



Research article

Aesthetic Crown Lengthening Using Chu Proportion Gauges: A Case Report

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Abstract.

Background: A harmonious smile is considered a symbol of beauty in modern society. Generally, a smile is considered pleasant when it normally exposes all of the maxillary teeth, as well as around 1 mm of facial gingiva. The gingival exposure of up to 2-3 mm is normally acceptable. The rehabilitation performed for the abnormalities in symmetry and contour of the gingiva in this region can be challenging. Crown-lengthening surgery is used in combination with perio-aesthetic procedures to repair gingival asymmetries and realign the dentogingival complex. The Chu's aesthetic gauges were designed to diagnose and treat aesthetic tooth discrepancies and abnormalities in a predictable manner.

Objective: To attain optimal crown lengthening using Chu's aesthetic gauges.

Case Report: A 21-year-old female patient presented to the Department of Periodontology, with a request for "better-looking teeth". Extraoral examination revealed no significant findings. No mobility and adequate levels of keratinized attached gingiva on intraoral examination. The case was diagnosed as a gummy smile, that could be repaired with crown lengthening. During the surgical crown-lengthening, Chu's aesthetic gauges were used to measure the midfacial length of the biologic crown at the same time. These gauges are unique technique that is innovative and a novel method to get adequate crown proportions.

Results: Evaluation after two weeks after the surgery showed a better-looking smile line and no erythema.

Conclusion: A successful crown-lengthening procedure was performed using Chu's aesthetic measurement, including optimal dimension of clinical crowns and symmetrical gingival contour.

Keywords: crown lengthening, aesthetic procedure, Chu's aesthetic gauges, case report

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1. Introduction

An aesthetic smile consists to three main components of the oral cavity such as the teeth, the lip framework, and the gingiva.[1] Medical aesthetics treatment is the most important for individuals who are looking for facial aesthetics. Dental and medical operations, in addition to pursuing the idea of health promotion, seek smile aesthetics, since the smile is a method of communication and socialization that reflects a variety of emotions.[2] There are several components that make a beautiful smile, including:[3]

- Minimal gingival exposure
- Symmetry and harmony between the maxillary gingiva and the upper lips
- Gingival tissue that is healthy and covers all interproximal gaps
- The anterior and posterior segments are in synchrony
- Teeth in proper size and length
- Appropriate tooth color and shade, as well as
- The lower lip should be parallel to the maxillary anterior teeth's incisal margins.

The aesthetics of the anterior maxillary region of the mouth are affected by the appearance of the gingival tissues that surround the teeth.[4] Gingival health is one of the primary cosmetic goals to be considered during treatment planning; gingival structure and contour are also important factors to consider. Knife-edged gingival margins firmly fitted to the teeth, interdental grooves, and cone-shaped interdental papilla have been described as the optimal gingival structure.[5]

Gummy smile is recognized by the American Academy of Periodontology (AAP) as a deformity and mucogingival condition that affects the area around the teeth. Gummy smile, or excessive gingival show of more than 4 mm, is a common complaint among patients, as it can affect social relationships and self-esteem.[2,6] This condition has multifactorial etiologies that must be treated in a sequentially manner in order to find the best treatment method and resolve the underlying causes.[7,8]

The main etiological factors related to gummy smile involve gingival (altered passive eruption), skeletal (vertical maxillary excess) and muscle (upper lip hyperfunction) characteristics. The prevalence of the gummy smile is 10% of the population aged between 20 – 30 years, and is considered to enhance 7% of males and 14% of women worldwide, although when considering different clinical circumstances, a higher prevalence has been seen.[9]

A gummy smile can be treated using a variety of techniques, including orthognathic surgery, gingivectomy or surgical crown lengthening, botox injection, myotomy of the lip elevator muscles, and surgical lip repositioning, depending on the etiologies. As a result, the most appropriate treatment technique is determined by the underlying etiology of a gummy smile.[8,9] The crown lengthening procedure to treat the gummy smile has long been known as a restorative procedure. This method is an adjuvant to perio-aesthetic procedure that is used to treat gingival asymmetries and reposition the dentogingival complex. Not only results in a longer clinical crown, but it also results in a longer biologic crown, which is defined as the distance between the incisal edge of the tooth and the crest of the bone.[10,11]

The Chu's aesthetic gauges were designed to diagnose and treat aesthetic tooth discrepancies and abnormalities in a predictable manner. Using Chu's aesthetic gauges to attain the optimal crown lengthening. At the same time, a desirable biologic width level was obtained for future restorative or prosthetics. These gauges' unique technique is a new and innovative method in this modern day.[12] Quantitative standards may now be used to evaluate and treat aesthetic and anatomic tooth size. These cutting-edge aesthetic gauges were created to eliminate the subjective aesthetic outcomes that may be obtained from a direct visual examination of aesthetic tooth proportions.[13,14]

Crown lengthening's ultimate purpose is to give a tooth crown dimension suitable for a stable dentogingival complex and the placement of a restorative margin, resulting in the best possible margin seal and an aesthetically attractive final restoration.[15] This case report described, using the measuring gauges known as Chu aesthetic gauges, the surgical sequence of crown lengthening to apically reposition the dentogingival complex.

