

## Two-stage esthetic crown lengthening

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A smile that is perceived as unattractive mars confidence, sociability and self-regard. For some patients, the lack of visual appeal stems in large part from a "gummy smile," which a lay person begins to consider disharmonious when there is 3 to 4 mm of gingiva displayed.<sup>1</sup>

Management of such a complaint often entails both periodontal and restorative therapy, if not also orthognathic surgery and facial plastic procedures.

The following report showcases two-stage esthetic crown lengthening and prosthetic rehabilitation for the treatment of a gummy smile.

### Patient history

A medically and periodontally stable 40-year-old female presented with excessive, asymmetric gingival display of 5 to 7 mm upon smiling, short clinical crowns and incisal wear from tooth #4 to #13 (Figs. 1, 2).

Due to attrition and the relationship between the dentition and periodontal drape, the anterior teeth appear square-shaped and "masculine."

Diagnoses included (1) Coslet Type IA altered passive eruption, evidenced by a wider-than-customary dimension of keratinized gingiva and an alveolar crest at least 1.5 apical to the cemento-enamel junction (CEJ); and (2) vertical maxillary excess.<sup>2,5</sup> The patient shows a thick tissue biotype.

### Treatment plan

- Consult with oral and maxillofacial surgeon regarding orthognathic surgery
- Consult with facial plastic surgeon regarding lip lowering therapy
- Consult with restorative dentist regarding ideal tooth shape set-up and fabrication of surgical guide
- Two-stage esthetic crown lengthening from tooth #4 to #13
- First stage: osseous recontouring
- 6-week healing period
- Second stage: gingivectomy
- 3-month healing period



Fig. 1a: Initial facial presentation of patient, who exhibits a gummy smile (up to 7 mm of soft-tissue display) and vertical maxillary excess.

Fig. 14: Facial view six years post-treatment.



Fig. 1b: Initial view of maxillary anterior teeth upon smiling. The clinical crowns appear short and demonstrate attrition.



Fig. 2: Excessive keratinized gingiva, a thick soft-tissue biotype and asymmetric gingival contours exist.



Fig. 4: Surgical guide in place in the mouth. The ideal tooth contours are shaded in white.



Fig. 5: Initial full-thickness flap reflection at first stage surgery. Note the apical level of the alveolar crest compared to the cemento-enamel junction.



Fig. 6a: Final bone contours after osteotomy.



Fig. 6b: The final osseous contour lies at least 3 mm from the anticipated restorative margins, as outlined by the surgical guide.



Fig. 3a



Fig. 3b

Fig. 3a: The maxillary diagnostic model.

Fig. 3b: Ideal wax-up created on the diagnostic model.



Fig. 7: Sling sutures in place after osseous reshaping. Note the similarity in gingival height and morphology between pre-surgical and post-surgical views.



Fig. 8: Healing 10 days after first stage crown lengthening. The periodontal level still approximates the initial presentation.

Fig. 9: Healing six weeks after first stage of crown lengthening.



Fig. 10a: Frontal view immediately after second stage gingivectomy.



Fig. 10b: Positional relationship between the lip and gingival margin immediately after second stage gingivectomy.

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- Final porcelain veneer restorations for teeth #4 through #13
- Delivery of maxillary occlusal bite guard

#### Treatment plan rationale

Ideal treatment for the patient with vertical maxillary excess embraces a host of dental and medical specialties.

In such a case as this, in which the patient demonstrates up to 7 mm of gingival display, LeFort I maxillary impaction may further refine results if conventional crown lengthening insufficiently elevates the periodontal margin, creates an unacceptable crown-to-root ratio or precludes achievement of a natural-seeming emergence profile due to exposure of excessive radicular structure.<sup>3</sup>

Likewise, neuromuscular relaxation of the upper lip by botulinum toxin type A (BTX-A) depresses the lip, and thus masks any mucosal surplus left after periodontal surgery.<sup>4</sup>

As the patient declined orthognathic and facial plastic therapy, the treatment rendered to alleviate her gummy smile and reestablish tissue and dental symmetry included a two-stage crown lengthening procedure followed by delivery of porcelain veneers from tooth #4 to #13.

