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Case Report

Lip Repositioning Surgery Without Myotomy to Achieve an Aesthetic Smile

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ABSTRACT

The concept of dentofacial aesthetics in modern society is changing and developing day by day. Patients who are inspired by perfect smiles want to stand out in the community by having a similar smile aesthetic. The harmony of the three components can provide this perfect smile aesthetic that patients wish to us to achieve. These three components that make up the smile frame are teeth, gums, and lips. Any exposure of the maxillary gingiva during a smile beyond 2 mm is known as a gummy smile. Nonsurgical or surgical methods can treat the gummy smile condition. In this case report, we used lip repositioning without myotomy, a minimally invasive surgical procedure for the management of excessive gingival display. Also, no supportive treatment was applied. The technique is based on partial removal of the tissue between a coronal incision following a mucogingival line and a parallel apical incision and moving the lip to a new position by joining the two lines. This method aims to limit the contraction of the muscles that lift the lip during a smile. With this procedure, a narrower vestibule, limited muscle activity, and less gum appearance during a smile are obtained. The patient was clinically evaluated and photographed in the 3rd and 12th months after the surgical procedure. In control performed in the 3rd month, the patient observed to be satisfied with the aesthetic smile, and the appearance of the gums was within normal limits. In the 12th month, the patient's complaint recurred, and the appearance of a scar on the smile line added to the negative picture. Lip repositioning is successful in the short term but, additional treatments required for long-term or permanent results. Considering the possible complications by myotomy, botulinum toxin-a recommended for long-term success.

INTRODUCTION

The concept of dentofacial aesthetics in modern society is changing and developing day by day. Patients who are inspired by perfect smiles want to stand out in the community by having a similar smile aesthetic. The harmony of the three components can provide this perfect smile aesthetic that patients wish to us to achieve. These three components that make up the smile frame are teeth, gums, and lips [1-4]. The shape, color, and location of these components play a decisive role in the aesthetic appearance. The pink component analysis should include the following: the amount of gingiva display during a smile, the periodontal health of the gingiva, the gingival contours, the aesthetic gingival line, and the presence of papillae [5].

During a un usual smile, the healthy gingival view is 1-2 mm. The measurement is made between the gingival edge of the central incisors and the lower border of the

upper lip [6-8]. Any exposure of the maxillary gingiva during a smile beyond 2 mm is known as a gummy smile. This situation described as the Excess Gingival Display (EGD) and gingival smile [9]. This condition is often seen a sun attractive [10]. Excessive gingival presentation is more common in women than in men. Its prevalence is 10% of the population between the ages of 20-30 [11,12].

EGD during a smile may be due to Vertical Maxillary Excess (VME), anterior dentoalveolar extrusion, altered or delayed passive eruption, plaque or drug-induced gingival enlargement, short or hyperactive or asymmetrical upper lip (HUL), or a combination there of [7,13]. The basis of the treatment is the detection of the cause of a gummy smile.

Due to the short crown length, a gummy smile can be treated with periodontal approaches include gingivectomy or an apically repositioned flap [14-17]. Vertical maxillary excess, dentoalveolar extrusion, short and/or hyperactive upper lip may be treated both surgically and nonsurgical [9,18-21]. EGD treatments include procedures such as orthognathic surgery, orthodontic treatment, detachment of lip muscles by myectomy and myotomy [22,23], lip elongation associated with rhinoplasty [13], lip repositioning [24], and botulinum toxin-A injections [25].

Table 1: Vertical maxillary excess classification.

