



## Research article

# Aesthetic Crown Lengthening With Anterior Maxillary Osteotomy for Achieving Ideal Clinical Crown Length: A Case Report

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**ORCID**Sri Pramestri Lastianny: <https://orcid.org/0000-0003-4177-403X>**Abstract.**

**Background:** A smile, a good harmonization of teeth, alveolar bones and gums inside the oral cavity can improve one's appearance and self-confidence. Short clinical crowns have become a frequent chief complaint. One of reasons for this is the altered passive eruption.

**Objective:** To describe the correction of altered passive eruption by performing crown lengthening with an osteotomy to achieve ideal clinical crowns and restore the functions and aesthetics.

**Case Report:** A 31-year-old man was admitted to the Periodontics Clinic of Rumah Sakit Gigi dan Mulut, Universitas Gadjah Mada Prof. Soedomo, Yogyakarta, Indonesia, with a chief complaint of front teeth looking short. He was diagnosed with an altered passive eruption in connection with a gummy smile. Crown lengthening was performed by gingivectomy technique with osteotomy, and interdental papilla was preserved.

**Conclusion:** Crown lengthening is an effective treatment in correcting dysfunctions and aesthetics due to altered passive eruption.

**Keywords:** altered passive eruption, short clinical crowns, crown lengthening procedure, osteotomy, papilla preservation

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## 1. Introduction

Aesthetics remain as everyone's attention and needs, especially in a smile which could improve confidence. A smile is formed by a good connection of teeth, related with alveolar bones and gingival, and lips as parts of the oral cavity. The principle of a smile design is building a balance of lips, gingival, and teeth [1]. Principle of smile designs, such as acknowledging face types, incisal edge positions, teeth components, and gum heights, contributes to developing beautiful smiles. Gum tissues of the upper lip are classified as low, medium, dan high [2]. A beautiful smile that is aesthetically accepted belongs to a medium category, in which every incisor tooth is visible, and the gums emerge at 1-2 mm [3].

Excessive gingival display (EGD) and short clinical crowns are disorders of smile harmonization and may cause periodontal problems as patients complain [4]. The excessive gingival display is a condition of excessive maxillary gingiva visible while smiling, also known as a gummy smile. A gummy smile impacts aesthetically and mostly are caused by the altered passive eruption, skeletal deformity involving vertical maxillary excess, short upper lip, or the combination of the three [5,6].

The altered passive eruption is a condition during the teeth eruption period. The gingival margin fails to migrate apically to achieve the level of or adjacent to the cemento-enamel junction (CEJ). Consequently, the gingiva margin is inclined incisal or coronally to the crown. The altered passive eruption is clinically indicated by a gummy smile and a short clinical crown [7]. Several approaches could achieve the correction of the altered passive eruption. One of them is crown lengthening periodontal surgery to decrease excessive gingiva tissue, expose the whole anatomy of the clinical crown, and reform the correct biologic width. Crown lengthening includes gingivectomy, apically positioned flap, with or without osteotomy, depending on the etiology [8].

This case report is intended to describe the correction of altered passive eruption by crown lengthening procedure with an osteotomy to achieve ideal clinical crown length and restore the functions and the aesthetics.

## 2. Case Report

A 31-year-old male was admitted to the Periodontics Clinic of Rumah Sakit Gigi dan Mulut, Universitas Gadjah Mada Prof. Soedomo, Yogyakarta, Indonesia, with a chief complaint of the upper right anterior teeth shorter than the upper left anterior. While smiling, the gums appear thick. He had a history of GERD, was a non-smoker, and had no allergies to medicine, food, or weather. The extraoral examination showed no disorder. The intraoral examination showed excessive gingival display (EGD) and short clinical crowns (Figure. 1A), the smile design of 3 mm excessive gingival tissue from the upper lip border (Figure. 1B). The clinical examination showed a central diastema between teeth 11 and 21 and a diastema between teeth 12 and 13 (Figure. 1C). Adequate attached gingiva was present in the anterior maxilla, asymmetrical gingiva margin, and short clinical crown on anterior maxillary teeth. Gingival analysis revealed gingival zenith heights of teeth 12, 13, 14 inclined coronally compared with teeth 22, 23, 24 (Figure. 1D). Radiologic findings showed no destruction of anterior maxillary bones (Figure 2). Good oral hygiene, probing depths, bone-sounding depths, crown widths, and lengths of teeth 12, 13, 14 are shown in Table 1 and Table 2.