A biphasic crown lengthening approach minimizes the 1 to 3 mm coronal gingival shifts common after one-stage procedures detected especially in patients with thick soft-tissue biotypes (such as the patient featured in this report).<sup>5</sup>

By first reshaping only the osseous crest and letting healing commence, it is possible to correct any coronal rebound of the soft tissue seen after healing at the second, gingivectomy-only, surgery. Once the attachment apparatus fully remodels post-gingivectomy, which takes roughly three months, final restorations may be cemented.

#### Restorative consult

From the diagnostic models, the patient's prosthodontist created an ideal dental wax-up, upon which a vacuform matrix was applied to generate a surgical guide (Figs. 3, 4).

#### Osseous recontouring (first stage)

The first stage of biphasic crown lengthening of teeth #4 through #13 involved only osseous resection. The patient took 0.25 mg oral triazolam and 600 mg ibuprofen one hour before surgery.

Anesthesia with 2 percent lidocaine with 1:100,000 epinephrine and 0.5 percent bupivacaine with 1:200,000 epinephrine was given via local infiltration.

A buccal sulcular incision was made extending from tooth #4 to #13, and vertical incisions were dropped at the mesio-buccal and disto-buccal line angles of teeth #4 and #13. A full-thickness flap was elevated (Fig. 5).

Osteotomy was performed using an Ochsenbein chisel, carbide finishing bur and Neumeyer bur to position the alveolar crest at least 3 mm from the anticipated restorative margin at each site, as verified by the surgical guide (Fig. 6).

The bone was gradualized such that no sharp edges or bulbous areas existed, and positive architecture was preserved. The flaps were replaced and sutured in sling fashion with 4-0 expanded polytetrafluoroethylene (ePTFE) (Fig. 7). The gingival height and shape post-surgery appeared similar to that found before surgery, even 10 days after intervention (Fig. 8).

#### Gingivectomy (second stage)

Once the soft tissue resettled six weeks post-osteotomy (Fig. 9), the second stage of biphasic crown lengthening of teeth #4 through #13 was executed. The patient was sedated and anesthetized as above.

A definitive external bevel gingivectomy of teeth #4 through #13 was performed with a #15 scalpel utilizing the surgical template to delineate the

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desired tooth contours (Fig. 10).

The papillae were left intact and no sutures were required. Healing four weeks after the gingivectomy revealed a harmonious gingival drape (Fig. 11).

**Final prosthetics**

Placement of final veneers on teeth #4 through #13 occurred three months post-gingivectomy (Fig. 12). An occlusal bite guard was delivered to protect the restorations.

In order to correct lip line asymmetry and further diminish gingival display, neuromuscular lip correction (lowering) with BTX-A was reconsidered, but the patient did not pursue treatment.

Six years after veneer placement, the patient remained satisfied with the functional and esthetic result achieved solely through periodontal surgery and prosthetic rehabilitation (Figs. 13, 14).

**Post-operative instructions**

After each surgical procedure, the patient was instructed to take ibuprofen 600 mg every 4-6 hours, hydrocodone 7.5 mg/acetaminophen 750 mg every 4-6 hours as needed for pain, and doxycycline 100 mg a day for 10 days.

The patient was instructed not to brush at or near the surgical site but instead to rinse with 0.12 percent chlorhexidine or warm saline twice daily. The patient was also directed not to chew in the affected area for at least two weeks.

Suture removal occurred at 10 to 14 days post-surgery.

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*(All photos provided by Dr. Michael Sonick)*



Fig. 11a: Frontal view four weeks after second stage gingivectomy.



Fig. 11b: Positional relationship between the lip and gingival margin four weeks after second stage gingivectomy.



Fig. 12a: Frontal view of final veneers (#4 through #13) three months after gingivectomy.



Fig. 12b: Central view of final veneers (#6 through #11) three months after gingivectomy.



Fig. 12c: Right lateral view of final veneers (#4 through #8) three months after gingivectomy.



Fig. 12d: Left lateral view of final veneers (#9 through #13) three months after gingivectomy.



Fig. 13a: Smile pre-treatment.



Fig. 13b: Smile six years post-treatment.

After



Fig. 14: Facial view six years post-treatment.

Before



**About the authors**



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Dr. Michael Sonick is a full time practicing periodontist and implant surgeon in Fairfield, Conn. He is a on the editorial boards of many journals and is co-editor of the textbook, *Implant Site Development*.

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