Degree	Gingival and mucosal display	Treatment modalities
I	2-4 mm	Orthodontic intrusion only Orthodontics and periodontics Periodontics and restorative therapy
II	4-8 mm	Periodontics and restorative therapy Orthognathic surgery The choice depends on the remaining amount of root encased in bone and crown to root ratio
III	≥ 8 mm	Orthognathic surgery with or without adjunctive periodontal and restorative therapy complete dentofacial harmony

*Taken from Garber and Salama[20]

VME classification made by Garber et al. and facilitated the selection of the treatment method suitable for this classification (Table 1) [20]. In the definitive diagnosis of Excessive Lip Motility (ELM), the appearance of teeth at rest and the relationship between teeth and lower lip while smiling should be evaluated and considered clinically regular [26]. To date, many treatments have been proposed for EGD due to upper lip hyper mobility and VME. However, there is no definite and accepted minimally invasive approach [12,27,28]. In this case report, we used lip repositioning, a minimally invasive surgical procedure for the management of excessive gingival display. As an alternative to invasive surgeries, it provides low morbidity, low incidence of complications, and rapid recovery. The primary disadvantage of the procedure is relapse. This technique aims to limit the contraction of the muscles that lift the lip during a smile to reduce the amount of gum that occurs during a smile [29]. With this procedure, a narrower vestibule, limited muscle activity and less gum appearance during a smile are obtained [24].

CASE PRESENTATION

A 22-year-old healthy girl applied to our clinic for an unsatisfactory smile (Figure 1). In clinical examination, the patient had a maxillary gingival appearance of more than 5 mm when she smiled (Figure 2). The patient has skeletal class II div 1 malocclusion (vertical maxillary excess degree II). Orthognathic surgery or/and orthodontic treatment are needed, but the patient demanded short-term and less morbidity treatment. The aim was to minimize the Gingival Display (GD) in the shortest time and with a minimally invasive surgical procedure.

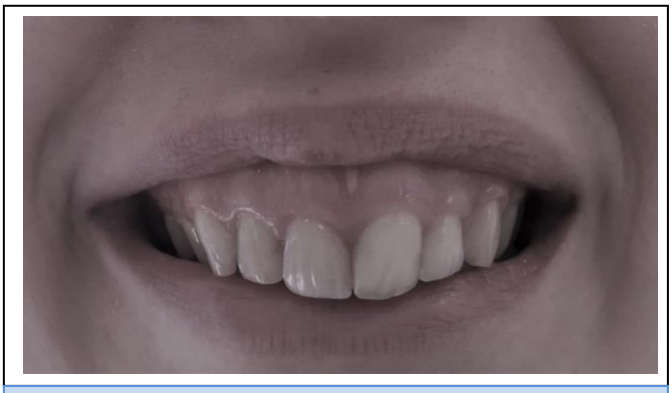

Figure 1: Pre-operative view smiling.

Intraoral and extraoral examinations of the patient were performed. Face symmetry and proportions were ordinary in both frontal and lateral views (Figure 3,4). Her upper lip was measured as 15 mm (from the lower border of the upper lip to the sub-nasal). It was below the standard value. Maxillary central incisor displays at rest, on average, is 6 mm. A periodontal examination performed. The patient's probing depths ranged from 1 to 3. Her gingival phenotype was medium. The clinical crown length was in usual anatomic

proportions. At the same time, she had an adequate width of the attached gingiva. The keratinized attached gingiva width ranged from 8 to 12 mm, and the thickness was 1-2 mm. The distance between the mucogingival composition and the maxillary labial vestibule depth in the anterior region varies between 4 mm and 8 mm. Smile gingival appearance was 5.5millimeters. Teeth lengths at rest and the relationship between teeth and lower lip while smiling were considered clinically expected. Thus, the hyperactive lip presence was diagnosed.

Figure 2: Exposure of the maxillary gingiva during a smile beyond 5 mm.

Figure 3: Gummy smile view from patient's profile.

Figure 4: Orthopantomography x-ray of the patient.

