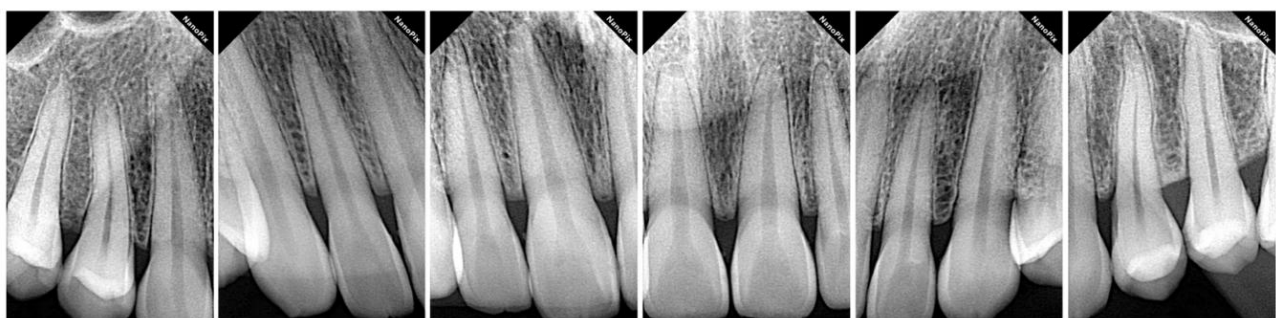


Figure 3. Radiograph examination

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 type 1B, where the treatment is gingivectomy and osseous surgery. Measurements and calculations using probes, chu gauges, bone sounding, and radiographic examinations are the basis for performing gingivectomy and osteotomy, as shown in Table 2. 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. 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. There was no treatment in phase 3 (prosthetic phase), and phase IV treatment was the maintenance phase.

Table 2. Calculation of the aesthetic crown lengthening plan

Measure ment	14			13			12			11			21			22			23			24		
	D	M id	M	D	M id	M	D	M id	M	D	M id	M	D	M id	M	D	M id	M	D	M id	M	D	M id	M
SD	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1	2	2	1	2	1	1	2
BS	2	2	2	2	2	2	2	3	3	3	3	2	2	3	3	3	2	2	3	2	3	3	2	2
GV	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0	1	1
OS	1	1	1	1	1	2	2	1	1	1	1	2	2	1	1	0	1	2	1	1	1	0	1	2

Aesthetic crown lengthening of teeth with ostectomy (gingivectomy with bone reduction) is an appropriate treatment option for APE due to its predictable outcome and minimal side effects 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 on 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 4).



Figure 4. Extraoral 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 Gracey curette, and then gingivoplasty was performed using a laser (Figure 5).

Then, a sulcular incision was performed on 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 on the teeth of areas 14, 13, 12, 11, 21, 22, 23, and 24 using a round bur. Irrigation of the surgical area using saline. Then, the flap was repositioned and sutured using the vertical mattress suture technique with 5-0 nylon thread. (Figure 6)



Gambar 5. Gingivectomy and gingivoplasty using a 15c blade and Laser



Figure 6. a. Flap elevation, b. Osteotomy, c. Suturing

The patient was prescribed amoxicillin 500 mg 3 times a day for 5 days, mefenamic acid 500 mg 3 times a day and taken if pain occurred, 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; there were no complaints from the patient, and the patient was very satisfied with the results. (Figure 7).



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

3. Discussion

In this case report, aesthetic crown lengthening with bone reduction was a phase II treatment performed after scaling and root planning. Aesthetic crown lengthening requires efficient planning to avoid potential over-resection or inadequate resection of the gingival tissue, leading to a partial resolution.[4] There are crucial factors for indicating this surgical procedure, including the quality of the periodontal phenotype, adequate width of keratinized tissue, and the dimension of the biological width.[13] In this case, the patient was diagnosed with excessive gingival display and the etiology of APE type 1 because the gingival margin was located more incisal than the CEJ, and the mucogingival junction (MGJ) was apical to the alveolar crest, the gingival width dimension and the clinical crown of the tooth were short. Based on bone sounding and radiographic examination, the case was classified into subgroup B because the alveolar crest was close to the CEJ.[14, 15]

Contraindications for this surgery include inadequate attached gingiva, which can complicate flap design, stabilization, and suturing. Other factors include significant vertical maxillary excess and a thin gingival biotype. Severe vertical maxillary excess necessitates orthodontic treatment or orthognathic surgery, while a thin gingival biotype increases the risk of relapse possibility.[7]

Several factors must be considered when performing an aesthetic crown lengthening, which requires a gingivectomy procedure to expose the tooth so that a minimum of 2 to 5 mm of keratinized gingival tissue is required to ensure gingival health.[13, 16] Additionally, papilla preservation is a crucial consideration in the surgical procedure. The interproximal bone was carefully removed to maintain the anatomical structure, enabling the interproximal tissue to grow coronally. The papillae should fill the space from the apex of the bone to the base of the contact area, which is approximately 5 mm or less.[17]

The cemento-enamel junction is normally apical to the gingival margin of the crown. Sulcus depth is usually 2 to 3 mm. 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 allow proper margin placement.[5] 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. Combining these two measurements results in an average biological width of 2.04 mm.[14, 18, 19]

Failures in aesthetic crown lengthening procedures can occur, including recession or the return of gingival tissue coronally towards the tooth structure.[20] Lanning et al. reported an apical displacement of the free marginal gingiva and clinical attachment levels at both treated and adjacent sites following crown lengthening surgery.[21] This can happen due to insufficient keratinized gingiva or inadequate surgery (failure to create an adequate distance between the healthy margin and the crest). Therefore, a comprehensive examination, including both clinical and supportive examinations, case selection, and careful surgical execution, is an obligation to avoid failure in aesthetic crown lengthening procedures.[20, 22]

4. Conclusion

The etiology of the gummy smile, in this case, was APE, which has been corrected well by performing aesthetic crown lengthening surgery with gingivectomy and bone reduction. After the surgery, there were no complaints of excessive pain or complications in the patient. Crown lengthening surgery is the right choice to improve the patient's aesthetic and functional appearance.

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