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Efficiency and Stability of Gummy Smile Correction Using a Minimally Invasive Technique

Myotomy and Detachment of the Bony Insertion of Upper Lip Elevator Muscles

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Abstract

Background:
Excessive gingival display (gummy smile) represents a common esthetic concern and a therapeutic challenge in oral and maxillofacial surgery. Its etiology may include vertical maxillary excess, dentoalveolar extrusion, short upper lip, hyperactivity of the upper lip elevator muscles, or altered passive eruption. Various surgical and non-surgical treatment modalities have been described. An evaluation of a minimally invasive surgical approach based on selective myotomy and detachment of the upper lip elevator muscles is presented.

Objective:
To assess the efficiency and stability of gummy smile correction using selective myotomy of the upper lip elevator muscles (levator labii superioris, zygomaticus major, and zygomaticus minor) with repositioning of muscle fibers near the anterior nasal spine.

Materials and Methods:

This prospective clinical work was conducted between January and September 2023 at the Department of Oral and Maxillofacial Surgery, Al-Wasity Hospital, Baghdad. Fifteen female patients (mean age: 28 years) with excessive gingival display of mixed soft- and hard-tissue etiology were treated under local anesthesia. Gingival display was assessed preoperatively and during follow-up for up to 9 months, and pre- and postoperative outcomes were statistically analyzed.

Results:
A significant reduction in gingival display was observed in 14 patients, while one patient demonstrated partial relapse during the follow-up period between 1 and 9 months. Statistical analysis revealed a highly significant reduction in gingival display at 9 months compared with preoperative measurements ($t = -4.10$, $df = 21.23$, $p = 0.0005$).

Conclusion:
Selective myotomy and detachment of the upper lip elevator muscles is a simple, minimally invasive, and effective technique for the correction of gummy smile. The procedure offers satisfactory esthetic outcomes with minimal morbidity, preservation of neuromuscular function, and good short-term stability.

Keywords: Gummy smile; Excessive gingival display; Myotomy; Upper lip elevator muscles; Minimally invasive surgery; Oral and maxillofacial surgery

Introduction

Lip repositioning surgery has been introduced as a less invasive alternative to orthognathic surgery for patients with excessive gingival display (EGD), also known as a gummy smile (GS). An "ideal smile" exposes 1–3 mm of gingiva [4,5], whereas EGD can negatively affect esthetics [6,7]. It is more prevalent in women and most noticeable during smiling [8,9].

Gingival show refers to the exposure of gingiva over the maxillary anterior teeth. Studies report 14–70% of females [1–6] and 7–38% of males [8,9] display excessive gingiva, with females being approximately twice as likely as males to have a high smile, regardless of age or ethnicity [8,10]. Smile attractiveness is generally reduced when gingival display exceeds 4 mm [1].

A gummy smile is commonly defined as gingival exposure greater than 2 mm, with some authors considering 2 mm as the threshold for clinical significance [8,36] Smile lines can be classified according to the Tjan et al. system as follows:

- **Grade I (Mild):** 2–4 mm of gingival exposure
- **Grade II (Moderate):** 4–6 mm of gingival exposure
- **Grade III (Severe):** ≥6 mm of gingival exposure

Etiologically, gummy smiles may result from dental, skeletal, or soft tissue factors, either individually or in combination. [8,14]. They are frequently multifactorial, arising from developmental factors such as skeletal discrepancies, anatomical characteristics like a short upper lip, or pathological conditions including drug-induced gingival enlargement. [5_23]

Among skeletal causes, vertical maxillary excess is a significant contributor. The two most common etiologies, however, are altered passive eruption and hypermobility of the upper lip. Altered passive eruption is generally managed with esthetic crown-lengthening procedures, [7,11] whereas hypermobility of the upper lip is addressed through various therapeutic modalities, including soft-tissue surgery or neuromodulatory approaches. [24,27]

A hypermobile upper lip is defined as upper lip movement exceeding 8 mm from rest to maximum smile, [5] and more than 85% of North American and Asian adults with gummy smiles exhibit this feature [28,29]. In over 40% of cases, hypermobility is identified as the sole soft-tissue etiology, while in approximately 35–40% of patients it occurs in combination with altered passive eruption. [28,29]. These findings suggest that targeting upper lip hypermobility represents a critical therapeutic approach for achieving esthetic improvement in patients with gummy smiles.

Lip repositioning surgery was first described by Rubinstein and Kostianovsky in 1973 as a technique without muscular intervention, aiming to limit upper lip elevator muscle retraction by removing a strip of mucosa from the maxillary buccal vestibule.[30] Subsequent surgical modifications were proposed to improve predictability, including detachment of the labial muscles,[6]placement of a silicone spacer,[31] lip elongation combined with rhinoplasty,[1] and myotomy of the levator labii superioris muscle combined with frenectomy.[32] Contraindications to lip repositioning procedures include severe vertical maxillary excess (>8 mm) and a minimal zone of attached gingiva, which may compromise flap design, stabilization, and suturing.[33]

Age has also been suggested as a factor influencing the prevalence of gummy smile. Tjan et al. reported a prevalence of approximately 11% among individuals aged 20–30 years in a mixed population from Los Angeles, USA.[34] Other authors noted that the position of the upper lip tends to decrease with advancing age, which may explain the lower prevalence of gummy smile in older individuals.[34]

