



Research article

Aesthetic Crown Lengthening in Type IA-Altered Passive Eruption: A Case Report

Galuh Candra Kirana¹ and Sri Pramestri Lastianny^{2*}¹Periodontic Specialist Program, Faculty of Dentistry, Universitas Gadjah Mada, Yogyakarta, Indonesia²Department of Periodontology, Faculty of Dentistry, Universitas Gadjah Mada, Yogyakarta, Indonesia**ORCID**Sri Pramestri Lastianny: <https://orcid.org/0000-0001-8484-9615>Galuh Kirana: <https://orcid.org/0000-0001-8484-9615>**Abstract.****Background:** Altered passive eruption (APE) is one of the etiologies of the gummy smile condition. The APE type IA can be corrected by aesthetics crown lengthening using the gingivectomy technique.**Objective:** To correct the condition of excessive gingival display et causa APE type IA with an aesthetic crown-lengthening procedure using a gingivectomy technique.**Case Report:** A 26-year-old female patient complained about her gummy smile which made her maxillary front teeth look short. The probing depth of the patient's anterior teeth was at normal measurement.**Conclusion:** The condition of altered passive eruption type IA can be corrected by an esthetic crown-lengthening procedure using gingivectomy technique to obtain good and optimal aesthetic smile results.**Keywords:** altered passive eruption, excessive gingival display, crown lengthening, gingivectomyCorresponding Author: Sri
Pramestri Lastianny; email:
sri.pramestri@ugm.ac.id

Published: 25 April 2022

Publishing services provided by
Knowledge E© Galuh Candra Kirana and Sri
Pramestri Lastianny. This article
is distributed under the terms of
the [Creative Commons](#)[Attribution License](#), which
permits unrestricted use and
redistribution provided that the
original author and source are
credited.Selection and Peer-review under
the responsibility of the NaSSIP
6 Conference Committee.

1. Introduction

The beauty and satisfaction of patients with treatment outcomes is one of the goals that distinguishes the success of treatment, if it is acceptable or truly satisfying[1]. Awareness of the importance of aesthetics aspect became dentist consideration for evaluating the treatment outcomes, which are influenced by the alignment between the patient's teeth, gingiva and lips[2].

The lower contour of the upper lip line, as an smile aesthetic component, is normally located in the cervico-coronal of the teeth, so that the patient's teeth and gums are optimally exposed when smiling[3]. Sharma et al.[2], defined the normal appearance of the exposed gingiva between the lower contour of the upper lip and the gingival margin of the anterior teeth. The normal exposed gingiva is 0-2 mm, while gingival appearance

OPEN ACCESS

of more than 2 mm is included in the condition of excessive gingival display or also called "gummy smile"[4].

The condition of the gummy smile can be caused by several etiologies, such as altered passive eruption, maxillary bone excess, bimaxillary protrusion, gingival enlargement, and upper lip abnormalities[3]. Altered passive eruption (APE) as one of the etiologies of the gummy smile is a condition where the gingival margin is located coronally than the cemento enamel junction (CEJ) position. It partially covers the labial area of the teeth in adulthood. This happens because of the disruption of the passive eruption stage, also known as the delayed/retarded passive eruption[5]. Coslet et al.[6], classified APE conditions into four groups. This classification is divided based on two things. Types I and II are differentiated based on the adequacy of the keratinized gingiva, while subtypes A and B are distinguished based on the position and distance of the alveolar crest to the CEJ (table 1 and Figure 1).

TABLE 1: APE classification (Coslet et al. [6])

Classification	Condition
Type IA	Keratinized gingiva > 2 mm, alveolar crest-CEJ normal (1,5 mm)
Type IIA	Keratinized gingiva <2 mm, alveolar crest-CEJ normal (1,5 mm)
Type IB	Keratinized gingiva > 2 mm, alveolar crest-CEJ not enough
Type IIB	Keratinized gingiva < 2 mm, alveolar crest-CEJ not enough

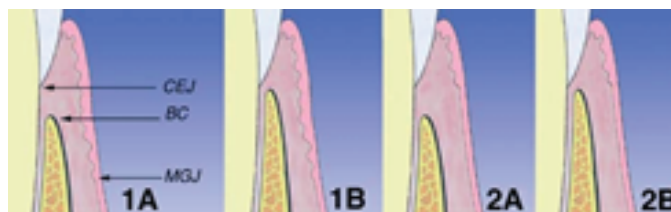


Figure 1: APE classification (Coslet et al. [6]).