The patient was informed about the procedure and post-surgical complications. Written consent was obtained from the patient for the surgical procedure, and the use of patient data and photographs. The vestibule depth, lip thickness, and ideal gum appearance of the patient were evaluated, and the limits of the tissue to be removed were determined with a marker pen (Figure 5). Local anesthetic (%4 ArticaineHcl with 1:200,000 epinephrine) was administered. A scalpel # 15 was used for the incision. The coronal incision was a partial-thickness incision and located on the mucogingival junction line. It was among the mesial of the right and left premolars. An apical incision was made in a single line parallel to the coronal incision and keeping the mucosa stretched. The incision line also included labial and buccal frenulum. While the epithelial tissue was removed, the small salivary glands in the sub mucosa were preserved, and the underlying connective tissue was left intact (Figure 6,7). The mucosal flap was sutured with simple interrupted sutures using a 4-0 silk suture starting from the first midline (Figure 8). Immediately after the operation, the appearance of the gum when smiling varied between 3-4 mm, and the lip length and thickness increased (Figure 9).

Figure 5: Incision outline is made with a marking pencil.

Postoperative care and possible complications were explained to the patient. The patient was instructed to avoid trauma, soft nutrition, and ice application until the next day. It was also suggested to limit facial movements such as laughing and talking. The patient was asked not to brush teeth for ten days and instead to shake gently with 2% chlorhexidine gluconate [30]. Postoperative 1000 mg Augment in BID (875 mg

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amoxicillin hydrate and 125 mg clavulanic acid) and 25 mg Arveles (25 mg dexketoprofen) twice a day for five days, were prescribed. Besides, it was recommended not to use milk and dairy products for the use of silk suture. The patient was called for control one week later, and no complications other than edema and pain were observed; the region was washed with serum. Sutures were removed from the area 2 weeks later. The patient's edema did not go away completely in the 2nd week, and she could not smile at ease yet. At the 3rd month check, there was a thin scar on the suture line, but it did not appear when the patient smiled (Figure 10). Six months after the procedure, the GD increased by 1 mm compared to the third month of post-op. Her last visit was 12 months after the operation, and the patient's lip position had almost returned to the place before the operation, and the patient's aesthetic complaint was renewed. However, the scar tissue formed in the incision line was located within the framework of the smile (Figure 11). A comparative GD is shown during the treatment process (Figure 12).

Figure 6: Operation View.

Figure 7: The strip of the epithelium which was removed.

Figure 8: Sutures placed.

Figure 9: The amount of gum appearance immediately after the operation.

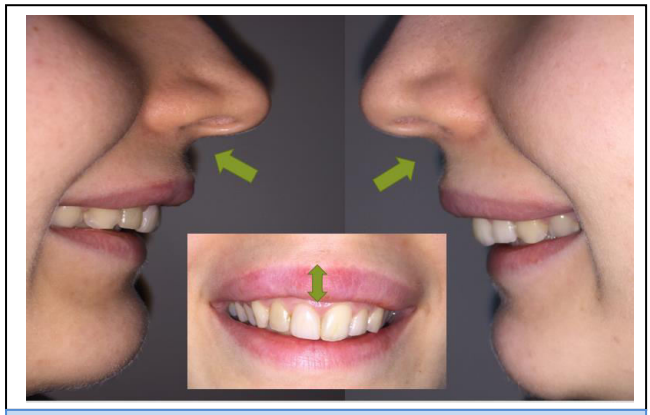

Figure 10: Clinical view 3 months after the operation: increased nasolabial angle and lip thickness.

DISCUSSION

In this case report, it was aimed to decrease the quantity of GD with lip repositioning technique in gummy smile patient with VMEdegree-2 and HUL. The results show that the method is successful and satisfactory in the short term (3-6 months), but in

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the long term (12 months and later) the lip slowly returns to its original position.

Figure 11: Clinical view 12 months after the operation: recurrence ofexcessive gingival display and scar formation in the smile line.

Figure 12: Comparative gingival appearance in the treatment process.

Although smile aesthetics vary according to the societies, the appearance of GD more than 3 mm is considered as a non-aesthetic condition in the common denominator [29,31,32]. In the literature, there are many etiologies of excessive gingival manifestation and various treatments [9,14,16,20,22-24,33-37]. Etiologies include altered passive eruption, dentoalveolar extrusion, VME, short clinical crowns, and HUL. GD treatments are as follows gingivectomy, an apically repositioned flap, orthodontic intrusion, botulinum toxin-A injections, and lip repositioning with or without myectomy or myotomy [29].

