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Interdisciplinary Management of Gummy Smile with Gingivectomy, Gingivoplasty, and Lip Repositioning: Case Report

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Abstract

Introduction: Excessive gingival display (EGD) is a multifactorial esthetic condition associated, among other factors, with altered passive eruption (APE) and upper lip hypermobility. An accurate etiological diagnosis is required to select the most appropriate treatment.

Objective: To describe the combined surgical management of a patient with EGD and to evaluate its clinical stability over 12 months.

Materials and Methods: A 30-year-old female patient presented with approximately 5 mm of gingival display during smiling, associated with APE and upper lip hypermobility, and a history of transient improvement after botulinum toxin injections. Esthetic planning was performed using Chu's Proportion Gauge. Treatment consisted of gingivectomy and gingivoplasty from canine to canine, followed by conventional lip repositioning (LR). Quarterly follow-up visits were performed for 12 months.

Results: Gingival architecture, dentogingival proportions, and gingival display during smiling improved. At the end of the follow-up period, adequate esthetic harmony and no clinical evidence of relapse were observed.

Conclusions: The combined treatment addressed both the dentogingival and the dynamic components of EGD, yielding favorable and stable esthetic results over 12 months. Studies with larger samples and longer follow-up are required.

Keywords
Gummy smile; Altered passive eruption; Lip hypermobility; Gingivectomy; Lip repositioning.

Introduction
Excessive gingival display (EGD), commonly known as gummy smile, is an esthetic alteration characterized by increased visualization of gingival tissue during smiling. A display greater than 3 mm is usually considered esthetically unfavorable and may generate patient dissatisfaction [1]. Its etiology is multifactorial and may include altered passive eruption (APE), upper lip hypermobility, alterations in lip length, vertical maxillary excess, and dentoalveolar factors [1,2]. Therefore, an accurate diagnosis that identifies the factors involved is essential to select the most appropriate treatment.

APE may produce apparently short clinical crowns due to a coronal position of the gingival margin. In these cases, procedures such as gingivectomy, gingivoplasty, or crown lengthening can improve the proportion between the teeth and the gingival tissues [1,2]. On the other hand, upper lip hypermobility constitutes the dynamic component of EGD and can be managed by surgical lip repositioning (LR), which aims to limit lip elevation during smiling [2-4]. Although this technique can significantly reduce gingival display, a partial loss of the effect over time has been described [4,5].

When dentogingival and dynamic factors coexist, the combination of procedures allows the causes of EGD to be addressed comprehensively [2,4]. In this context, this report describes the case of a patient with approximately 5mm of gingival display associated with APE and upper lip hypermobility, treated with gingivectomy, gingivoplasty, and surgical LR. The case highlights the importance of an individualized diagnosis and esthetic planning to obtain favorable results, and evaluates their stability over 12 months of follow-up.

Case Report
A 30-year-old melanodermic female patient with no relevant medical history presented to the Master's Clinic in Periodontics and Dental Implants of the Universidad Autónoma de Santo Domingo (UASD), Dominican Republic, seeking treatment to improve the esthetics of her smile. Her chief complaint was dissatisfaction with her smile due to excessive display of gingival tissue when smiling. This condition represented an important esthetic concern with an impact on her self-perception and social interaction, and she expressed a strong interest in a permanent solution (**Figure 1**).



Figure 1: Initial clinical presentation, showing approximately 5mm of gingival display during smiling.

Regarding her dental history, the patient reported a previous attempt to correct the gingival display with botulinum toxin injections. According to her account, the treatment produced an evident clinical improvement of the smile; however, the effect was transient and the gingival display subsequently returned. The last application had been performed approximately one year before the initial evaluation.

A comprehensive smile evaluation was performed, considering the relationship between the gingival tissues, the dimensions of the clinical crowns, and the dynamics of the upper lip during smiling. Approximately 5 mm of gingival display was observed during smiling, accompanied by clinical features compatible with APE and upper lip hypermobility. The simultaneous presence of these findings indicated a multifactorial condition, with a dentogingival component related to the position of the gingival margin and a dynamic component related to the mobility of the upper lip. Identifying both factors was determinant for treatment planning, since an intervention directed at only one of them could be insufficient to achieve the desired esthetic correction.

Based on the clinical findings and the patient's expectations, a combined surgical treatment plan was established. Gingivectomy and gingivoplasty of the maxillary anterior sector, from canine to canine, were planned to remove the excess gingival tissue, modify the soft-tissue architecture, improve the gingival contour, and favor an adequate proportion between the clinical crowns and the periodontal tissues. Complementarily, surgical repositioning of the upper lip was planned to limit its displacement during smiling and reduce the gingival display associated with lip hypermobility.

