

## Surgical Lip Repositioning Procedure to Correct Excessive Gingival Display: A Case Report of Identical Twins

Filip Ambrosio,\* Hana Gadalla,† Natasha Kapoor,\* Anthony L. Neely\* and Bassam M. Kinaia\*†



**Introduction:** Excessive gingival display (EGD) is an esthetic concern for patients with a gummy smile. With the increase in the esthetic expectations of patients, EGD could have an adverse emotional and psychosocial impact. The extent and etiology of gingival display dictate which treatment is indicated. For patients with EGD and a short or hypermobile upper lip, surgical lip repositioning (LRP) is a viable treatment alternative to other more invasive procedures such as orthognathic surgery. The procedure was first introduced in 1973 and resulted in reduced morbidity compared with orthognathic surgery while resulting in predictable improvement. LRP reduces gingival display by restricting the pull of elevator lip muscles and shortening the vestibule, thereby decreasing the range of motion of the lips and decreasing the amount of gingival display.

**Case Presentation:** The current report evaluates the esthetic results of LRP surgery on identical 27-year-old twin sisters exhibiting severe vertical maxillary excess (VME) and hypermobile upper lip. Both patients were given the option of orthognathic surgery to correct their VME or LRP to reduce their gummy smile and improve esthetics. Both elected LRP to address their gummy smile and avoid higher morbidity and costs associated with orthognathic surgery.

**Conclusion:** Both patients achieved acceptable esthetic results that were stable at 12 and 24 months. *Clin Adv Periodontics* 2018;8:48–53.

**Key Words:** Esthetics; gingiva; gummy; maxilla; smiling; vestibuloplasty.

### Background

Excessive gingival display (EGD) is an esthetic predicament characterized by excessive exposure of maxillary gingiva during smiling.<sup>1</sup> EGD is often regarded as an unesthetic smile due to the gummy smile appearance that can negatively impact the emotional and psychologic status of patients.<sup>2</sup> Patients with EGD often lack self-confidence, have a restrained smile, or place their hand in front of their mouth during smiling.<sup>3</sup> The prevalence of EGD has been reported to be 14% in females and 7% in males.<sup>4</sup> Some of the possible etiologies associated with EGD include altered passive eruption,<sup>5</sup> vertical maxillary excess (VME),<sup>6</sup> gingival enlargement, and a short or hypermobile

upper lip.<sup>7</sup> Depending on the amount of gingival display, treatment could include esthetic crown lengthening,<sup>8</sup> orthodontic therapy,<sup>9</sup> injection of botulinum toxin type A,<sup>10</sup> orthognathic surgery, or surgical lip repositioning (LRP).<sup>6</sup> For patients with EGD and a short or hypermobile upper lip, surgical LRP appears to be a reasonable alternative treatment modality.<sup>10,11</sup> Although orthognathic surgery is recommended for patients with VME of  $\geq 8$  mm, surgical LRP is an effective treatment alternative with considerably less morbidity.<sup>12</sup> The procedure reduces gingival display by restricting the action of the elevator lip muscles and shortening the vestibule, resulting in favorable esthetic outcomes.<sup>13</sup> Although the literature cites many different case reports,<sup>12,14,15</sup> the current report allows a unique opportunity to evaluate the esthetic results of LRP surgery in identical twin sisters exhibiting severe VME.

### Clinical Presentation

Healthy 27-year-old identical twin females presented to the Graduate Periodontics Clinic at the University of

\*Department of Periodontology and Dental Hygiene, University of Detroit Mercy School of Dentistry, Detroit, MI

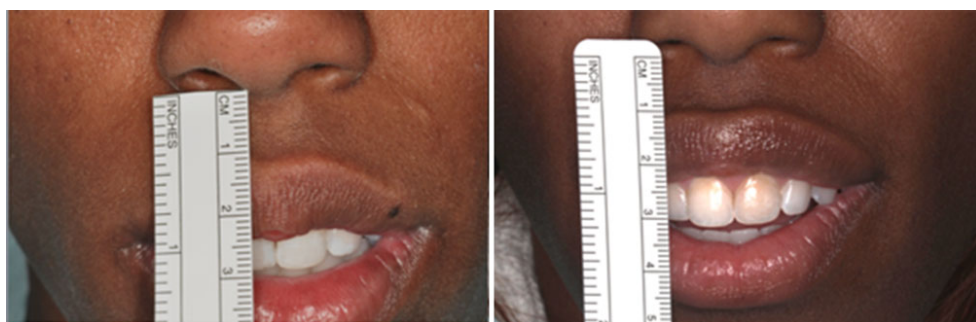
†Private practice, Grand Blanc, MI

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**FIGURE 1** Initial clinical presentation showing appropriate clinical crown length for patient 2.



