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LIP REPOSITIONING AS AN ADJUNCT TO THE TREATMENT OF EXCESS GINGIVAL DISPLAY: CASE SERIES

Manish Dev Sejwal, Vidushi Sheokand *, Amit Bhardwaj, Deeksha Mehta and Monika Dhayal

Faculty of Dental Sciences, SGT University, Udhera, Gurugram - 122505, Haryana, India.

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Correspondence to Author:
Vidushi Sheokand

Reader,
Faculty of Dental Sciences,
SGT University, Udhera, Gurugram - 122505, Haryana, India.

E-mail: vidushi.sheokand@gmail.com

ABSTRACT: A smile is a basic and universal facial expression and is an interaction between the teeth, the lip, and the gingival outlines. The smile plays a significant role in the communication and appearance of an individual. As the esthetic demand increases, obtaining a "perfect smile" has become a major goal for many people of this generation. One of the most important features of dental and facial aesthetics is the vertical anterior tooth display. This esthetic judgment is made by viewing the patient from the front side in dynamic states like a conversation, facial expressions, and smiling. Excess gingival display (EGD), also known as a gummy smile, is defined as a high smile line showing more than 1.5 to 2 mm of the gingiva during smiling. It is a common condition with a 2:1 female predilection. At least 50% of the population exhibit some form of gingival display in a normal smile. A gummy smile or an excess gingival display (EGD) is generally considered unattractive, while a discrepancy will always exist between dental practitioners and laypeople when assessing esthetics. In this case series, one case was done with the help of a scalpel, and the other was done with a laser. The healing was measured using the healing index, and the pain was measured using a visual analog scale.

INTRODUCTION: A smile is a basic and universal facial expression and is an interaction between the teeth, the lip, and the gingival outlines. The smile plays a significant role in communication and the appearance of an individual. As the esthetic demand increases, obtaining a "perfect smile" has become a major goal for many people of this generation [1]. Along with the teeth, the position of the lips, the condition of the oral tissues, and the gingival scaffold all affect the final esthetics of a smile [2]. One of the most important features of dental and facial estheticsis the vertical anterior tooth display, and this esthetic judgment is made by viewing the patient from the front side in dynamic states like conversation, facial expressions, and smiling. Creating the perfect smile today is a challenge, as the fundamental smile for facial attractiveness requires a multidisciplinary approach and very precise treatment planning [3]. Excess gingival display (EGD), also known as a gummy smile, is defined as a high smile line showing more than 1.5 to 2 mm of the gingiva during smiling [4]. It is a common condition with a 2:1 female predilection [5]. At least 50% of the population exhibit some form of gingival display in a normal smile.

Gummy smile or an excess gingival display (EGD) is generally considered as unattractive, while a discrepancy will always exist between dental practitioners and laypeople when assessing esthetics. However, the amount of discrepancy considered unattractive that exists in the range defined as more than 3mm is agreed on across different populations [6]. EGD is a multifactorial condition that may result from the interplay of several discrepancies, and the etiologic factors may be broadly defined as dentoalveolar and non-dento-

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alveolar [7]. The dentoalveolar discrepancies usually include short clinical crowns, gingival overgrowth, extrusion and altered passive eruption. Treating these discrepancies is less challenging as the most dent alveolar causes of EGD can be improved by restorative and periodontal approaches [3]. Non-dent alveolar discrepancies involve hyperactive, incompetent, or short lip and vertical maxillary excess. Treatment in such cases becomes more challenging as it requires different approaches based on the etiologic contributors. EGD may be treated both surgically and non-surgically. Orthognathic surgery, lip repositioning, and Botox injections are the main treatment modalities typically employed for treating EGD. Orthognathic surgery is traditionally used to correct the jaw and face; however, in cases with minor discrepancy, the cost, invasiveness, and postoperative morbidity of the procedure cannot always be justified for the outcome achieved. Botox is a more conservative and immediate nonsurgical treatment modality.