Historically, traditional surgical approaches focused on upper lip manipulation, including elliptical resection of the maxillary labial mucosa (Linton and Fournier, 1979),[6]myotomy of the levator labii superioris (Miskinyar, 1983),[17] and Le Fort I maxillary osteotomy for vertical maxillary excess (Kawamoto, 1982).[15] While effective in reducing gingival display, these procedures

were commonly associated with complications such as lip shortening, visible scarring, altered lip mobility, and compromised esthetics.[35]

The present work aims to evaluate the effectiveness and long-term stability of upper lip levator muscle myotomy in reducing excessive gingival display. This research provides clinical evidence on how surgical modification of the levator muscles can improve aesthetic outcomes, enhance smile harmony, and offer predictable results for patients seeking correction of a gummy smile.

Patients and Methods

Patients

Fifteen female patients (age range: 17–39 years; mean age: 28 years) presenting with excessive gingival display were treated between January and September 2023 at the Department of Oral and Maxillofacial Surgery, Al-Wasity Teaching Hospital, Baghdad, Iraq, under the supervision of the Arab Board Council. Diagnosis was based on comprehensive clinical examination supported by radiographic evaluation. Etiology included both soft- and hard-tissue components, and all procedures were performed under local anesthesia.

According to the Tjan et al. smile line classification, patients were categorized as **Grade I (n = 1), Grade II (n = 3), and Grade III (n = 11)**. Preoperative assessment included detailed medical and dental history, etiological evaluation, and standardized clinical photography. Postoperative outcomes were assessed during full-smile evaluation.

Inclusion Criteria

- Age 16–40 years with esthetically unacceptable gingival display
- Intact permanent dentition up to the first maxillary molars
- Absence of dental or periodontal pathology
- Class I or II skeletal anteroposterior relationships
- No previous treatment for gummy smile, including botulinum toxin injections

Exclusion Criteria

Patients were excluded if they had:

- Dental or periodontal disease
- Severe skeletal malocclusions such as vertical maxillary excess (VME)
- Systemic or psychological disorders
- Age >40 years
- Gingival hyperplasia
- Excessive gingival display due to a short or hyperactive upper lip (Fig. 1)

Clinical Examination

A. Extraoral Examination

Facial symmetry and smile parameters were assessed:

- **Incisal show at rest:** Vertical distance from upper incisor edges to the upper lip at rest (Fig. 2); normal: 3–4 mm
- **Incisal show on smiling:** Distance from upper incisor edges to the upper lip during full smile (Fig. 3); ideally, 100% of incisal show plus 2–3 mm visible (Fig. 4)
- **Gingival show on smiling:** Distance from the free gingival margin to the upper lip during smile (Fig. 3)

B. Intraoral Examination

- **Dental status:** Teeth from the first molar on one side to the contralateral first molar were intact and suitable for surgery
- **Skeletal relationship:** Anteroposterior skeletal classification (Class I or II) was confirmed; patients with severe malocclusions that could interfere with surgery were excluded

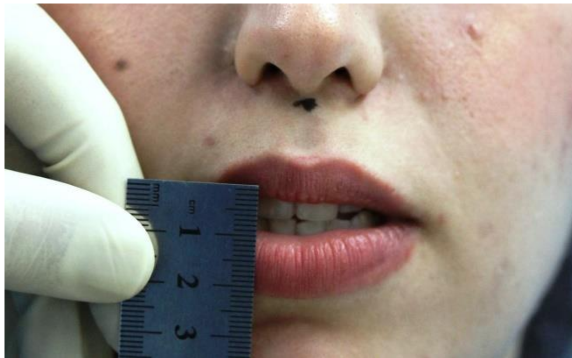


Figure1. FemalepatientwithsevereVME

Fig.2. Incisal show at rest

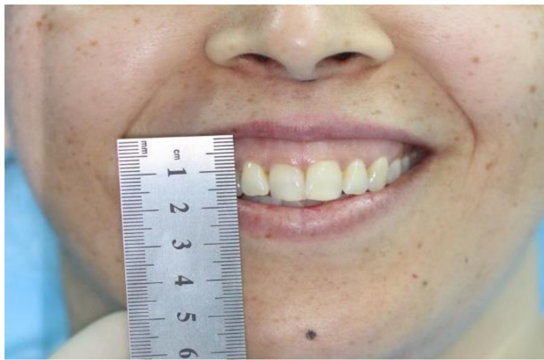


Fig. 3. Full incisal exposure during a smile.

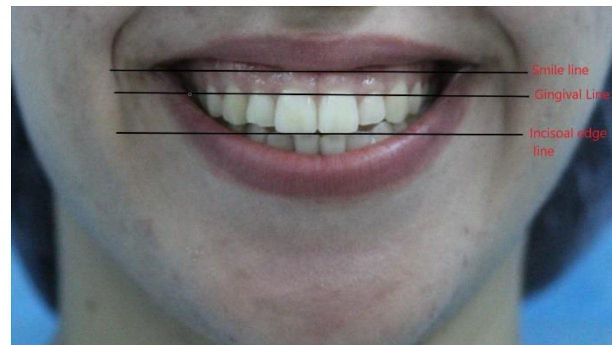


Fig.4. Full incisal exposure during smile

Methods

Patient Preparation and Selection

All patients were informed of the benefits, potential complications, and alternative surgical options for managing excessive gingival display, and **written informed consent** was obtained. Patients were selected according to predefined inclusion and exclusion criteria. The indications and expected esthetic effects of the procedure were clearly explained.