2. Case Report

A 21-year-old woman was referred to the Department of Periodontology Universitas Hasanuddin requesting "better-looking teeth". She was dissatisfied with her smile aesthetic due to the overexposure of the maxillary gingiva on her tooth 12 and 13 (Figure 1). Periodontal examination revealed good, the gingiva was pink and firm, with intact papillae. Deep probing depths, no mobility, and adequate amounts of keratinized attached gingiva were found during clinical exams. The patient was diagnosed as a gummy smile. After evaluation of the patient's medical and family history, it was concluded that she was medically fit for surgery. The patient was given an explanation of the treatment plan and signs an informed consent for the procedures.



Figure 1: Preoperative. Overexposure of the maxillary gingiva on tooth 12 and 13 (Source: Author's own work).

2.1. Surgical Procedure

The surgical area was disinfected extraoral and intraorally, then anesthetized with pehacaine containing lidocaine and epinephrine 1:80,000 (Figure 2). The first sounding gauge was used to perform bone sounding (Figure 3). The Chu proportion gauge was used to determine the tooth width to length ratio after the biologic width was determined. This proportion gauge's incisal stop was placed against the tooth's incisal edge. The horizontal arm's color-coded bands corresponded to the vertical arm's color-coded bands. A diagnosis of width to length discrepancy was made if the color-coded bands did not match existing tooth proportions. Following that, bleeding points were defined using the Chu proportion gauge as a guide (Figure 4). To reduce bleeding during the procedure, the margin gingiva strip was removed using periodontal electrocautery (Figure 5). The periodontal dressing was applied once all of the procedure was completed (Figure 6).



Figure 2: Disinfectan surgical area and anaesthetized with pehacaine (Source: Author's own work).

Instructions for postoperative care were given. The patient was told to gently rinse twice a day for 15 days. During this time, tooth brushing was discontinued in the surgical



Figure 3: Bone sounding of tooth 12 and 13 (Source: Author's own work).



Figure 4: Using Chu Gauge for biologic width tooth 12 and 13 (Source: Author's own work).



Figure 5: Using electrocautery to reduce bleeding during surgery (Source: Author's own work).



Figure 6: Application of surgical dressing (Source: Author's own work).

area during that time. An analgesic (Mefinal 500mg every 8 hours for 5 days) was also prescribed and vitamin B complex has given for helping the healing.

2.2. Treatment Result

Follow-up was performed after 7, 30, and 90 days. During the postoperative period, bruising, swelling, or hematoma were not observed, but some tension while smiling was seen during the first month. After 90 days (Figure 7), there was no tension apparent and scar on the patient's smile. Her lips, teeth, and gums were in better harmony. The patient felt satisfied with her smile after the treatment.



Figure 7: Follow up in 3 months (Source: Author's own work).

3. Discussion

A gummy smile has a major impact on the relationship, self-esteem and attractiveness of patients. The correction improves both the aesthetics and confidence of the patient. There was a prevalence of women in all the studies analyzed, due to the fact that a gummy smile is most commonly found in the female gender. The largest number of surgically treated cases was among women, perhaps due to a greater aesthetic need among females, especially about concerning to an attractive smile.[9]

Aesthetic crown lengthening was reported in this case report using aesthetic measuring gauges, Chu's aesthetic gauges, to evaluate the proportional width and height of clinical crown dimension, osseous level, and sufficient level of interdental papilla. The Chu's aesthetic gauge is used as a guide. This tool designed for diagnosis and correction of nonconformities abnormal tooth size and shape disturbing aesthetics, so it is expected to get more predictable treatment outcomes and accurate. The use of electrocautery had no negative effects on the oral tissues. The recovery time was cut in half because there was no post-operative bleeding. The patient was satisfied with the result which increased her beautiful smile and self-esteem.[16,17]

According to Magne and Belser (2014), when assessing aesthetic success, several principles must be considered, and several aspects seem to be connected with a greater sense of smile aesthetics. The phrase "biologic width" was developed by Ingber et al.(1977) to define the distance between the alveolar crest and the base sulcus, which is roughly 2 mm.[18,19]

4. Conclusion

This case study focuses on a step-by-step approach to periodontal aesthetic crown lengthening that was carried out with the help of a new aesthetic proportion gauge, the Chu aesthetic gauge, it not only indicated the optimal crown length of a tooth, but also provided for visual precision in crown lengthening, which is essential to a successful, predictable, and aesthetic restorative outcome.

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