Prior to surgery, the informed consent process was carried out. The nature of the proposed procedures, the therapeutic objectives, the expected benefits, the treatment alternatives, and the potential complications were explained in detail. The complications discussed included postoperative pain and edema, ecchymosis or hematoma, bleeding, alterations of the gingival contour, gingival recession, dentin hypersensitivity, unfavorable healing, scar formation, and possible relapse of the gingival display. Once the patient's questions were resolved and her authorization was obtained, the planned surgical treatment was initiated.

Gingivectomy and gingivoplasty

Gingivectomy was the first procedure performed, from canine to canine in the maxilla. Local anesthesia was administered with 4% articaine with epinephrine 1:100,000 by infiltration in the operative area. Chu's Proportion Gauge was then used as a reference to establish the desired clinical crown length and the ideal position of the new gingival margin (**Figure 2**). The gauge was positioned using the incisal edges and the coronal dimensions of the anterior teeth as references, allowing comparison of the existing clinical proportions with the ideal ones. Its color-coded references guided the final position of the gingival margin, and the corresponding bleeding points were marked as a guide to define the new margin.

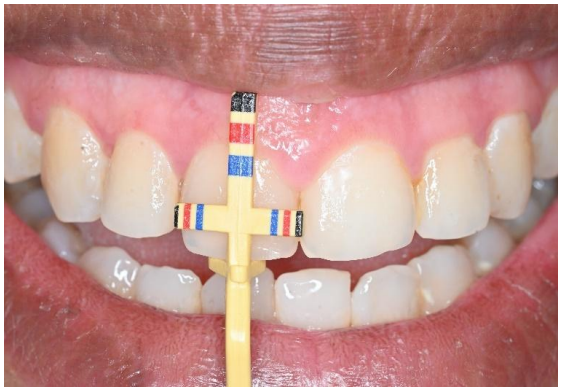


Figure 2: Chu's Proportion Gauge positioned on the maxillary central incisors to establish the desired clinical crown length and the new gingival margin position.

The incision was performed following the established references, and the excess gingival tissue was removed. The resection was carried out in a controlled manner, aiming to maintain a physiological, regular, and harmonious gingival architecture and to respect the position of the gingival zenith and the esthetic relationship between the soft tissues and the clinical crowns.

Gingivoplasty was then performed to remodel and regularize the remaining gingival tissue, providing a more physiological, scalloped, and esthetically harmonious contour, eliminating irregularities produced during the resection, and creating an adequate transition between the soft tissues and the tooth surfaces. Kirkland gingivectomy knives were used for the controlled recontouring and thinning of the remaining tissue (**Figure 3**).



Figure 3: Immediate postoperative view after gingivectomy and gingivoplasty from canine to canine.

Lip repositioning

Once gingivectomy and gingivoplasty were completed, the second surgical stage, upper LR, was performed. Because of the upper lip hypermobility identified during the clinical evaluation, a conventional LR technique was used, whose principle is to surgically limit the upward elevation of the lip by reducing the depth of the vestibule. Two parallel horizontal incisions were delimited approximately 11 mm apart. The first was made 1 mm coronal to the mucogingival junction, and the second in the labial mucosa. Both incisions were connected by vertical incisions at their ends, extending laterally to the region of the maxillary second premolars, thereby delimiting a band of mucosa to be removed (**Figure 4**).

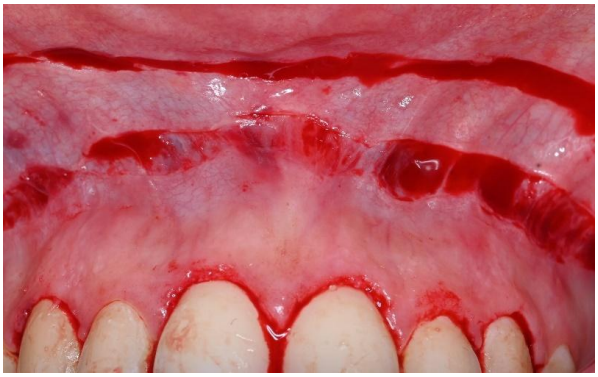


Figure 4: Incision design for lip repositioning: two parallel horizontal incisions approximately 11 mm apart, connected by vertical incisions.

The tissue between both incisions was then excised (**Figure 5**), leaving the surgical bed shown in (**Figure 6**). After removal of the mucosal band, the surgical edges were approximated with a continuous suture. This approximation reduced the depth of the vestibule and limited the upward displacement of the lip during smiling, which is the fundamental principle of the conventional LR technique (**Figure 7**).

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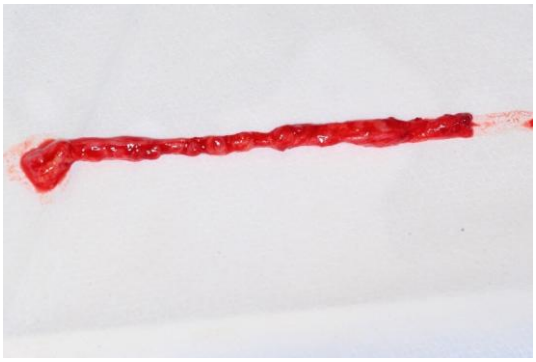


Figure 5: Band of mucosa excised between the two horizontal incisions.