**FIGURE 2** Initial clinical presentation of patients 1 (left) and 2 (right) showing incompetent lip closure.



**FIGURE 3** Facial view of patients 1 (left) and 2 (right) showing excessive gingival display.



**FIGURE 4** Facial view of patients 1 (left) and 2 (right) showing hypermobile upper lip upon dynamic smile.

Detroit Mercy, Detroit, MI for evaluation of gummy smile within a year of each other (2013–2014). Upon clinical examination, the clinical crown lengths for maxillary anterior teeth were within the normal ratio of 80%,<sup>16</sup> but the patients exhibited EGD with incompetent lip closure (Figs. 1 and 2). The patients had severe VME with a hypermobile short upper lip (Fig. 3).<sup>6</sup> They exhibited 11 mm of gingival display during dynamic smile with 9 mm

of keratinized gingiva (Figs. 4 and 5). Treatment options were discussed, and both consented to surgical LRP.

## Case Management

The facial and dental midlines were marked using a surgical marker at three locations: nose, philtrum, and interdental papilla between the central incisors (Fig. 6). This is an important step to be performed prior to local anesthesia as these points provide correct realignment of the facial midline for bilateral symmetry post-surgically.<sup>13</sup>

Under local anesthesia, incisions were outlined using a surgical marker on the alveolar mucosa extending from the mucogingival junction (MGJ) to 12 mm apically and expanding to the distal of the second premolars bilaterally (Fig. 7).<sup>15</sup> Then, a partial-thickness incision was made in the previously marked areas, exposing the underlying connective tissue (CT) (Figs. 8 and 9). The apical mucosa was approximated to reduce the vestibular depth and sutured to the MGJ using interrupted 6-0 sutures.<sup>‡</sup> To ensure bilateral symmetry, the sutures were started at the midline, followed by the distal aspects of the premolars, and finally closing the incisions primarily (Fig. 10). The patients received non-steroidal anti-inflammatory drugs for 7 days and an antimicrobial rinse.<sup>§</sup> Post-surgical instructions were given with emphasis on minimizing lip movement for at least 4 weeks. The patients were followed up at 1, 2, and 4 weeks and 6, 12, and 24 months.

## Clinical Outcomes

At 1 and 2 weeks both patients experienced significant bilateral swelling and ecchymosis in the perioral and periorbital areas (Fig. 11). All sutures were removed at the 4-week follow-up, and the swelling and bruising were completely

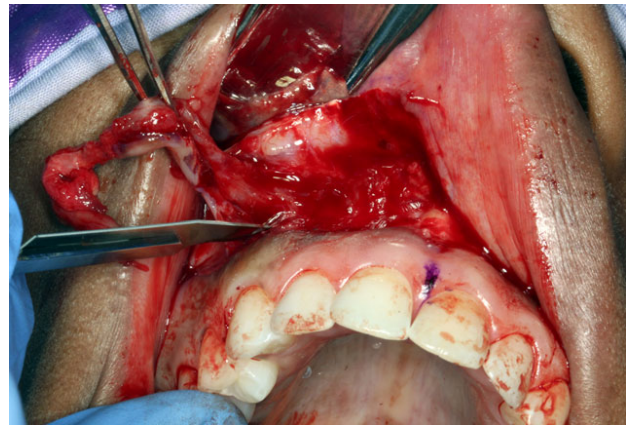
<sup>‡</sup>Ethicon, Johnson & Johnson, Cincinnati, OH.

<sup>§</sup>Hi-Tech Pharmacal, Amityville, NY.

<sup>||</sup>0.12% chlorhexidine gluconate, 3M ESPE, St. Paul, MN.