**Figure 1:** A. The intraoral examination showed excessive gingival display (EGD) and short clinical crowns B. The smile design of 3 mm excessive gingival tissue from the upper lip border C. Central diastema between teeth 11 and 21 and a diastema between teeth 12 and 13 D. Gingival analysis: gingival zenith heights of teeth 12, 13, 14 inclined coronally compared with teeth 22, 23, 24.



**Figure 2:** Panoramic radiograph findings.

After performing the initial phase, which consists of dental health education (DHE), scaling, and root planing, a treatment to achieve the ideal proportion of clinical crown lengths is done by paying attention to biological and anatomical aspects, in accordance to achieve optimal biologic width. According to clinical examinations, the case was altered passive eruption associated with a gummy smile. After discussing the chief complaints and clinical examination results, a periodontal surgery was performed by crown lengthening procedure with gingivectomy starting with internal bevel incision combined with sulcular incision and osteotomy. Every procedure had been informed to the patient, and he had given his consent.

Crown lengthening procedure:

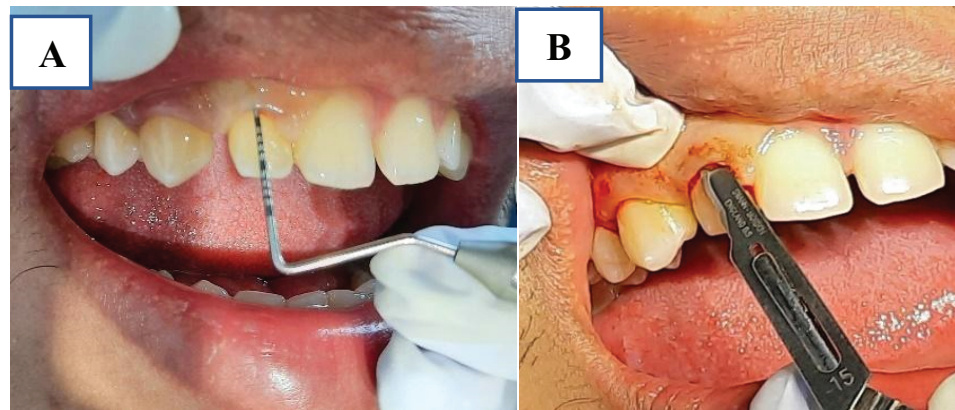
TABLE 1: Clinical crown widths and lengths.

Teeth elements	Clinical lengths	Ideal lengths	Widths
14	7.3 mm	Adjusted to tooth 24	7.3 mm
13	7.5 mm	Adjusted to tooth 23	8.5 mm
12	6.5 mm	Adjusted to tooth 22	6.7 mm
11	10 mm		9 mm
21	10 mm		8.5 mm
22	8.4 mm		6.5 mm
23	10.6 mm		8.8 mm
24	9 mm		7.3 mm

TABLE 2: Probing examination and measurement, and bone-sounding of tooth 12,13,14

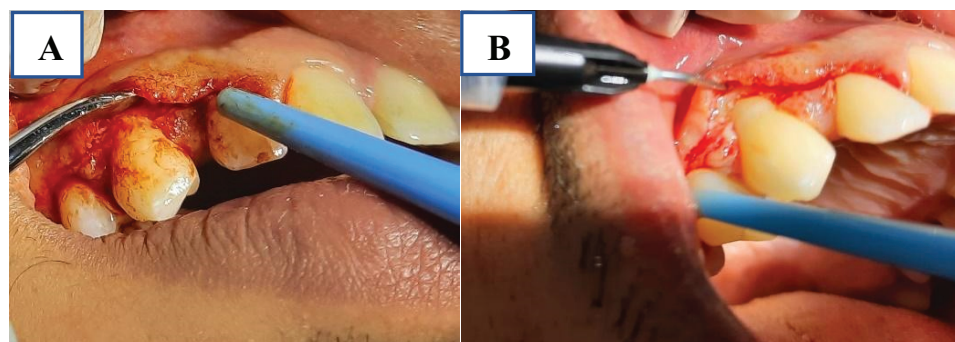
Regio	12			13			14		
	Mesial	Buccal	Distal	Mesial	Buccal	Distal	Mesial	Buccal	Distal
Ideal proportion	8.4 mm			10.6 mm			9.1 mm		
Length	6.5 mm			7.5 mm			7.3 mm		
Width	6.7 mm			8.5 mm			7.3 mm		
Probing depth	4 mm	3 mm	3 mm	3 mm	3 mm	3 mm	2 mm	2 mm	2 mm
Bone sounding	5 mm	4 mm	5 mm	4 mm	4 mm	4 mm	4 mm	4 mm	4 mm
Biological width	2 mm	2 mm	2 mm	2 mm	2 mm	2 mm	2 mm	2 mm	2 mm
Gingivectomy	1.9 mm	1.9 mm	1.9 mm	3.1 mm	3.1 mm	3.1 mm	1.8 mm	1.8 mm	1.8 mm
Osteotomy	0	0.9 mm	0	2.1 mm	2.1 mm	2.1 mm	0.8 mm	0.8 mm	0.8 mm
Post-operative bone apical-margin distance	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm	3 mm