The treatment for gummy smiles caused by APE is a crown lengthening procedure with or without ostectomy[3]. The aim of the procedure is increasing the length of the clinical crown to improve the aesthetic condition (aesthetic crown lengthening) and/or providing adequate structural support for restorative treatment (functional crown lengthening). In the crown lengthening treatment process, there is a biological basis in the form of a biological width that needs to be maintained and a consideration in determining the type of technique would be used[7]. Biological width consists of junctional epithelium (0.97 mm) and connective tissue (1.07 mm)[8]. Gupta et al.[9]

showed in 85% of the population biological width is about 2 mm and its physiological location varies by age differences, tooth migration, and orthodontic treatment.

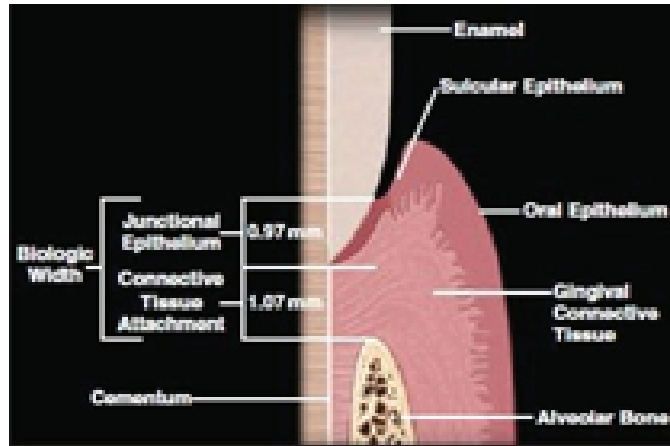


Figure 2: Biological width(Gupta et al. [9]).

Ernesto et al. [10] propose four indication of *crown lengthening*:

TABLE 2: Indication of crown lengthening by Ernesto et al. [10]

Classification	Characteristics	Treatment
Type I	Sufficient soft tissue allows gingival exposure of the tooth without exposure of the alveolar crest and violation of the biologic width.	Gingivectomy
Type II	Sufficient soft tissue allows gingival excision without exposure of the alveolar crest but in violation of the biologic width.	Gingivectomy and ostectomy
Type III	Gingival excision to the desired clinical crown length will expose the alveolar crest.	Gingivectomy and ostectomy, limited flexibility
Type IV	Gingival excision will result in inadequate band of attached gingiva	Limited surgical options.No flexibility.

This case report has aim to evaluate the esthetic crown lengthening procedure to correct a patient with altered passive eruption type IA.

2. Case Report

A 26 year old female patient came to the RSGM Prof. Soedomo FKG UGM and complained about her gummy smile and made her maxillary front teeth look short. The patient does not feel any pain. The patient had just completed four years of orthodontic treatment in January 2021. The condition that the patient complained about had existed before the use of his orthodontic appliance. The patient did not have a habit of smoking or consuming alcohol, and denied having a history of systemic illness or allergies.

Objective examination of the patient showed the presence of gingival conditions covering the cervico-coronal area of teeth 14, 13, 12, 22, 23, and 24 which were visible in the patient's normal smile. The probing depth in the mid buccal area of these teeth was 2.5 mm for teeth 14 and 24, and 3 mm for teeth 13, 12, 22, and 23. Bone sounding were performed on each tooth (table 3). There was no tooth mobility and trauma of occlusion. Visual evaluation for the patient's lip line when smiling normally showed the lower border of the patient's upper lip was about 2 mm from the cervico-coronal area of teeth 14, 13, 12, 22, 23 and 24 (Figure 3).



Figure 3: (a) Normal smile; (b) highest smile; (c) right angle; (d) left angle.

An OPG X-ray (Figure 4) has been performed. There is a horizontal bone loss in the patient's posterior region. The calculation of the aesthetic crown lengthening plan can be seen in table 4. The measurement and calculation become the basis reason for performing a 2 mm gingivectomy. Other considerations for plan are based on following reasons: classification of APE type IA patients, lower contour of the upper lip line when the patient smiles, the height of the gingival margin on the ideal reference tooth (11 and 21) and ideal crown length based on the ideal crown root ratio of 2:3 (table 3).