All included patients had declined more invasive treatments, such as orthognathic surgery. None had previously undergone surgical correction for gummy smile; one patient had received botulinum toxin injection but refused to repeat it due to undesirable effects on smile expression and discomfort. All patients in this study were female; this distribution reflects coincidental treatment-seeking behavior rather than intentional exclusion of males.

Surgical Technique

All procedures were performed under local anesthesia with conscious sedation. Local infiltration was achieved using **2% lidocaine with epinephrine (1:80,000)**. Asepsis was ensured by irrigating the superior labial vestibule at the subnasal region with povidone–iodine solution.

A horizontal incision approximately 10 cm in length was made, extending from the first premolar on one side to the first premolar on the contralateral side. A **3–5 mm band of mucosa** was preserved above the gingival sulcus and mucogingival junction to facilitate wound closure.

Two parallel incision lines were created:

- In **half of the cases**, a full-thickness incision involving the mucosa and underlying musculature, including fibers of the **incisivus labii superioris muscle**, was performed to enhance restriction of upper lip elevation (Fig. 5).

- In the **remaining cases**, the original technique described by Chacón Martínez et al. was followed, excising only a strip of mucosa. The distance between incision lines corresponded to **twice the gingival display** or a maximum of **12 mm**.Subperiosteal dissection was then performed, extending over the anterior wall of the maxillary sinus, infraorbital rim, and malar region, with care taken to preserve the infraorbital nerve. The insertion sites of the upper lip elevator muscles (*levator labii superioris*, *zygomaticus major*, and *zygomaticus minor*) were identified and released by myotomy. Patients were asked to smile intraoperatively to confirm muscle location and facilitate disinsertion (Fig. 6).

- The *incisivus labii superioris* muscle fibers, as extensions of the *orbicularis oris*, were subsequently identified, released, and reattached to the periosteum just inferior to the anterior nasal spine using two 3-0 polyglactin sutures. Hemostasis was achieved with electrocautery, and the mucosa was closed in a V–Y pattern using 4-0 black silk to lengthen the upper lip and enhance eversion. No drains were placed.

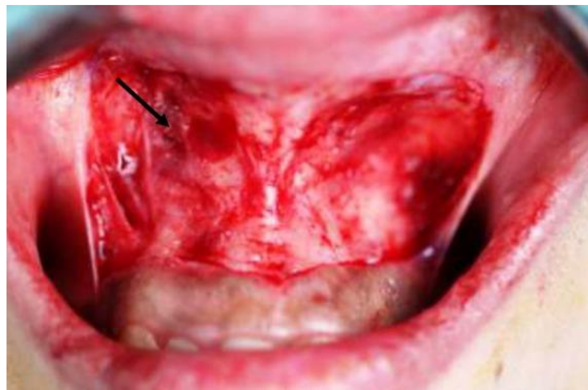


Figure 5. *Scanty fibers of the incisivus labii superioris muscle (arrowheads) originating from the maxillary bone and coursing superiorly toward the orbicularis oris muscle.*

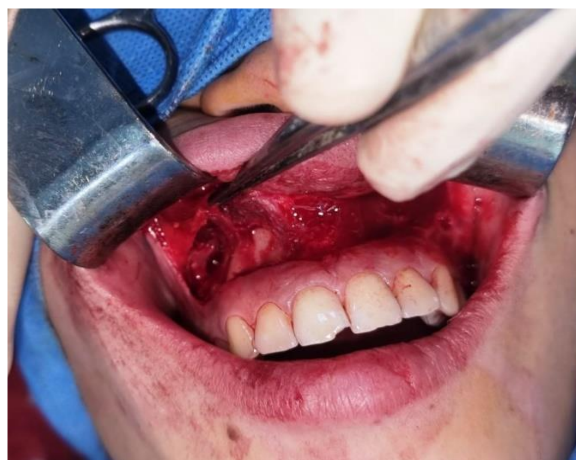


Figure 6. Intraoperative view showing detachment of the upper lip elevator muscle fibers (*levator labii superioris*, *zygomaticus major*, and *zygomaticus minor*) from their bony insertions.

Surgical Procedure

Patients were prepped under strict asepsis. Mucosal incision lines were drawn (Fig.7), and local infiltration with 2% lidocaine with epinephrine (1:80,000) was performed. Two parallel mucosal incisions were made: 2–3 mm above the mucogingival junction and at a

distance corresponding to twice the gingival display or a maximum of 12 mm (Fig. 8), and the intervening mucosal strip was excised (Figs. 9).

Bilateral subperiosteal dissection was performed to detach the upper lip elevator muscles (levator labii superioris, zygomaticus major, zygomaticus minor, incisivus labii superioris), which were reattached anteriorly near the anterior nasal spine (Figs. 10, 11). The flap was closed with simple interrupted 3-0 silk or Vicryl sutures (Fig. 12), and the upper lip position was verified extraorally (Fig. 13). In selected cases, a nylon suspension suture or V–Y closure was used to support the wound and enhance lip length and eversion Fig14.