Injecting overactive muscles with measured quantities of botulinum toxin reduces muscle activity and relaxes the lip muscle, thereby decreasing upward pull on the lip [8]. The improvement achieved is almost immediate by this technique but lasts only for a short time. Lip repositioning is a viable alternative for patients desiring a less invasive treatment. The lip repositioning technique was first described in 1973 by Rubinstein and Kostianovsky to treat EGD [9]. It was originally described as cosmetic plastic surgery to correct a gummy smile caused by a hypermobile lip but was later reported as a dental procedure for the first time in 2006 by Rosenblatt and Simon. Lip repositioning has been proposed as a conservative surgical method that offers a less invasive approach to treat EGD. This surgical technique was designed to be shorter, less aggressive, and have fewer postoperative complications than orthognathic surgery [10]. The main aim of the surgery is to reduce the pull of the smile muscles, *i.e.* (Zygomaticus minor, levatoranguli, orbicularis oris, and levator labii superioris) via a reduction in the depth of the upper vestibule by removing a strip of superficial mucosa from the upper *i.e.* maxillary buccal vestibule to create a partial-thickness flap between the mucogingival junction and the upper lip musculature [11]. Contraindications of lip repositioning include the patients with severe vertical maxillary excess and the minimal zone of attached gingiva, which can create difficulties in flap design, stabilization, and suturing [12]. Several modifications have been introduced to the technique to prevent the relapse, including frenum sparing [13, 14] muscle severance [15, 16] and the use of lasers [17, 18]. Muscle severance was added to address the reports of relapse or limited success with the classical technique. Recently, this technique has been gaining popularity due to its simplicity and potential to eliminate excess gingival display.[3]This case illustrates the use of the surgical lip repositioning technique as the less invasive method for the management of a gummy smile associated with vertical maxillary excess and hypermobility of the upper lip.

Case Report 1: A 30-year-old female patient reported to the Department of Periodontology in SGT Dental College, Gurugram, Haryana, with a chief complaint of a gummy smile. There was no significant medical or family history, and the patient was medically sound and fit for the appropriate surgical procedure. On extraoral clinical examination, the face was bilaterally symmetrical with incompetent lips. A severe gingival display was seen during smiling which extended from the maxillary right second premolar to the maxillary left second premolar **Fig. 1**. A diagnosis of vertical maxillary excess and hypermobility of the upper lip with a high smile line was made. As the patient wants a less invasive procedure to address her chief complaint, informed consent was obtained after explaining the alternate treatment modalities, benefits, and possible complications of a lip repositioning procedure. The pre-operative photographs of the patient were taken, including frontal and profile views of relaxed and in a maximum smile. Before starting the procedure, complete extraoral and intraoral mouth disinfection was carried out, and the surgical site was anesthetized. The local infiltration was additionally administered in the buccal vestibule for the haemostasis purpose, and then measurements were taken using mm scale **Fig. 2.** The surgical area of 10–14 mm of the mucosa to be removed was demarcated with a sterile pencil on dried tissue **Fig. 3**. Then, a single partial-thickness elliptical incision was started at the mucogingival junction extending from the right first molar to the left first molar to peel out a strip of mucosa. The

incision was as superficial as possible remove only 1 mm of epithelium, leaving the connective tissue and the muscle fibers intact. A second parallel incision was made at approximately 13 to 15 mm distance from the first incision and coincided with the mucogingival line to avoid any loss in the attached gingiva. The two incisions were extended horizontally, creating an elliptical outline **Fig. 4**. The epithelium was then excised, leaving the underlying connective tissue exposed and the tissue tags were removed **Fig. 5.** The mucosal flap was sutured at the mucogingival junction using the simple interrupted technique. Firstly, the interrupted suture was placed at the midline to ensure proper symmetry of the lip midline with the midline of the teeth **Fig. 6**; then continuous interlocking sutures were made to approximate both the flaps **Fig. 7**. After the treatment was completed, the immediate postoperative photographs of the patient were taken **Fig. 8**. Then pressure pack was applied for haemostasis purposes. Postoperative instructions were explained to the patient, including placing ice packs over the upper lip for several hours during the first 24 h, limited facial movements for 1 week, no brushing around the surgical site for 14 days, and emphasizing minimum lip movements as much as possible. The patient was advised to rinse gently with 0.12% of 10ml chlorhexidine gluconate antiseptic mouthwash bid for 2 weeks. NSAID's (diclofenac potassium, 50 mg) and antibiotic (Amoxicillin, 500 mg) were also prescribed to the patient for the first 3–4 days to manage postoperative pain and to provide any infection. Regular oral hygiene methods were stopped for 2 days around the surgical site. The patient was instructed to follow up after 1 week for suture removal and to assess healing. At the 1st week postoperative visit, sutures were removed, followed by gentle swabbing with a wet gauze and irrigation. There was an uneventful healing pattern seen at surgical site **Fig. 9**. Follow-up examination after intervals revealed reduced gingival display **Fig. 10**. At 2 months follow-up visit, a scar formation was observed **Fig. 11**. The patient was also comparing the difference in her gum show during smiling and laughing which she was concern about before the treatment. Our results indicate good stability with no relapse at 3 months follows up **Fig. 12.**