Clinical and radiographic examinations as well as the calculations became the basis for the patient's diagnosis of altered passive eruption which in the latest AAP is included in the diagnosis of mucogingival deformities and conditions around teeth: excessive gingival display.



Figure 4: Patient's OPG.

Clinical conditions and examination results are the basis for determining the diagnosis and treatment plan. The patient has been explained and agreed on the treatment plan.

TABLE 3: Calculation of the patient's crown root ratio

Elemen		14	13	12	22	23	24
Clinical height	crown	8	8	8	8	8,5	8
Rontgen height	crown	25	28	25	25	28	25
Ideal crown height		10	11,2	10	10	11,2	10

TABLE 4: Calculation of the aesthetic crown lengthening plan

Element of tooth	14	13	12	22	23	24
Probing depth(M/B/D)	3/2,5/4	4/3/3	3/3/4	3	3	3/2,5/4
Bone sounding(M/B/D)	5,5/5/5,5	5,5	5,5	5,5	5,5	5,5/5/5,5
Biological width	2	2	2	2	2	2
Gingivectomy	2	2	2	2	2	2
Ostectomy	-	-	-	-	-	-
Result of the new sulcus	0,5	1	1	1	1	0,5

At the initial stage, the patient was given dental health education (DHE) regarding her existing clinical conditions and had been performed scaling and root planing (SRP) at the first dental visit. In the corrective phase, the patient was planned to be treated with an aesthetic crown lengthening treatment without ostectomy using gingivectomy technique for 14, 13, 12, 22, 23 and 24. In the maintenance phase, the patient was scheduled and asked to do a control at a week after surgery and periodically every 6 months.

Aesthetic crown lengthening treatment procedure using gingivectomy technique on the 14, 13, 12, 22, 23 and 24 was performed at the second visit (Figure 5). The patient preparation was done by assessment of vital signs and the patient's medical approval for the procedure. The asepsis procedure was performed in the operating area. The patient was given local anesthesia with lidocaine HCL 2% at the apical area of the operative teeth. The gingiva labial and buccal were marked with a pocket marker by the depth of 2 mm. An external bevel incision was made on the labial and buccal gingiva with a #15 scalpel blade and orban to cut the interdental papillae. The excised tissue was removed and followed by gingivoplasty procedure. Re-evaluation was carried out with SRP and saline irrigation. After the procedure was completed, the operation area was dried with sterile gauze and covered with a pack (Resopac). The patient was given postoperative instructions and prescribed with amoxicillin 500 mg tablets to be taken every 8 hours and mefenamic acid tablets 500 mg taken if necessary for five days.



Figure 5: Aesthetic lengthening crown procedure.

The patient was controlled via telemedicine (because of limitation in Covid19 situation) on the day seven post-operative. Patients were evaluated visually, the pack has disappeared completely, the condition of the gingival margin has healed and the patient is satisfied with the results of the treatment. The lower contour of the patient's upper lip line also optimized. The new probing depth measurement should be measured to check if the gingival sulcus optimized by the surgery when it possible to do the direct follow up.



Figure 6: Conditions (a) pre-operation; (b) post-operative day seven.

3. Discussion

Altered passive eruption (APE) is characterized by the absence of damage or signs of inflammation in the patient’s periodontal tissues[11]. In this case, the patient’s chief complaint was corrected by aesthetic crown lengthening using gingivectomy procedure. The patient had a mean probing depth of the complained area was 2.5-3 mm. The patient’s condition was diagnosed with altered passive eruption type IA. The condition of APE type IA is determined by the failure of the exclusive passive eruption stage of the teeth, causing an excess of gingival area that overlaps the clinical crown, but the distance of the alveolar bone crest to the CEJ is normal[5]. This diagnosis became the basis reason to choose an aesthetic crown lengthening using gingivectomy procedure for the case’s treatment.

