Frontiers in Dentistry

Lip Repositioning, a Solution for Gummy Smile

Pardis Haddadi[1*], Hadi Zare[1], Ali Azadikhah[2]

1. Department of Periodontics, Faculty of Dentistry, Lorestan University of Medical Sciences, Khorramabad, Iran
2. Department of Periodontology, School of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran

Article Info

Article type:
Case Report

Article History:
Received: 14 Apr 2020
Accepted: 23 Mar 2021
Published: 22 Apr 2021

**** Corresponding author:***
Department of Periodontics, Faculty of Dentistry, Lorestan University of Medical Sciences, Khorramabad, Iran

Email: pardishddi@gmail.com

A B S T R A C T

For many years oral esthetic problems treated by dentists were limited to those involving the teeth without giving consideration to the gingiva. However, today it is well established that these structures should be in balance to appear esthetically pleasing. More than 3mm gingival show during smiling is considered as 'excessive gingival display' also known as "gummy smile", which is not attractive. The current case series, presents three patients with gummy smile managed by lip repositioning surgery, each with 1 year follow up. Our objective was to introduce lip repositioning as a successful treatment modality to decrease gingival show using a simple and conservative surgical approach.

Keywords: Oral Surgical Procedures; Lip; Smiling

➢ **Cite this article as:** Haddadi P, Zare H, Azadikhah A. Lip Repositioning, a Solution for Gummy Smile. *Front Dent.* 2021:18:15.

INTRODUCTION

For many years, dentists mainly focused on teeth without paying much attention to the gingiva, when treating esthetic issues of the oral cavity. However, today in order to be attractive, the lips, teeth and gums are required to be in harmony. A beautiful smile is one with 2mm gingival display [1] and when this exceeds 3mm it is considered to be unappealing and is known as "gummy smile" [2]. The worldwide prevalence of excessive gingival display is 10.5% to 29% and it is less common in men than women, with a 2:1 female tendency [3]. Various factors contributing to gummy smile should be identified before treatment [4]. These include altered passive eruption, short upper lip, hypermobility of the upper lip, bimaxillary protrusion, anterior dentoalveolar extrusion, vertical maxillary excess (VME) and thin upper lip [5,6].

Gummy smile due to VME can be treated by orthognathic surgery, which requires hospitalization and can result in considerable morbidity, making it unacceptable for some patients [7]. Hyperfunction of labial elevator muscles (zygomaticus minor, levator anguli oris, orbicularis oris, and levator labii superioris) is another cause of gummy smile, which can be managed by one of the least invasive treatment options, i.e., botulinum toxin injection. When administered intramuscularly, the toxin blocks the release of acetylcholine through cleavage of synaptosome-associated protein-25 (SNAP-25), leading to partial chemical denervation of the muscle. The resulting localized relaxation of muscle activity translates to restricted pulling-up action of the lip during smiling [8]. The effect of botulinum toxin injection is noticeable within 1–2 weeks, and usually last for 4–6 months. It has been indicated that multiple injections may lead to extended muscle paralysis, meaning that reduced gingival exposure would remain, even after the toxin

has been metabolized [9] Botulinum toxin is generally safe, if injected properly and given at the right dosage. However, adverse events like asymmetrical smile, speech problems, difficulty in chewing/drinking, pain, infection, bruising/hematoma, inflammation, edema, reduced muscle strength and nerve palsy, have been reported [10] . The largest issue of botulinum toxin treatment is the need for multiple administrations, 4–6 months apart [11]. Esthetic crown lengthening is another option that has been used to correct excessive gingival display by restoring the normal dentogingival relationship, which also leads to functional improvement [12,13]. The choice to supplement it with osseous resection depends on the available biological width in the surgical site. When crestal bone level is close to the cementoenamel junction, a simple gingivectomy is not recommended since the biologic width of the gingival attachment may be compromised. In such circumstances, a full thickness periodontal flap with osteotomy should be performed [14].