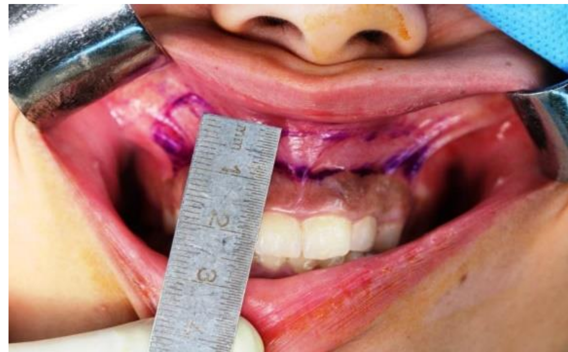


Figure 7. Intraoperative measurement of gingival display before local anesthesia injection.

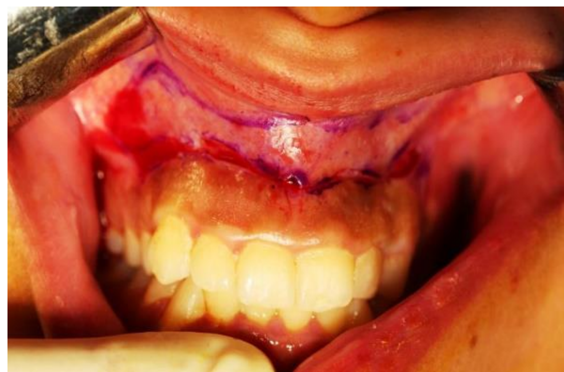


Figure 8. Intraoperative view of the initial mucosal incisions, showing a 12 mm distance between the two lines.

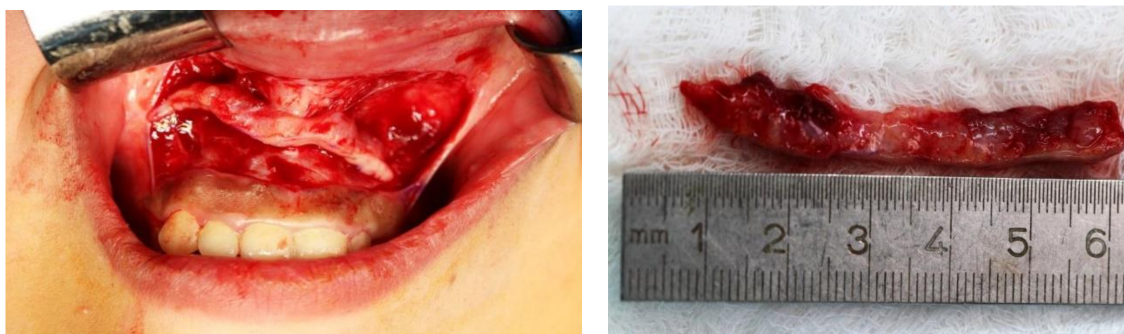


Figure 9. Full mucoperiosteal flap reflection with excision of the mucosal strip

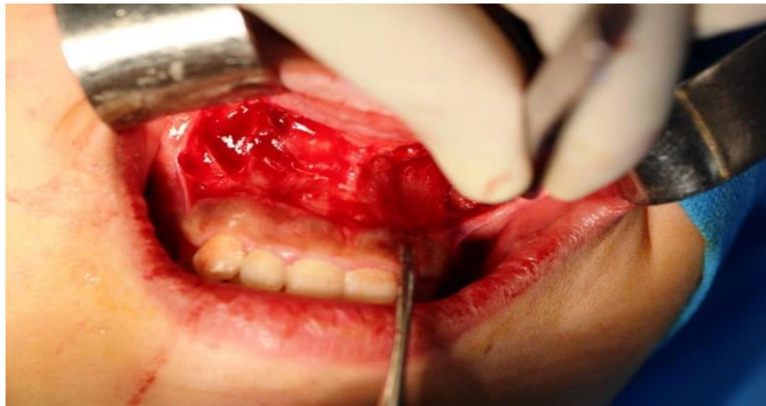


Fig 10: Exposing muscle fibers and manipulating it, to pull it toward its new Anterior position

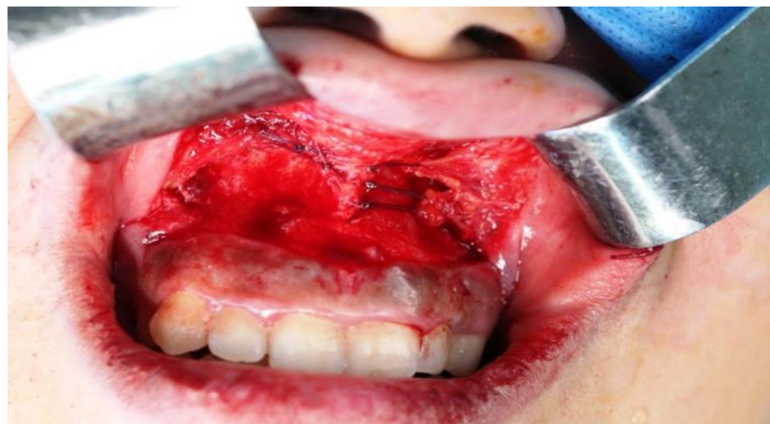


Fig 11: Intraoperative photography shows suturing of the levator muscle fibers to its New postion at Anterior nasal spine

