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Er:YAG laser-assisted flapless esthetic crown lengthening procedure: A case report

Excessive gingival display (EGD) is a growing concern and is often considered to have a negative impact on the esthetics of a smile. Altered passive eruption is a common etiologic factor, in which the gingival margin is malpositioned incisally and does not approximate the cemento-enamel junction (CEJ), resulting in short clinical crowns and unfavorable appearance. In cases of EGD related to altered passive eruption, an esthetic crown lengthening procedure is required, which involves gingivectomy and/or osseous resection to re-establish an appropriate biological width of 3 mm. Conventionally, esthetic crown lengthening requires the gingiva to be contoured by scalpel and osseous surgery using a rotary instrument under a full-thickness flap; however, the procedure is time consuming, requires suturing, and sounds frightening, especially for anxious patients who are afraid of surgery.

Recently, Er:YAG laser (ErL) has gained attention in several periodontal and peri-implantitis therapies¹ because it can precisely ablate both soft and hard tissues with minimal thermal side effects.^{2–4} Additionally, ErL irradiation without water spray can coagulate blood well, which could be advantageous for bleeding control during surgery. Herein, we demonstrate a minimally invasive, flapless esthetic crown lengthening approach using ErL.

A 22-year-old woman came to the Department of Periodontology, Chung Shan Medical University Hospital, with the chief complaint of unesthetic, short clinical crowns in

the anterior teeth and explained that she has fear of surgery and would prefer the laser therapy to fix her unesthetic smile instead of the conventional surgery (Fig. 1A). The Chu's Proportion Gauge was used to measure the width:length ratio of the maxillary anterior teeth; the analysis revealed teeth #13 to #23 had undesirable ratio (Fig. 1B). Once the desired teeth dimensions were determined by the gauge, the ideal positioned gingival zenith were marked on the patient's tissues (Fig. 1C), gingivectomy was then performed to achieve the ideal gingival margin using ErL (SAPPHIRE Laser, LIGHTMED®, Kaohsiung, Taiwan) under 55 mJ/pulse (Panel setting: 80 mJ/pulse) at 20 Hz with a water spray (Fig. 1D). Following gingivectomy, the level of the underlying alveolar bone was examined by bone sounding (Fig. 1E), which revealed exposure of the osseous crest at the newly positioned gingival margin that required osseous contouring to restore the biological width. The laser tip was marked 3 mm in length, followed by bone tissue removal by ErL irradiation under 70 mJ/pulse (Panel setting: 100 mJ/pulse) at 20 Hz with a water spray. Using this marking as a reference, the laser tip was advanced apically 3 mm during the bone contouring procedure to achieve precise bone reduction (Fig. 1F). No suturing was required because it was performed flaplessly (Fig. 1G). At 3 months and 1 year post-surgery follow up, the results presented healthy periodontal tissues (Fig. 1H and I).

<https://doi.org/10.1016/j.jds.2021.10.006>

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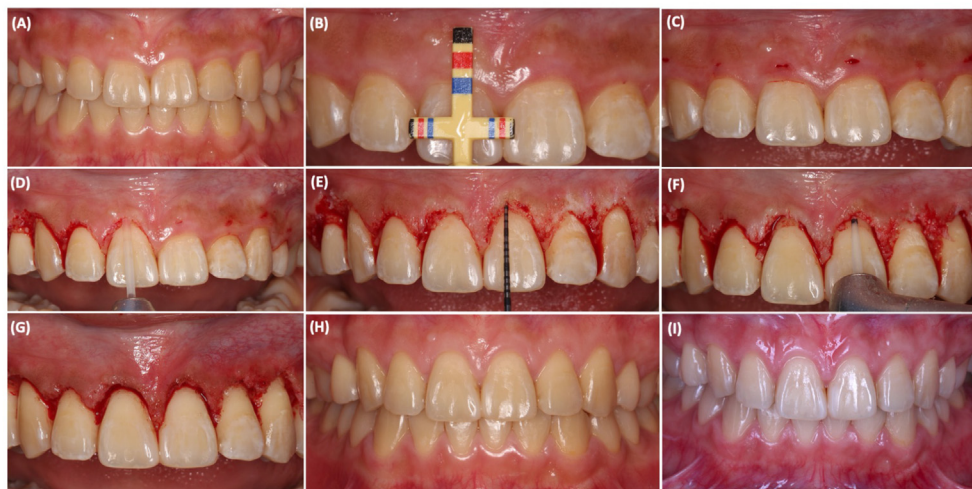


Figure 1 The clinical photographs of our case. (A) The intraoral photograph showing unesthetic, short clinical crowns of the anterior teeth. (B) Chu's proportion gauge tip revealing undesirable ratio of teeth #13 to #23. (C) Ideal positioned gingival zenith was marked on patient's soft tissues. (D) Gingivectomy was then performed using Er:YAG laser to achieve the ideal gingival margin. (E) After gingivectomy, bone sounding was performed showing the exposure of the osseous crest at the newly positioned gingival margin. (F) The laser tip was marked 3 mm in length, followed by bone tissue removal by ErL irradiation. Using this marking as a reference, the laser tip was apically advanced by 3 mm during the bone contouring procedure to achieve precise bone reduction. (G) No suturing was required, since it was done flaplessly. (H) Follow up at 3 months and (I) One-year post-operation intraoral photograph presenting stable results with healthy periodontal tissues.

ErL-assisted flapless esthetic crown lengthening offers less tissue manipulation and bleeding, shorter surgery duration, and sounds more accepting to patients who fear conventional scalpel surgery. This report indicates that minimally invasive flapless crown lengthening by ErL is predictable and has clinical outcomes similar to those of the open flap technique.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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Received 27 August 2021
Final revision received 4 October 2021
Available online 20 October 2021