FIG 1: PRE-OPERATIVE PICTURE

FIG. 2: MEASUREMENT RECORDED

FIG. 3: INCISION OUTLINE

FIG. 4: FLAP ELEVATION AFTER SUPERFICIAL INCISION

FIG 5: REMOVED TISSUE BAND

FIG. 6: MIDLINE ANCHORING SUTURE

FIG. 7: CONTINUOUS INTERLOCKING SUTURES

FIG. 8: IMMEDIATE POST -OPERATIVE PICTURE

FIG. 9: HEALING AFTER 1 WEEK

FIG. 10: AT 1 MONTH HEALING

FIG. 11: HEALING AT 2 MONTHS

FIG. 12: POSTOPERATIVE AFTER 3 MONTHS

Visual Analogue Scale

S. no.	Baseline	15th Day	30th Day
1	6	4	0

Healing Index (By Huang *et al*):

S. no.	Baseline	15th Day	30th Day
1	3	1	0

Case Report 2: A 25-year-old female patient reported to the Department of Periodontology in SGT Dental College, Gurugram, Haryana, with a chief complaint of a gummy smile. The patient reported no significant medical or family history. The patient was medically sound and fit for the appropriate surgical procedure. The face was bilaterally symmetrical with incompetent lips on extraoral clinical examination. A severe gingival display was seen during smiling which extended from the maxillary right first premolar to the maxillary left first premolar **Fig. 1**. A diagnosis of vertical maxillary excess and hypermobility of the upper lip with a high smile line was made. As the patient wants a less invasive procedure to address her chief complaint, informed consent was obtained after explaining the alternate treatment modalities, benefits, and possible complications of a lip repositioning procedure. The pre-operative photographs of the patient were taken, including frontal and profile views of relaxed and a maximum smile.

Before starting the procedure, complete extraoral and intraoral mouth disinfection was carried out, and the surgical site was anesthetized. The local infiltration was additionally administered in the buccal vestibule for the haemostasis purpose, and then measurements were taken using mm scale **Fig. 2**. The surgical area of 10–14 mm of the mucosa to be removed was demarcated with sterile pencil on dried tissue **Fig. 3**. Then, a single partial-thickness elliptical incision was started at the mucogingival junction extending from the right first molar to left first molar to peel out a strip of the mucosa. The incision was as superficial as possible, removing only 1 mm of epithelium, leaving the connective tissue and the muscle fibers intact. A second parallel incision was made at approximately 13 to 15 mm distance from the first incision and coincided with the mucogingival line to avoid any loss in the attached gingiva. The two incisions were extended horizontally, creating an elliptical outline were given with a laser **Fig. 4**. The tissue was excised and removed as shown in **Fig. 5** and **Fig. 6.** Using the simple interrupted technique, the mucosal flap was sutured at the mucogingival junction. Firstly, the interrupted suture was placed at the midline to ensure proper symmetry of the lip midline with the midline of the teeth **Fig. 7**; then continuous interlocking sutures were made to approximate both the flaps **Fig. 8**. After the treatment was completed, the immediate postoperative photographs of the patient were taken **Fig. 8**. Then pressure pack was applied for hemostasis purposes. Postoperative instructions were explained to the patient, including placing ice packs over the upper lip for several hours during the first 24 h, limited facial movements for 1 week, no brushing around the surgical site for 14 days, and emphasizing minimum lip movements as much as possible.

The patient was advised to rinse gently with 0.12% of 10ml chlorhexidine gluconate antiseptic mouthwash bid for 2 weeks. NSAIDs (diclofenac potassium, 50 mg) and antibiotic (Amoxicillin, 500 mg) were also prescribed to the patient for the first 3–4 days to manage postoperative pain and to provide any infection. Regular oral hygiene methods were stopped for 2 days around the surgical site. The patient was instructed to follow up after 1 week for suture removal and to assess healing. During the 1st week postoperative visit, sutures were removed, followed by gentle swabbing with wet gauze and irrigation.