Figure 6: Surgical bed after removal of the mucosal band.



Figure 7: Wound closure with continuous suture after lip repositioning.

After suturing, hyaluronic acid gel (Oddent Liquid Gingival® 0.025%) was applied topically as an adjunct for postoperative soft-tissue management, to favor adequate conditions for healing and tissue repair. Postoperative instructions were given to the patient, including local care measures and recommendations to promote adequate healing of the treated tissues. Sutures were removed at 15 days, accompanied by clinical follow-up to evaluate soft-tissue healing and the response to treatment.

Quarterly follow-up visits were performed until 12 months were completed. At the final evaluation, favorable esthetic results were observed, characterized by adequate dentofacial harmony and stability of the outcome. No clinical signs of relapse were observed during the follow-up period (**Figure 8**).



Figure 8: Final clinical situation at 12 months of follow-up.

Discussion

EGD is an esthetic alteration of multifactorial etiology, in which dentogingival, muscular, and skeletal factors may participate. In the present case, the patient showed approximately 5 mm of gingival display during smiling, associated with features compatible with APE and upper lip hypermobility. The simultaneous identification of these components was determinant to establish a treatment directed at the different causes involved, since the isolated correction of one of them could be insufficient. The literature recommends an individualized etiological diagnosis before selecting the treatment for EGD [1,2].

Gingivectomy and gingivoplasty were indicated to correct the dentogingival component, allowing modification of the position and architecture of the gingival margin and improvement of the proportion between the clinical crowns and the soft tissues. The use of Chu's Proportion Gauge provided objective references to determine the final position of the gingival margin and favored greater symmetry and harmony of the anterior sector [6,7]. This approach agrees with the principles described for the esthetic treatment of APE, in which soft-tissue planning must consider tooth proportions and the relationship between the periodontal structures [1].

Because of the concomitant upper lip hypermobility, surgical LR was performed as a complement to the periodontal treatment. This technique seeks to limit the upward elevation of the lip by reducing the vestibular depth, and it constitutes a conservative alternative for patients in whom lip mobility is an important factor of gingival display [2,5]. The available evidence shows that LR can produce a clinically significant reduction in gingival display; however, a progressive decrease of its effect during follow-up has also been described. Santos-Pereira et al. reported a mean reduction of approximately 2.10 mm at 12 months and noted a tendency toward relapse during the first year [6].

In the present case, clinical stability and the absence of evident signs of relapse were observed during the 12 months of follow-up. This favorable result may be related to the combined approach to the dentogingival and dynamic components of the smile. In addition, the previous botulinum toxin treatment, which produced a temporary improvement followed by recurrence, illustrates the transient nature of this therapeutic modality. The literature indicates that botulinum toxin can be effective to temporarily reduce muscular hyperactivity but requires reinjection because of the limited duration of its effect [7]. Therefore,

in patients with a multifactorial etiology, surgical treatment may represent an alternative with the potential for greater stability.

Nevertheless, these results must be interpreted with caution because this is a single case report. The absence of relapse over 12 months does not allow the superiority of the combined approach over isolated techniques to be established. Likewise, it would be advisable to incorporate standardized measurements of gingival display and lip mobility at the different follow-up visits to allow a quantitative evaluation of the outcome. Despite these limitations, the case demonstrates the importance of an accurate etiological diagnosis and of an individualized, interdisciplinary approach. The combination of gingivectomy, gingivoplasty, and LR allowed the dentogingival and dynamic factors to be addressed simultaneously, obtaining a favorable and clinically stable esthetic result during the follow-up period.

Conclusion

Excessive gingival display requires correct identification of its causes in order to select an adequate treatment. In this case, the presence of altered passive eruption and upper lip hypermobility justified a combined surgical approach. Gingivectomy and gingivoplasty improved gingival proportion and architecture, while lip repositioning reduced lip mobility during smiling, and Chu's Proportion Gauge facilitated more precise planning of the gingival margin. During the 12 months of follow-up, favorable esthetic results were observed, with no clinical evidence of relapse. Although these results are encouraging, they cannot be generalized because this is a single case report, and studies with larger samples and longer follow-up are required.

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Institutional review board statement

Ethical approval was not required for this case report.

Data availability statement

No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Informed consent statement

Written informed consent was obtained from the patient for publication of her clinical information and images, ensuring confidentiality and anonymity in accordance with the Declaration of Helsinki.

Conflict of interest

The authors declare no conflicts of interest.

Author contributions

V.F.C.P. performed the original writing of the manuscript. L.M.F.E., M.G.A.E., and K.M.S. contributed to the clinical management of the patient. A.I.B.R., R.O.A.J., M.A.M., and V.S.M.R. contributed to data collection and literature review. All authors have read and approved the final version of the manuscript.

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