Before the procedure, the patient was given povidone-iodine 1% gargle, and then betadine solution 10% was applied as an extraoral and intraoral antiseptic. Local anesthesia was injected into tooth 12, 13, 14 areas. Initial probing was performed to determine the ideal zenith and marginal gingival distances for gingivectomy. Bone-sounding measurement by using UNC-15 probe to decide the necessity of osteotomy (Figure. 3A). The ideal measurement of the dento-gingival complex, according to Bhuvaneshwaran et al. (2010), is approximately 3 mm. If there any smaller distance should need alveolar bone osteotomy. The pocket depths were marked with a pocket marker to create a bleeding point as a guide to cut excessive gingiva. Gingivectomy and internal bevel incision with scalpel number 15 were performed to mesial, buccal, and distal aspects of tooth 12 (1.9 mm depth), tooth 13 (3.1 mm depth), and tooth 14 (1.8 mm depth) from the gingival margin and following the bleeding point (Figure. 3B).



**Figure 3:** A. Probe measurement of ideal proportions of teeth and gums B. Internal bevel incision of mesial, buccal, and distal aspects of teeth 12, 13, 14.

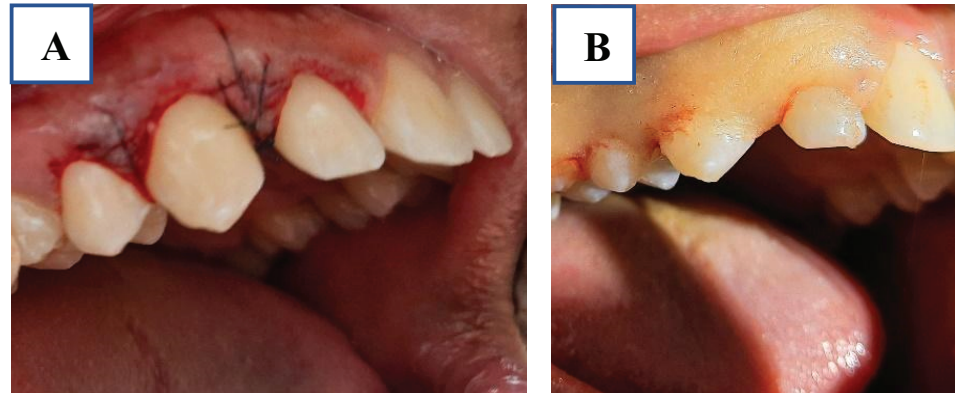
Afterward, a full-thickness flap from buccal 12 to distal 14 with sulcular incision was performed, and interdental papilla was preserved with flap incision technique. Therefore, the interdental papilla shape could be maintained to prevent gingiva recession and interdental papilla loss, especially for aesthetic reasons. The flap was dissected with raspatories to achieve an appropriate field of view. (Figure. 4A). Osteotomies were performed as deep as 0.9 mm to the buccal aspect of tooth 12; 2.1 mm to mesial-buccal-distal aspects of tooth 13; and 0.8 mm to mesial buccal distal aspects of tooth 14 by using round bur and normal saline irrigations (Figure. 4B).