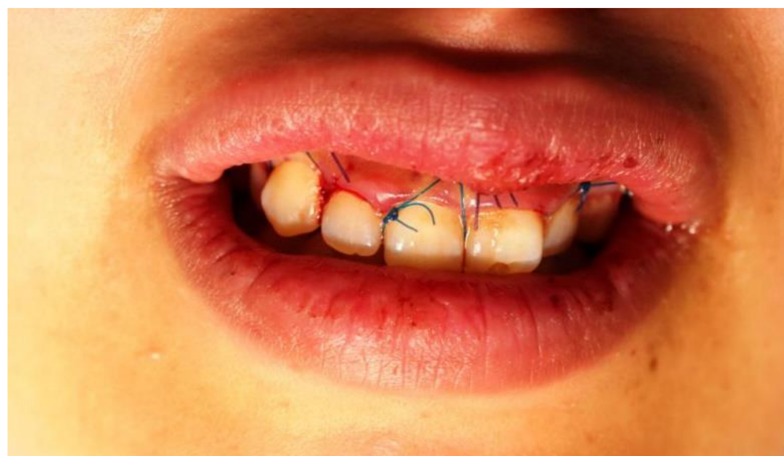


Fig 12: Intraoperative Photography shows the suturing of the upper part of the flap to the new inferior position.

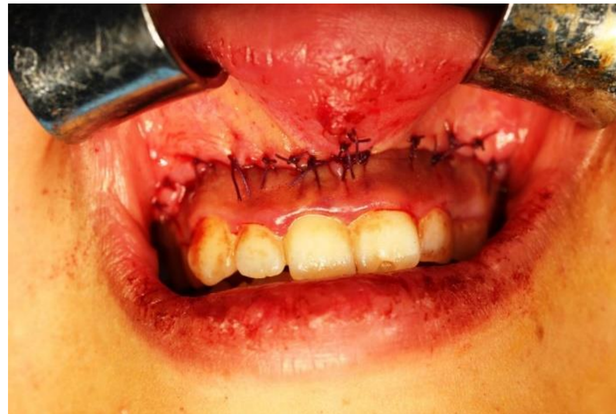


Fig 13: Intraoperative photography shows the suspension suture around the Anterior teeth.

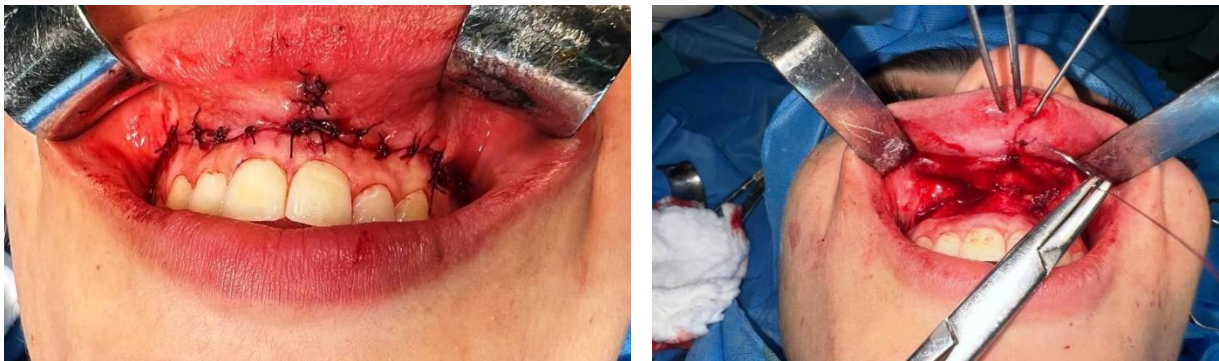


Fig 14: Intraoperative photography shows V-Y suturing closure to lengthen the upper lip and increase eversion

Results

Results, Data Collection, and Statistics

All 15 patients showed immediate postoperative elimination of gingival display. Follow-up at 1 week, 2 weeks, 1 month, 3 months, and 6 months confirmed sustained limitation of upper lip elevation during smiling. Temporary impairment of lip movement was observed, primarily due to postoperative pain and edema, with gradual return to normal function as edema resolved.

Patients reported high satisfaction with the esthetic outcome, particularly noting improved upper lip fullness resulting from postoperative eversion. (Fig. 15-16). The procedure provides a less invasive alternative to orthognathic surgery, with reduced postoperative pain, minimal complications, and same-day discharge. It is particularly suitable for patients who decline or are not candidates for more extensive surgical procedures.

All patients showed a significant reduction in gingival display between 1 and 9 months (Fig 17). Gradual recovery of upper lip muscle function contributed to slight increases in lip elevation over time; however, all measurements remained within the normal range according to the study classification criteria.