In 1973, a lip repositioning procedure to treat gummy smile was described by Rubinstein and Kostianovsky [15], followed with reports by Litton and Fournier [16], Miskinyar [17] and Robbins [18]. It was modified in 2006 by Rosenblatt and Simon and presented to dentists [4]. This surgical technique is suggested to be a conservative permanent solution that requires a less invasive approach than orthognathic surgery. Its purpose is to limit the traction of muscles involved in smiling (zygomaticus minor, levator anguli, orbicularis oris, and levator labiisuperioris), by decreasing the depth of the upper vestibule [19]. In the original technique an elliptical incision was made in the depth of the vestibule consisting of a lower incision, 3-4mm from the gingival margin of the teeth, and an upper incision at a distance double to that of the gingival display. A 10–12mm distance between the upper and lower incisions was maintained [20]. The original method did not entail muscle detachment after flap reflection; however, some authors support performing myectomies to sever muscle attachments responsible for smiling [16,17]. Another technique used for pulling up the attachments of the smile muscles is to use an autogenous or alloplastic separator. This spacer is placed through a nasal approach between the anterior nasal spine and the elevator muscles of the lip to inhibit superior displacement of the repositioned lip [21].

In hyperactive upper lip cases, lip repositioning surgery seems to be an ideal treatment plan. Due to limited data on this procedure [22], the current case series presents three patients treated by lip repositioning surgery with 1-year follow up. After an accurate explanation of the surgical procedures and techniques, all patients signed an informed consent.

Case 1: A 28-year-old systematically healthy woman with a chief complaint of gummy smile presented to our clinic. On the first visit, she was asked to pronounce the letter “M”, in order to measure the amount of incisal exposure at rest [23]. A periodontal probe was used to determine gingival- and teeth-show during a full smile. Her gummy smile was diagnosed to be the result of both VME and altered passive teeth eruption, with no lip incompetency. Therefore, she was scheduled to receive gingivectomy along with lip repositioning. The upper lip length from the base of the nose to the superior border of the upper lip vermillion was 11mm and the amount of gingival display measured as the distance between the lower border of the upper lip vermillion and the gingival margin of the central incisor was 12mm, before surgery. For local anesthesia, 2% lidocaine and epinephrine was infiltrated between the maxillary premolars on both sides. First, gingivectomy was done to correct crown heights. Then, two parallel incisions were made, one in the mucogingival junction, and the other on the vestibular side of the upper lip. The distance between these two incisions was twice the length of the intended lip repositioning, based on previous studies [22]. The outlined mucosa was removed by partial thickness dissection, followed by advancement of the mucosal flap and closure with single interrupted sutures using 4-0 vicryl. The frenum was removed and sutured as the final step to maintain symmetry. Two 400mg ibuprofen tablets were given to the patient immediately after surgery and she was instructed to use a 0.2% chlorhexidine mouthwash twice daily for 2 weeks and take

500mg amoxicillin three times a day for 7 days. Healing was uneventful as presented in Figure 1, showing 1-year follow-up photographs.

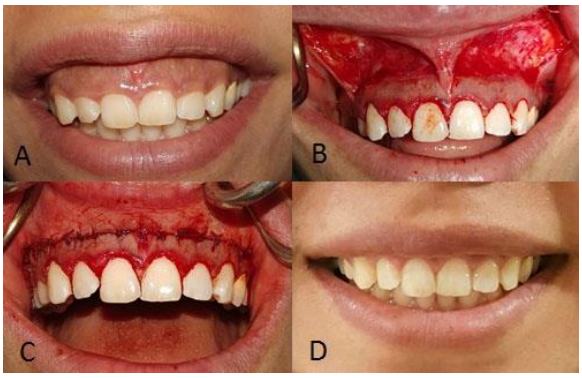

Fig. 1. A) Preoperative patient smile. B) Outline of both incisions, connective tissue exposed after epithelial excision, gingivectomy. C) Interrupted sutures with 4-0 vicryl. D) One-year postoperative smile

Case 2: A 32-year-old female complaining of a non-symmetric smile, excessive gingival show and decreased lip volume was examined in our clinic. The patient was healthy without any medical problems. Her upper lip length was 10mm and the amount of gingival display was 5mm. In order to correct the asymmetry, two-stage surgery was planned. Unilateral gingivectomy for correction of gingival level asymmetry was considered as the first stage followed by lip repositioning one month later, as the second stage. The procedure was the same as Case 1 and healing was without complication. One-year post-op results are shown in Figure 2.