A hyper plastic growth of the maxillary skeletal base results in the teeth being positioned farther away from the skeletal maxillary base and a display of gingiva below the inferior border of the upper lip. Which defined as VME [20]. HUL is caused by hyper function of the lip lift muscles, while the maxillary lip length is normal at rest [38]. In simple VME degree, I or II and in cases of HUL, lip repositioning procedure is indicated [39,40]. Contraindications of the lip repositioning procedure are inadequate attached gingiva and severe vertical maxillary excess (VME III) [34]. Our case has adequate attached gingiva and the vertical maxillary protrusion is not advanced.

The technique was initially defined as cosmetic surgery to correct the gummy smile caused by the HUL [24]. It was later used for the management of a case with a short upper lip [22]. Later; the original method was modified to include myectomy and partial resection of the levator labii superioris [23]. The purpose of the modification was to reduce the risk of recurrence with muscle resection, but postoperative paraesthesia complications were reported. The procedure was used much later, with an elliptical-shaped incision of 10-12 mm breadth in partial-thickness and without any process on the muscles, and good results were reported for a maximum follow-up period of 8 months [34,41]. In one of the studies in which the method was used in VME and HUL patients, it was suggested to remove the mucosa so that it was twice the width of the visible gum, and they achieved excellent results over a year [39]. In the other study, an etiology-therapy protocol was presented for clinicians [40]. The main disadvantage of the process is relapse. When recurrence occurs, surgery can be repeated to include more mucosa, or botulinum toxin-A may be administered as recommended in other studies [34,39,40,42,43]. Botulinum toxin-A injections for treatment of excessive gingival display is indicated when the patient presents with GD upon smiling that exceeds 2 mm and at least one of the following: the primary cause of GS is muscle hyperactivity, the patient opts for the least invasive treatment, the patient requests a temporary treatment while awaiting

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definitive surgery, or treatment is a complement to surgical treatment [27].

Common postoperative complications are swelling, bruising, some restrictions of lip movement and paraesthesia. Mucocele is a rare complication [22-24,39,40]. It has been demonstrated by various authors that the procedure with good prognosis and is also safe and straightforward [22-24,34,39-41].

In this case, the results are as follows: Although smile aesthetics was satisfactory in the 3rd month in clinical evaluation, in the 12th month, GD reached the same level and scar tissue formed in the smile line. The patient did not develop any complications except minor local edema and mild pain. The patient was asked about post-treatment satisfaction in the control sessions. It was observed that the patient was delighted with the results of the treatment at the first check-up (3rd month).

When she came to his last control (12th month), she reported that she was very pleased with aesthetics until the 6th month, but this situation changed later. When the patient came to the final check, he requested that the procedure be renewed again.

As an alternative to invasive surgeries, it provides low morbidity, low incidence of complications and rapid recovery. In cases suitable for indication, predictable successful results can be obtained. Additional investigation and more research are needed to accurately evaluate this technique and its outcome, with more sample sizes and longer follow-up times.

CONCLUSION

The lip repositioning procedure was effectively reduced the EGD, and this resulted in much faster results than other treatment alternatives. The patient was found to have much lower morbidity than possible procedures. After the measurements, a trial step was used using sutures without cutting to give the patient an estimate of the final results, which increased the patient's treatment motivation compared to other treatments.

However, it was seen that the results were not permanent in the long term. The patient was not satisfied with the result, and the condition recurred. In order to reduce muscle activity, the patient was recommended to apply botulinum toxin-A before repeating lip repositioning. In patients with EGD due to HUL and VME grade 1 or 2, additional supportive therapies are recommended in addition to lip repositioning therapy, and it is believed that only an optimal result will be obtained in this way.

CONFLICT OF INTEREST

The authors declare that they are no conflict of interest in this study.

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