Gingival display measurements recorded preoperatively and at 1, 3, 6, and 9 months postoperatively, along with patient age, are summarized in Table 1. Comparison between preoperative and 9-month measurements demonstrated a highly significant reduction in gingival display ($t = -4.1009$, df = 21.225, $p = 0.0005$), confirming the procedure's efficacy and long-term stability. Fig17 (curve diagram)

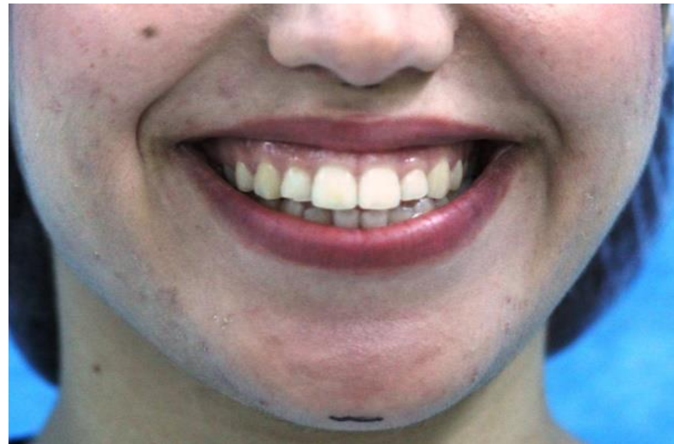


Fig 15: preoperative clinical photography showing a gingival show of 4mm

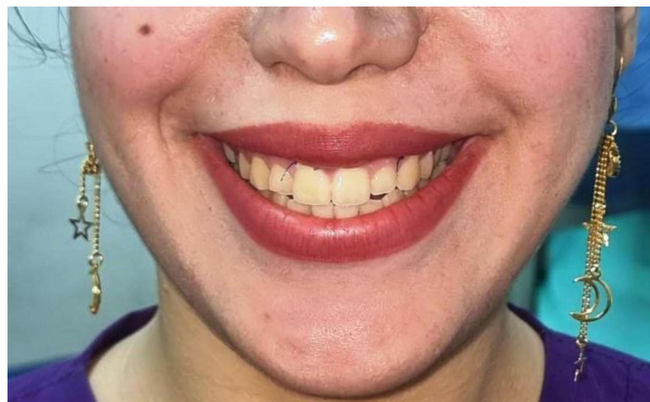


Fig. 16. Clinical photography: postoperative slight edema (14th day postoperatively), excellent reduction of gingival show.

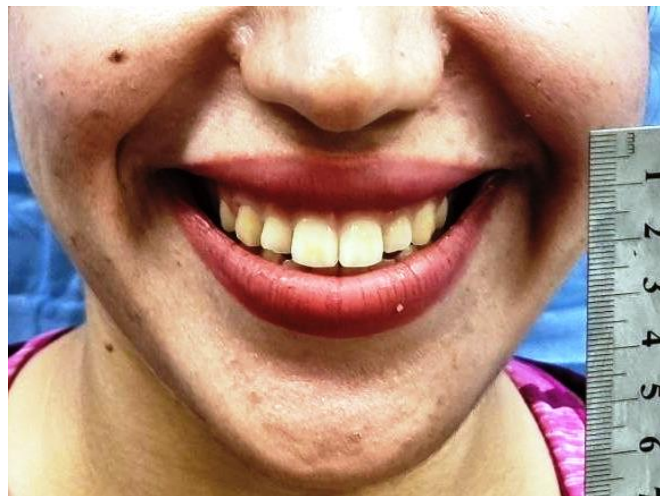
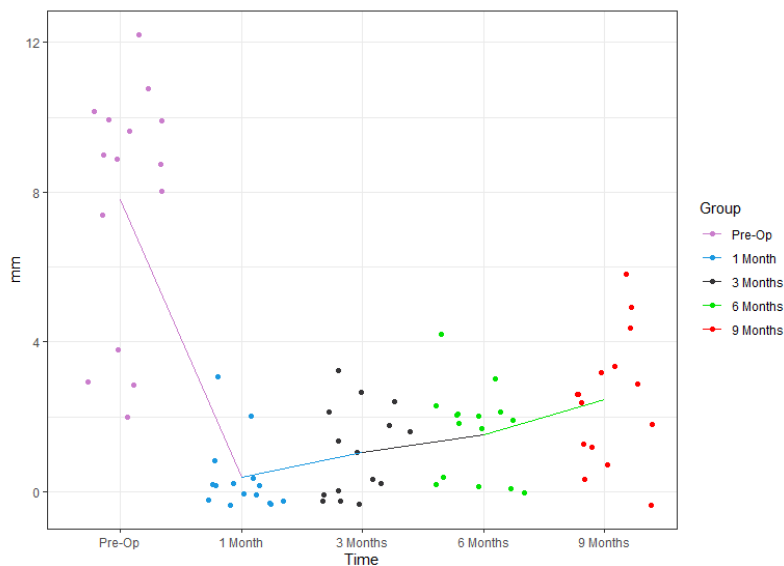


Fig. 17. Clinical photography:10months postoperatively, stability of the results and satisfaction of the patient

Patient ID	Age	Pre-operative	Month 1	Month 3	Month 6	Month 9	% Change
1	25 years	11	2	3	3	3	73
2	39 years	9	1	2	2	6	33
3	23 years	7	0	0	0	1	86
4	21 years	2	0	0	0	0	100
5	32 years	3	0	0	0	1	67
6	20 years	10	0	2	2	4	60
7	17 years	12	0	2	2	3	75
8	38 years	10	0	1	2	2	80
9	21 years	4	0	0	0	1	75
10	27 years	9	3	3	4	5	44
11	34 years	9	0	0	2	2	78
12	36 years	8	0	0	2	3	63
13	22 years	10	0	1	2	3	70
14	36 years	3	0	0	0	0	100
15	33 years	10	0	2	2	3	70

Table 1. Gingival display measurements of all patients recorded preoperatively and at 1, 3, 6, and 9 months postoperatively, along with patient age. Changes in gingival display were calculated by comparing preoperative values with the final 9-month measurements for each patient.