Fig. 2. A) Preoperative patient smile. B) Unilateral gingivectomy on right side. C) Connective tissue exposed after epithelial excision. D) Postoperative smile after one year

Case 3: A 24-year-old female patient with no systemic problems presented to our clinic, complaining of "excessive show of gingiva when smiling". The upper lip length was 13mm and the amount of gingival display was 4mm in the anterior segment, prior to surgery. The treatment plan was lip repositioning, performed in the same manner described above. Healing was uneventful and one-year follow-up demonstrated good results as shown in Figure 3.

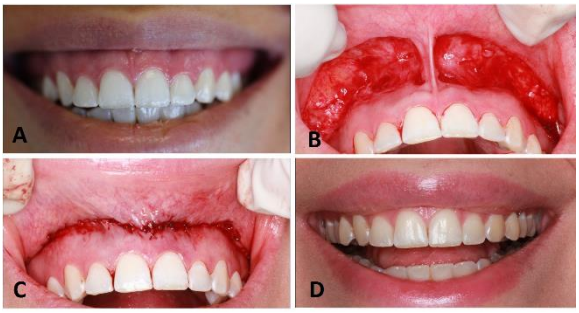

Fig. 3. A) Preoperative patient smile. B) Incision outline, connective tissue exposed after epithelial excision. C) Interrupted sutures with 4-0 vicryl. D) One-year postoperative smile

DISCUSSION

By presenting 3 gummy smile cases treated with lip repositioning, we aimed to propose this surgical procedure as a predictable and stable approach for the reduction of excessive gingival show. Initially introduced in 1973, lip repositioning was used by plastic surgeons [20], and eventually it entered dentistry and was applied for the correction of excessive gingival display [4]. When VME is diagnosed as the cause of gummy smile, treatment plan is based on the severity of gingival show as suggested by Garber and Salama [24]. Accordingly, patients with class 1 VME, have 2-4mm gingival show and based on their preference and crown/root ratio, they can be managed with orthodontic intrusion only, orthodontic and periodontal therapy or periodontal and restorative treatment. Class 2 VME cases have 4-8mm gingival show and can be treated with a combination of periodontal and restorative therapy as well as orthodontic surgery. Cases of class 3 VME demonstrate more than 8mm gingival show and can receive

orthognathic surgery with or without adjunctive periodontal and restorative therapy to reach craniofacial harmony. However, because of the high morbidity and complications associated with orthognathic surgery, many patients look for an alternative treatment option. Lip reposi-tioning is a less invasive and more acceptable approach. It seems that the most important factor in case selection for this procedure is the length of the upper lip and the amount of gingival display. In patients with more than 10mm upper lip length, the results seem to be more predictable and could be maintained for at least 1 year, as demonstrated in this report. The improve-ment of 3-4mm of gumminess is possible with lip repositioning [22]. This procedure is especially suggested for individuals with minor discrepancies seeking a less invasive alternative, compared to orthognathic surgery. Lip repositioning also has more immediate and stable results in comparison to botulinum toxin treatment [25]. However, it has some contraindications including severe VME (more than 4mm of gingival show when smiling) and minimal amount of keratinized tissue in the surgical site, which makes suturing and flap stabilization difficult or even impossible [2]. Therefore, in patients with more than 4mm gingival show, the combi-nation of gingivectomy and lip repositioning may be considered, as seen in Case 1. In patients with minimal keratinized tissue, orthognathic surgery or botulinum toxin injections might be beneficial. In this study, the major clinical outcome was the reduction of gingival display, which remained stable after one year follow up in all cases. Our patients reported a feeling of upper lip dryness during the first week after surgery, which may have been caused by removal of minor salivary glands during partial thickness dissection of the epithelium and underlying connective tissue. This complication disappeared within 2 weeks in all cases. No other adverse event was reported and all cases were satisfied with the obtained results.

CONCLUSION

We conclude that accurate case selection is critical for reducing the risk of relapse in lip repositioning surgery and if followed correctly, outcomes will be sustainable for months. We believe that there is a need for randomized clinical trials to assess the outcomes of this surgical technique and to determine the influence of variations in methods and different patient factors on the final outcomes.

CONFLICT OF INTEREST STATEMENT

None declared.

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