



Lip repositioning as a complement to gummy smile treatment – A case report

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ABSTRACT

The aim of this case report was to present an alternative therapeutic combination involving lip repositioning (LR) in the correction of gummy smile (GS). This treatment is less invasive than orthognathic surgery and is highly acceptable to patients, using a modified technique that combines myotomy with the insertion of polyester threads as a physical barrier against relapse.

1. Introduction

The condition of the oral cavity is directly linked to the patient's emotions. Dentists and laypeople perceive GS as a non-aesthetic factor.¹ Gingival exposure (GE) above 3 mm when smiling is considered GS.² This characteristic affects 14 % of women and 7 % of men.

Etiologies of GS are: Hypermobile Upper Lip (HUL), Vertical Maxillary Excess (VME), Altered Passive Eruption (APE), Dentoalveolar Extrusion (DE) and Short Lip (SL). Recent studies indicate that there is a prevalence in the etiologies of APE and HUL and or their combination, the indicated treatment is the combination of Clinical Crown Lengthening (CCL) and LR.² Success in correcting GS begins with an accurate diagnosis, given that each etiology requires a different therapeutic approach.

This study introduces a minimally invasive approach using lip repositioning augmented with polyester threads, offering a novel and effective solution for managing gummy smiles and reducing the need for more invasive surgical options.

LR is indicated in 80 % of GS cases.³ The technique first proposed by Rubinstein and Kostianovsky,⁴ has been undergoing modifications in order to overcome the challenge of relapse, since the surgical objective is to contain excessive movement of the upper lip lifting muscle and the zygomatic minor wing of the nose, intradermal muscles of the facial mimic. Recently, the insertion of polyester threads in the region of the muscles after LR has been proposed to promote a physical barrier against relapse.⁴ It is important to emphasize that LR is a procedure that is highly accepted by patients.⁵

The aim of this report was to evaluate the results of combining the application of **botulinum toxin** (BT) with the techniques of CCL, incisal

edge repair and LR with insertion of polyester threads.

2. Case report

A 30-year-old woman came to author's clinic in Niterói in 2019 complaining about the disharmony of her smile (**Fig. 1A**). After analyzing the patient's health history, anamnesis and complementary exams, the patient was assessed, presenting periodontal health and a healthy systemic condition. Smile planning was carried out through a Digital Smile Design (DSD) (**Fig. 1B**). After collecting the photos measured to standardize the virtual ruler and measuring from the gingival margin to the CEJ with the millimeter probe (North Carolina - HuFriedy). Before surgery, the patient underwent biofilm control and oral hygiene instruction. The incisal edge exposure at rest and during a wide smile was also recorded, which was approximately 75 % of the teeth.

Before proceeding with the CCL, precise adjustments of the incisal edges of the involved teeth were made. This initial step is essential for obtaining a complete three-dimensional view of the tooth, allowing for more accurate planning of the gingival contour that will be established through the crown lengthening procedure. The incisal adjustments are fundamental not only for the final aesthetic of the smile but also for ensuring harmony in the shape, size, and position of the teeth, improving the overall functionality of the smile, including phonetics and occlusal guidance.

The diagnosis of Altered Passive Eruption (APE) led to the decision to perform Clinical Crown Lengthening (CCL) as part of the comprehensive treatment plan. In this case, approximately 1.5 mm of gingival tissue was carefully removed from each tooth involved, ranging from the left to the

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right second premolar. This step was essential to adjust the gingival margins, enhancing the overall aesthetics of the smile and providing a more balanced exposure of the teeth during smiling (Fig. 1C).

After the previous stage, the patient underwent correction of the incisal edges and application of botulinum toxin (BT) 15 days before surgery. A precise dosage of 2 units of BT was administered bilaterally to the muscles responsible for upper lip elevation, aiming to minimize muscle activity during the critical healing phase. This meticulous BT application, coupled with conservative crown lengthening, lip repositioning with myotomy and the insertion of polyester threads, has proven to be an effective multidisciplinary approach in gingival smile correction and its harmonization.

CCL surgery was then performed from the left second premolar to the right second premolar. First, an incision was made using a 15C internal bevel and then an osteotomy was performed using a piezo surgical instrument (NSK - Brazil), until 3 mm was reached from the bone crest to the future gingival margin, coinciding with the CEJ.

The lip repositioning procedure was executed by making the first incision on the mucogingival line and a second parallel incision in the labial vestibule, set 10 mm from the first. This width was chosen based on preoperative measurements of gingival exposure, set at 5 mm when smiling, thus the mucosal strip removed totaled 10 mm through vertical incisions at the distal edges that joined the two previous incisions. This procedure was then repeated on the other side, and the labial frenulum was severed (Fig. 1C).⁵

Myotomy of the levator labii superior and zygomaticus minor muscles was performed, aiming for long-term stability. The lower end of the remaining muscles was then tied with absorbable 4–0 polyglactin thread (Vicryl, Ethicon, Puerto Rico). External sutures were also performed to secure the repositioned tissues 14 days later (Fig. 1D).