All measurements are reported in millimeters (mm).



(**Fig:18**) curve diagram: vertical axis, it represents the changes in gingival show in millimeters, the horizontal axis, it represents the time of measurements (months)

Conclusions

The present study demonstrates that upper lip repositioning surgery is a simple, minimally invasive procedure with an average operative time of 1 hour under local anesthesia. It improves smile esthetics without affecting sensory or motor function and is well tolerated by patients.

The results are stable and long-lasting, as shown in short- and mid-term follow-up. Dissection and reinsertion of the upper lip elevator muscles (incisivus labii superioris, levator labii superioris, zygomaticus major, and zygomaticus minor) allow

spontaneous repositioning of the lip fibers, effectively limiting excessive elevation.

This technique provides an alternative to orthognathic surgery, botulinum toxin injection, or orthodontic therapy, and can be safely performed in patients below skeletal maturation. Unlike prior studies combining adjunctive procedures, our approach involved only muscle manipulation, isolating the effect of lip repositioning. The procedure is safe, associated with minimal complications, and provides reliable functional and esthetic outcomes.

References

1. Ezquerra F, Berrazueta MJ, Ruiz-Capillas A, Arregui JS. New approach to the gummy smile. *Plast Reconstr Surg.* 1999;104:1143–1150.
2. Lee EA. Aesthetic crown lengthening: Classification, biologic rationale, and treatment planning considerations. *Pract Proced Aesthet Dent.* 2004;16:769–778.
3. Chu SJ, Karabin S, Mistry S. Short tooth syndrome: Diagnosis, etiology, and treatment management. *J Calif Dent Assoc.* 2004;32:143–152.
4. Springer NC, Chang C, Fields HW, et al. Smile esthetics from the layperson's perspective. *Am J Orthod Dentofacial Orthop.* 2011;139(1):e91–e101.
5. Garber DA, Salama MA. The aesthetic smile: Diagnosis and treatment. *Periodontol 2000.* 1996;11:18–28.
6. Litton C, Fournier P. Simple surgical correction of the gummy smile. *Plast Reconstr Surg.* 1979;63(3):372–373.
7. Ayyildiz E, Tan E, Keklik H, Demirtag Z, Celebi AA, Pithon MM. Esthetic impact of gingival plastic surgery from the dentistry students' perspective. *Eur J Dent.* 2016;10(3):397–402.
8. Tjan AH, Miller GD, The JG. Some esthetic factors in a smile. *J Prosthet Dent.* 1984;51(1):24–28.
9. Han SH, Lee EH, Cho JH, et al. Evaluation of the relationship between upper incisor exposure and cephalometric variables in Korean young adults. *Korean J Orthod.* 2013;43(5):225–234.
10. Awad MA, Alghamdi DS, Alghamdi AT. Visible portion of anterior teeth at rest and analysis of different smile characteristics in the Saudi population of the Jeddah region. *Int J Dent.* 2020;2020:8859376.
11. Rossellin GD, Adabbo RW. La fisura labioalveolopalatina. Evaluación histórica de los criterios de tratamiento. *Rev Iberolatinoamericana.* 1987;3:123.
12. Polo M. Botulinum toxin type A (Botox) for the neuromuscular correction of excessive gingival display on smiling (gummy smile). *Am J Orthod Dentofacial Orthop.* 2008;133(2):195.
13. Rouviere H, Delmas A. *Anatomía humana: descriptiva, topográfica y funcional.* 2nd ed. Barcelona: Masson; 2003. p. 30–109.
14. Monaco A, Streni O, Marci MC, Marzo G. Gummy smile: Clinical parameters useful for diagnosis and therapeutic approach. *J Clin Pediatr Dent.* 2004;29:19.
15. Kawamoto MK Jr. Treatment of the elongated lower face and gummy smile. *Clin Plast Surg.* 1982;4:479.
16. Howard HG. *Psiquiatría general.* 5th ed. Mexico City: Manual Moderno; 2001. p. 369.
17. Miskinyar SA. A new method for correcting a gummy smile. *Plast Reconstr Surg.* 1983;72:397.
18. Peck S, Peck L, Kataja M. Some vertical lineaments of lip position. *Am J Orthod Dentofacial Orthop.* 1992;101(6):519–524.
19. Kokich VO Jr, Kiyak HA, Shapiro PA. Comparing the perception of dentists and lay people to altered dental esthetics. *J Esthet Dent.* 1999;11(6):311–324.
20. Allen EP. Use of mucogingival surgical procedures to enhance esthetics. *Dent Clin North Am.* 1988;32(2):307–330.
21. Kim TW, Kim H, Lee SJ. Correction of deep overbite and gummy smile using a mini-implant with a segmented wire in a growing Class II Division 2 patient. *Am J Orthod Dentofacial Orthop.* 2006;130(5):676–685.
22. Tawfik OK, El-Nahass HE, Shipman P, et al. Lip repositioning for the treatment of excessive gingival display: A systematic review. *J Esthet Restor Dent.* 2018;30(2):101–112.
23. Dym H, Pierre R 2nd. Diagnosis and treatment approaches to a "gummy smile." *Dent Clin North Am.* 2020;64(2):341–349.
24. Coslet JG, Vanarsdall R, Weisgold A. Diagnosis and classification of delayed passive eruption of the

dentogingival junction in adults. *Alpha Omegan.* 1977;70(3):24–28.