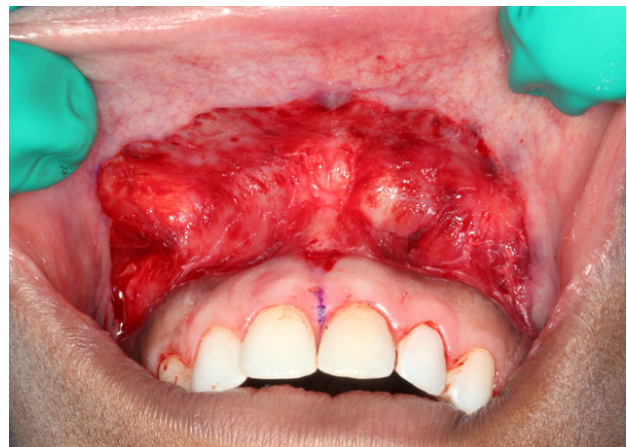
**FIGURE 5** Intraoral facial view showing a wide zone of keratinized gingiva for patient 2.



**FIGURE 8** Intraoral facial view showing partial-thickness dissection of the superficial mucosa for patient 2.



**FIGURE 6** Facial view showing facial and dental midlines before local anesthesia administration for patient 2.



**FIGURE 9** Intraoral facial view showing exposure of the underlying CT for patient 2.



**FIGURE 7** Intraoral facial view outlining the extent of the surgical incision for patient 2.



**FIGURE 10** Intraoral facial view demonstrating primary closure using monofilament non-resorbable sutures for patient 2.

resolved (Fig. 12). The patients were satisfied with the improvement and reduction in their gummy smiles. The results remained satisfactory at 12 and 24 months for both patients (Figs. 13 and 14).

## Discussion

Correct analysis of EGD is crucial before making treatment recommendations. Most patients have an average lip

length of  $\approx 22$  mm from the subnasale to the most inferior portion of the upper lip.<sup>17</sup> When the patient has EGD, this distance is smaller and is accompanied by incompetent lip closure or a hypermobile upper lip, resulting in a gummy smile. Different treatment modalities are used to reduce EGD, with orthognathic surgery being the main option for correction of VME. Orthognathic surgery is associated with high morbidity and increased cost since it is often performed in a hospital setting. Therefore, LRP



**FIGURE 11** Two-week postoperative facial view showing bilateral swelling and ecchymosis in the perioral region for patient 1 (left) and patient 2 (right).



**FIGURE 12** Four-week facial view showing resolution of swelling for patient 1 (left) and patient 2 (right).



**FIGURE 13** Twelve-month facial view demonstrating reduction in gummy smile for patient 1 (left) and patient 2 (right).

is a less invasive alternative treatment option to improve esthetics for patients with VME or hypermobile upper lip. It reduces the labial retraction of the elevator smile muscle and minimizes gingival display.<sup>11</sup> However, LRP is

associated with minor relapses at 6 months and potential complete relapse at 12 months post-surgery.<sup>12</sup> To minimize potential relapse from contraction of the underlying CT, leaving non-resorbable monofilament sutures at the midline and corners of the mouth for 4 weeks is important. Further, post-surgical instructions should include specific emphasis on minimizing lip movement for at least 4 weeks. Other post-surgical findings include bruising, discomfort, swelling, and mucocele formation.<sup>13</sup> These typical complications are generally manageable with medications and normal post-surgical care. In the current report, both patients exhibited significant swelling despite their non-contributory medical history. This could be attributed to the excision of mucosa and close proximity to the elevator muscles. The future use of corticosteroids should reduce the swelling and morbidity. The results of the current report showed slight differences in the amount of gingival display for patients 1 and 2, with 2 mm less gingival display for patient 1. It is noteworthy to highlight that patient 2 had more EGD initially compared with patient 1, hence, the results seem to be proportional (Figs. 3 and 13). Despite these differences, both patients were satisfied with the reduction in their gummy smiles and improvement in their overall esthetics (Figs. 13 and 14). The results were stable with minimal relapse at 12 and 24 months. ■



**FIGURE 14** Twenty-four-month facial view showing satisfactory maintenance of reduction in gingival display for patient 1 (left) and patient 2 (right).