Polyester threads (Bioline, Goiás, Brazil) were inserted using a 3 ml syringe and a 22 G 1/2 (0.7 × 30 mm) needle. The threads were strategically positioned in the subnasal region and between the canine and premolars, close to the canine fossa on both sides. The insertion technique involved a back-and-forth movement at the depth of the bone, targeting areas most susceptible to muscle pull and potential relapse. A

total of three threads were inserted, forming a stable fibrous barrier at strategic muscle attachment points. This intervention is essential to prevent the relapse of the elevated lip position and ensure long-term stability of the surgical results (Fig. 2A).⁴

It was only possible to perform CCL with LR in the same surgical procedure, because the technique used involved a conservative flap, made using the piezo surgical instrument.² The result after 2 years of treatment shows stability and a much more harmonious smile when compared to the initial smile (Fig. 2B and D).

3. Discussion

Patients with mild to moderate GS involving APE, HUL and VME, whom are not willing to undergo hospitalization for orthognathic surgery, have the possibility of alternative treatments such as therapeutic associations involving aesthetic balance between teeth, lips and face.² This case illustrates the successful combination of CCL, BT, and LR with polyester threads in achieving a harmonious smile without altering the patient's skeletal base.

Treatment mentioned does not change the patient's skeletal condition, as it can be seen from the photo of the patient at rest (Fig. 2C).

The therapeutic basis of aesthetic periodontal treatment for GS is CCL, a well-established procedure with a vast scientific basis, but due to a biological limit, in some cases an additional procedure is very welcome. For this reason, there has been an increase in the number of publications and modifications of the LR technique with the aim of complementing the results of GS treatments involving mild to moderate HUL and/or VME etiologies.⁶

The lack of standardization of the LR technique and the high demand for treatments to correct GS,³ has brought about a vast number of changes, with the aim of achieving long-term success and stability.^{2,5} In 2022, it was proposed to associate a physical barrier with polyester threads, which, because they form a fibrosis and are not reabsorbed, maintain the result achieved, but further studies are needed (Fig. 2A).⁴

This clinical case describes the combination of LR with myotomy and polyester threads, CCL, reconstruction of the incisal edges and BT, with



A. Initial condition of the patient with GE of 5 mm from the zenith to the edge of the upper lip while smiling, element 11.



B. The CCL was performed from the gingival margin to the CEJ, guided by the DSD.

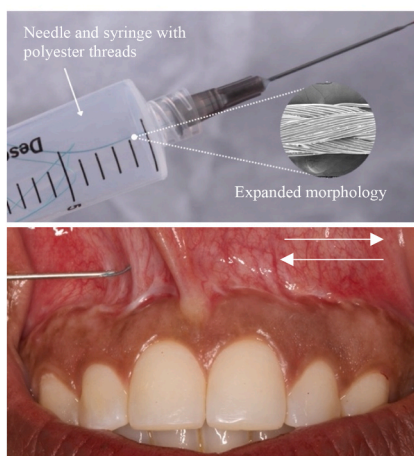


C. Removal of the strip of mucous tissue bilaterally with rupture of the labial frenulum.



D. CCL performed with piezo and LR.

Fig. 1. – Preoperative and transoperative.



A. Insertion of wires for physical barrier.



B. 2-year follow-up results. Association of CCL, adequacy of incisal edges, LR and BT.



C. Rest condition of patient before and after treatment.



D. Before and after the combination of procedures.

Fig. 2. – Threads incersion, results and resting/smiling condition of patient before and after treatment.

the aim of achieving a more harmonious result (Fig. 2D) and less surgical invasion, such as orthognathic surgery, as long as the patient is not contraindicated by the technique (minimal zone of attached gingiva).⁶

4. Conclusion

LR is an alternative for reducing GE when smiling in patients with HUL etiology and/or mild to moderate VME. With the precise application of BT, conservative CCL, and targeted myotomy followed by the strategic insertion of polyester threads, this technique has shown to be an effective complement to traditional methods.

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Patient's consent form (PCF) for case report of an adult

I, Layza Elena de Freitas Oliveira, holder of Individual Taxpayer Identification Number 133.624.057–11, have been informed about the objective of the case report study, which aims to present a new technique for treating a gummy smile, associating the use of polyester threads as a physical barrier to maintain the stability of the lip

repositioning result. Additionally, I have been informed about the possible risks associated with this procedure, such as dry mouth sensation and post-surgical bruising. I am aware that I may be asked for follow-up appointments at any time.

I declare that I authorize the use of clinical-laboratory data of my case and the receipt of a copy of this informed consent form.

You are being invited to participate in a Case Report study. For this, we ask for your authorization to use clinical data and photographic images found in your medical record, for the presentation of your case in a scientific meeting and publication in a scientific journal or book as a "Case Report."

By authorizing the disclosure of this Case Report, you will incur no costs, nor will you receive any financial benefit. Your authorization is voluntary, and refusal to authorize will not result in any penalty or change in the manner in which you are treated by the researchers, who will handle your identity with professional confidentiality standards.

The Case Report will be at your disposal when finalized. This consent form is printed in two original copies, one of which will be archived by the responsible researcher and the other will be provided to you.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence

the work reported in this paper.

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The authors declare that they have no conflicts of interest.

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