25. Mele M, Felice P, Sharma P, et al. Esthetic treatment of altered passive eruption. *Periodontol 2000.* 2018;77(1):65–83.

26. Silberberg N, Goldstein M, Smidt A. Excessive gingival display: Etiology, diagnosis, and treatment modalities. *Quintessence Int.* 2009;40(10):809–818.

27. Alpiste-Illueca F. Altered passive eruption (APE): A little-known clinical situation. *Med Oral Patol Oral Cir Bucal.* 2011;16(1):e100–e104.

28. Andijani RI, Tatakis DN. Hypermobile upper lip is highly prevalent among patients seeking treatment for gummy smile. *J Periodontol.* 2019;90(3):256–262.

29. Cetin MB, Sezgin Y, Akinci S, et al. Evaluating the impacts of etiologically relevant factors on excessive gingival display. *Int J Periodontics Restorative Dent.* 2021;41(3):e73–e80.

30. Rubinstein AM, Kostianovsky AS. Cosmetic surgery for the malformation of the smile: Original technique. *Prensa Med Argent.* 1979;70:3791.

31. Ellenbogen R, Swara N. Improvement of the gummy smile using the implant spacer technique. *Ann Plast Surg.* 1984;12:16–24. https://doi.org/10.1097/00000637-198401000-00004

32. Ishida LH, Ishida LC, Ishida J, Grynglas J, Alonso N, Ferreira MC. Myotomy of the levator labii superioris muscle and lip repositioning: A combined approach for the correction of gummy smile. *Plast Reconstr Surg.* 2010;126:1014–1019. https://doi.org/10.1097/PRS.0b013e3181e3b6d4

33. Simon Z, Rosenblatt A, Dorfman W. Eliminating a gummy smile with surgical lip repositioning. *J Cosmet Dent.* 2007;23:102–109.

34. Tjan AH, Garber DA. Some esthetic factors in a smile. *J Prosthet Dent.* 1984;51:24–28.

35. Converse J. *Facial surgery. Plast Reconstr Surg.* 1977;3:1540.

36. Kawamoto MK Jr. Treatment of the elongated lower face and gummy smile. *Clin Plast Surg.* 1982;4:479.

37. Robbins JW. Differential diagnosis and treatment of excess gingival display. *Pract Periodontics Aesthet Dent.* 1999;11:265; quiz 273.

38. Fehrenbach MJ, Herring SW. *Illustrated Anatomy of the Head and Neck.* 2nd ed. Philadelphia, PA: WB Saunders; 2002. p. 94–125.

39. Ganesh B, Burnice NKC, Mahendra J, Vijayalakshmi R, K AK. Laser-assisted lip repositioning with smile elevator muscle containment and crown lengthening for gummy smile: A case report. *Clin Adv Periodontics.* 2019;9:135–141. https://doi.org/10.1002/cap.10060

40. Alammar AM, Heshmeh OA. Lip repositioning with myotomy of the elevator muscles for the management of a gummy smile. *Dent Med Probl.* 2018;55:241–246. https://doi.org/10.17219/dmp/92317

41. Storrer CLM, de Oliveira ND, Deliberador TM, Ori LT, Guerrero SM, Santos FR, et al. Treatment of gingival smile: A case report. *J Int Acad Periodontol.* 2017;19:51–56.

42. Abdullah WA, Khalil HS, Alhindi MM, Marzook H. Modifying gummy smile: A minimally invasive approach. *J Contemp Dent Pract.* 2014;15:821–826. https://doi.org/10.5005/jp-journals-10024-1625

43. Alammar A, Heshmeh O, Mounajjed R, Goodson M, Hamadah O. A comparison between modified and conventional surgical techniques for lip repositioning in the management of the gummy smile. *J Esthet Restor Dent.* 2018;30(6):523–531.

44. Ribeiro-Júnior NV, Campos TV, Rodrigues JG, Martins TM, Silva CO. Treatment of excessive gingival display using a modified lip repositioning technique. *Int J Periodontics Restorative Dent.* 2013;33(3):309–314.

45. Aly LA, Hammouda NI. Botox as an adjunct to lip repositioning for management of excessive gingival display with hypermobility of the upper lip and vertical maxillary excess. *Dent Res J (Isfahan).* 2016;13(6):478–483.

46. Jacobs PJ, Jacobs BP. Lip repositioning with reversible trial for the management of excessive gingival display: A case series. *Int J Periodontics Restorative Dent.* 2013;33(2):169–175.

47. Torabi A, Najafi B, Drew HJ, Cappetta EG. Lip repositioning with vestibular shallowing technique for treatment of excessive gingival display of various

etiologies. *Int J Periodontics Restorative Dent.* 2018;38(Suppl):e1–e8.

48. Strong AL, Cederna PS, Rubin JP, Coleman SR, Levi B. The current state of fat grafting: A review of harvesting, processing, and injection techniques. *Plast Reconstr Surg*. 2015;136(4):897–912.