## Summary

### Why are these cases new information?

- A less invasive procedure is presented as an alternative to orthognathic surgery.
- Stable results are shown with significant improvement after 2-year follow-up.
- There was satisfactory improvement in reducing gummy smile for patients with Class III VME.

### What are the keys to successful management of these cases?

- It is important to determine etiology for gummy smile. The following factors should be evaluated:
  - Patient has normal clinical crown length and width.
  - Patient has hypermobile upper lip with excessive gingival display.
  - Patient refuses orthognathic surgery.
  - Correct surgical and suturing techniques are used to maintain symmetry.

### What are the primary limitations to success in these cases?

- A limited amount of data is available from prospective clinical trials documenting the short- and long-term effectiveness of surgical LRP.
- Procedure does not eliminate VME.

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### CORRESPONDENCE

Dr. Bassam M. Kinaia, Graduate Periodontics Program Department of Periodontology and Dental Hygiene, University of Detroit Mercy, 2700 Martin Luther King Jr. Blvd., Detroit, MI 48208-2576. E-mail: [kinaiabm@udmercy.edu](mailto:kinaiabm@udmercy.edu); [kinaiaperio@gmail.com](mailto:kinaiaperio@gmail.com)

## References

1. Matthews TG. The anatomy of a smile. *J Prosthet Dent* 1978;39:128-134.
2. Terry DA, McGuire M. The perio-aesthetic-restorative approach for anterior reconstruction – Part I: Evaluation and periodontal surgery. *Pract Proced Aesthet Dent* 2002;14:283-291.
3. Fairbairn P. Lip repositioning surgery – A photographic guide. *Aesthetic Dentistry Today* 2007;1:67-73.
4. Diamond O. Facial esthetics and orthodontics. *J Esthet Dent* 1996;8:136-143.
5. Coslet JG, Vanarsdall R, Weisgold A. Diagnosis and classification of delayed passive eruption of the dentogingival junction in the adult. *Alpha Omegan* 1977;70:24-28.
6. Garber DA, Salama MA. The aesthetic smile: Diagnosis and treatment. *Periodontol 2000* 1996;11:18-28.
7. Levine RA, McGuire M. The diagnosis and treatment of the gummy smile. *Compend Contin Educ Dent* 1997;18:757-624.
8. Ribeiro FV, Hirata DY, Reis AF, et al. Open-flap versus flapless esthetic crown lengthening: 12-month clinical outcomes of a randomized-controlled clinical trial. *J Periodontol* 2014;85:536-544.
9. Foley TF, Sandhu HS, Athanasopoulos C. Esthetic periodontal considerations in orthodontic treatment—The management of excessive gingival display. *J Can Dent Assoc* 2003;69:368-372.
10. Polo M. Botulinum toxin type A (Botox) for the neuromuscular correction of excessive gingival display on smiling (gummy smile). *Am J Orthod Dentofacial Orthop* 2008;133:195-203.
11. Rubinstein A, Kostianovsky A. Cosmetic surgery for the malformation of the laugh: Original technique (in Spanish). *Prensa Med Argent* 1973;60:952.

12. Dayakar MM, Gupta S, Shivananda H. Lip repositioning: An alternative cosmetic treatment for gummy smile. *J Indian Soc Periodontol* 2014;18:520-523.
13. Simon Z, Rosenblatt A, Dorfman W. Eliminating a gummy smile with surgical lip repositioning. *Cosmet Dent* 2007;23:100-108.
14. Silva CO, Ribeiro-Júnior NV, Campos TV, Rodrigues JG, Tatakis DN. Excessive gingival display: Treatment by a modified lip repositioning technique. *J Clin Periodontol* 2013;40:260-265.
15. Humayun N, Kolhatkar S, Souiyas J, Bhola M. Mucosal coronally positioned flap for the management of excessive gingival display in the presence of hypermobility of the upper lip and vertical maxillary excess: A case report. *J Periodontol* 2010;81:1858-1863.
16. Sterrett JD, Oliver T, Robinson F, Fortson W, Knaak B, Russell CM. Width/length ratios of normal clinical crowns of the maxillary anterior dentition in man. *J Clin Periodontol* 1999;26:153-157.
17. Peck S, Peck L, Kataja M. The gingival smile line. *Angle Orthod* 1992;62:91-100, discussion 101-102.

○ indicates key references.