**Figure 4:** A. Buccal flap dissection using raspatorium B. Normal saline irrigation to the surgical field.

Tissue adaptation was applied by pressing the gingiva with saline-moist sterile gauze for about 3 minutes. The wound was then sutured with vertical mattress technique using nylon 5.0, papilla interdental was stitched adequately to achieve primary wound healing, and a resorbable periodontal dressing (Resopac) was applied (Figure. 5A and Figure. 5B). Post-operative medications consisted of 500 mg of Amoxicillin every 8 hours for five days, 500 mg of Paracetamol as analgesics if necessary, and Chlorhexidine 0.12% gargle twice a day for a week. After surgery, the patient was instructed a soft diet

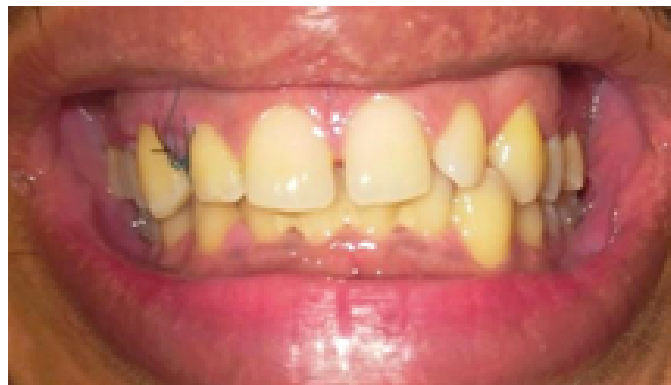
meal plan and medications, avoidance of hot food and drinks, spicy food, careful tooth-brushing and brushing the wound. If there is any bleeding, the patient was instructed to contact the nearest dentist, dental clinic, or hospital. The post-operative appointment was scheduled after one week.



**Figure 5:** A.Wound closure with sutures B. Periodontal dressing (Resopac) was applied.

The patient was evaluated a week after surgery, saline irrigation was performed, and dental health education was promoted to motivate proper oral hygiene (Figure 6).

Two weeks after surgery, the stitches were removed, saline irrigation and dental health education were performed again.



**Figure 6:** One-week post-operative evaluation.

### 3. Discussion

Excessive gingival or gummy smile with the short clinical crown was evident as the patient's chief complaint. A gummy smile was caused by the altered passive eruption, a failure of the gingiva margin in migrating apically to reach CEJ. Therefore, the gingiva margin is inclined incisally or occlusally [7]. The treatment performed was crown lengthening with gingivectomy, and internal bevel incision techniques continued with

osteotomies to achieve ideal crown lengths and restore the functions and aesthetics [8]. The aim of the procedures was the formations of gingival margin with ideal proportionate contour post-operatively. Crown lengthening procedure was performed to decrease existing excessive gingiva, expose anatomical clinical crowns, and reform proper biologic width.

Crown lengthening procedures can be performed in several methods. The choice is based on the gingival architectures, bone apex level, gingival biotype, and gingival keratin level. If the alveolar apex level is more than 3 mm from the gingival margin, tissue dissection is performed. And if bone resection is not performed, there are two choices, gingivectomy with external bevel or apically repositioned flap with reverse bevel incision. If the alveolar apex level is less than 3 mm from the gingival margin, the procedure is an apically positioned flap with bone resection [9,10].

In this case report, the crown lengthening was performed with gingivectomy technique and internal bevel incision. According to Bhuvaneswara et al. (2010), the ideal dento-gingival complex measurement is approximately 3 mm. If the distance is less, the alveolar bone osteotomy should be performed. A full-thickness flap with sulcular incision was made and the interdental papilla was preserved with flap technique to maintain interdental papilla shape to prevent a recession, gingival shrinkage, and interdental papilla loss procedure, especially for aesthetic reasons. Takei first introduced the flap technique with papilla preservation incision in 1985, and its modifications were developed. Papilla preservation flap has been proven to deal with gingiva recession in several case reports and researches after periodontal surgery [11].

## 4. Conclusion

Aesthetics are important parts of dentistry. Gummy smiles and short clinical crowns due to altered passive eruptions are aesthetical and functional problems commonly complained. Crown lengthening is an effective procedure in correcting the problems. The results affected the patient's outcome and satisfaction. The success of the procedure was achieved by the absence of post-operative complaints and excessive gingival.

## 5. Acknowledgment

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