FIG. 1: PRE OPERATIVE VIEW

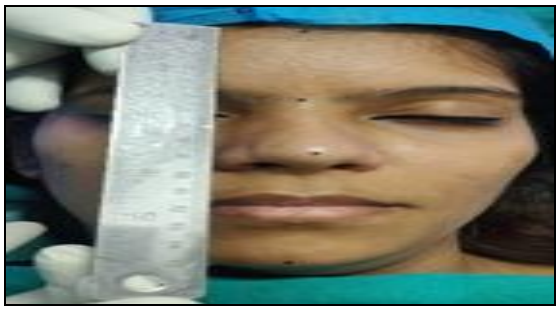

FIG. 2: MEASUREMENT RECORDED

FIG. 3: INCISION OUTLINE

FIG. 4: INCISION WITH LASER

FIG. 5: FLAP ELEVATION AFTER INCISION

FIG. 6: EXCISED TISSUE

FIG. 7: MID ANCHORING SUTURE

FIG. 8: SUTURES PLACED

FIG. 9: POST OPERATIVE

FIG. 10: POST OPERATIVE FRONT VIEW

Visual Analogue Scale

S. no.	Baseline	15th Day	30th Day
1	4	2	0

Healing Index (By Huang *et al*):

S. no.	Baseline	15th Day	30th Day
1	2	1	0

DISCUSSION: Gummy smile or Excess gingival display is a common esthetic problem that has been left untreated unless the associated etiologic factors caused functional challenges [19]. It is a multifactorial condition that needs careful examination to detect the causative etiology. As the

case is more severe, there is more need for collaborative multiple treatment modality approaches. Lip repositioning was introduced as a conservative and permanent solution for treating this esthetic discrepancy. This technique involves a simple and short procedure that requires basic surgical instruments and results in fast healing and a positive outcome [18].

It is a novel technique used with selective cases either as an adjunctive treatment to the commonly used well-known modalities for treating gummy smile or as an alternative to the highly invasive surgeries since it has less adverse effects with lower incidence of complications faster healing time. It can be performed either by scalpel or with laser. The above case series represents 2 cases in which one case was done with the help of scalpel and the second case was done with the help of laser. Advantages of Laser include patient comfort as well as the comfort for the clinician as it provides a bloodless field for surgery. Surgery performed with laser is less time-consuming as compared to scalpel. Cost-effectiveness is more in case of scalpel as compared to laser. Studies have shown that EGD affects 7% of men and 14% of women in the world, and in addition, females have been found to be more esthetically critical when compared to males [20]. Ellenbogen and Swara [21] reported the use of spacers to fill the space previously occupied by the muscles to prevent muscle reattachment at the same level. The reduction in the gingival display results from both the change in lip length and the limited lip movement [19].

The main disadvantage of this technique is the relapse. Relapse may be seen during the first 6–8 weeks. It can be resolved by either revisiting the surgical site to incise more mucosa as required or by using Botox injections, as suggested by Humayun *et al.* [22]. Some common postoperative complications are mentioned in the literature, such as minor discomfort and some lip movement restriction to swelling, bruising, and par aesthesia. Some rare complications include mucocele, which occurs due to damage to minor salivary glands, and it resolves on its own [5]. Some investigations have reported high satisfaction in patients with lip repositioning procedures [23]. It is considered a technique sensitive, less time-consuming and cost-effective way to correct the excessive gingival display; therefore, it is mostly adopted treatment option by the patients [24]. Additional studies and more research with larger sample size and longer follow-up visits are required to evaluate this procedure and its outcome properly. Although these procedures are not carried out so frequently in practice as they are very technique sensitive, they provide very good and satisfactory results. As one of the above cases mentioned. We have a follow-up of more than 9 months, and the result of the surgery was also very satisfactory.

CONCLUSION: In conclusion, surgical lip repositioning is effective for reducing gingival display by positioning the upper lip in a coronal location [10]. The long-term stability of the results remains to be seen, but it is a promising alternative treatment modality with a high level of patient satisfaction.

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CONFLICTS OF INTEREST: Nil

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