The gingivectomy procedure is the simplest technique of crown lengthening without the need for bone reduction. This technique is performed by cutting the excessive gingival area[12]. Zangrando et al.[13] in his study introduced a modification in the classification of APE conditions. The consideration in determining the diagnosis with this modified APE classification is not only the width of the existing keratinized gingiva and the distance between the alveolar crest to the CEJ, but also the involvement of an altered active eruption (AAE) condition that may occur as long as the existing APE. This modification of the APE classification provides several alternative treatment techniques (table 5). Referring to the clinical condition and tissue measurement in patients and their diagnosis, the gingivectomy technique is the right and efficient choice to treat the type IA APE.

TABLE 5: Classification of modified APE (Mariana et al. [11])

APE	Type I	Type II
Without AAE	External/Internal bevel incision	Internal bevel incision and apically positioned flap
With AAE	Internal bevel incision and ostectomy	Internal bevel incision, ostectomy and apically positioned flap

The results from the aesthetic crown lengthening using gingivectomy technique on the patient’s case showed that the technique was successfully correcting the patient’s complaints and give a good healing of the gingival tissue. The results on the day seven post-operative showed lower contour of the patient’s upper lip line was optimized and the treatment succeed in providing patient aesthetic satisfaction.

4. Conclusion

This case report shows that the aesthetic crown lengthening procedure using gingivectomy technique is the right choice of treatment in overcoming the patient's gummy smile complaints caused by the condition of altered passive eruption type IA. A complete examination and measurement in the initial planning is a very important key to support and strengthen the rationale for choosing the right treatment procedures. Patients with type IA APE in this case report showed a good and optimal aesthetic crown lengthening treatment results by achieving patient satisfaction and good tissue healing after the surgery.

5. Acknowledgements

I thank the following individuals for their expertise and assistance throughout all aspects of our study and for their help in writing the manuscript.

References

- [1] Câmara CA. Aesthetics in orthodontics: Six horizontal smile lines. *Dental Press Journal of Orthodontic*. 2010;15(1):118-131.
- [2] Sharma A, Sharma S, Garg H, Singhal V, Mishra P. Lip repositioning: A boon in smile enhancement. *Journal of Cutaneous and Aesthetic Surgery*. 2017;10:219-222.
- [3] Mahardawi B, Chaisamut T, Wongsirichat N. Gummy smile: A review of etiology, manifestations, and treatment. *Sriraj Medical Journal*. 2019;71(1):168-174.
- [4] Bhola M, Fairbairn PJ, Kolhatkar S, Chu SJ, Morris T, de Campos M. The lip stabilization technique - Indications and guidelines for case selection and classification of excessive gingival display. *International Journal of Periodontics and Restorative Dentistry*. 2015;35:549-559.
- [5] Illueca FA. Altered passive eruption (APE): A little-known clinical situation. *Medicina Oral, Patología Oral y Cirugía Bucal*. 2011;16(1):100-104.
- [6] Coslet GJ, Vanarsdall R, Weisgold A. Diagnosis and classification of delayed passive eruption of the dentogingival junction in the adult. *Alpha Omegan*. 1977;10:24-28.
- [7] Xenoudi P, Karsydis A. Crown lengthening procedures for functional and esthetic purposes. *Current Oral Health Reports*. 2019;6:230–236 .
- [8] Cohen DW. Pathogenesis of periodontal disease and its treatment. Washington DC: Walter Reed Army Medical Center; 1962.

- [9] Gupta G, Gupta R, Gupta N, Gupta U. Crown lengthening procedures - A review article. *Journal of Dental and Medical Sciences (IOSR-JDMS)*. 2015;14(4):27-37.
- [10] Ernesto AL. Aesthetic crown lengthening: classification, biologic rationale, and treatment planning consideration. *Practical Procedures & Aesthetic Dentistry*. 2004;16(10):769-778.
- [11] Tonetto MR, Pinto SCS, Bandeca MC, Lima SNL, Higashi C, Bonafe E. Crown lengthening as treatment for altered passive eruption: Review and case report. *World Journal of Dentistry*. 2015;6(3):178–183.
- [12] Patil VA, Patel JR. Treatment of altered passive eruption related gummy smile. *Periodontics Prosthodont*. 2017;3(1):2–4.
- [13] Zangrando MSR, Veronesi GF, Matheus V et al. Altered active and passive eruption: A modified classification. *Clinical Advances in Periodontics*. 2019;7(1):51-56.