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Shreyas Gupte
Professor, Dr G.D Pol
Foundation's Y.M.T Dental
College & Hospital, Kharghar,
Navi Mumbai, Maharashtra,
India

Nirali Jhaveri
Resident, Dr G.D Pol
Foundation's Y.M.T Dental
College & Hospital, Kharghar,
Navi Mumbai, Maharashtra,
India

Karishma Motwani
Resident, Dr G.D Pol
Foundation's Y.M.T Dental
College & Hospital, Kharghar,
Navi Mumbai, Maharashtra,
India

Corresponding Author:
Karishma Motwani
Resident, Dr G.D Pol
Foundation's Y.M.T Dental
College & Hospital, Kharghar,
Navi Mumbai, Maharashtra,
India

Lip repositioning: A case report and review of literature over a decade

Shreyas Gupte, Nirali Jhaveri and Karishma Motwani

Abstract

Excessive gingival display (EGD) resulting in a “gummy smile” is a major esthetic concern in an individual’s personal and social life. Numerous treatment modalities have been used for the correction of EGD. This report describes the successful treatment of a young man with an excess gingival display caused by a hyperactive upper lip that was treated with a lip repositioning surgical technique along with a literature review spanning a decade. The procedure was accomplished by scraping a strip of mucosa from the maxillary buccal vestibule and suturing the mucosa of the lip to the mucogingival junction. This technique results in shortened vestibule and restricted the muscle pull of the elevator muscles of the lip, thereby reducing gingival display when the patient smiles.

Keywords: Gummy smile, lip repositioning, excessive gingival display.

1. Introduction

Excessive gingival display (EGD), commonly termed gummy smile, is a condition in which there is an overexposure of the maxillary gingiva during smiling; in severe cases, the overexposure is present in repositioning of the mouth and lips ^[1]. Although some gingival display gives the impression of a youthful smile, a gingival display larger than 3 mm is considered unattractive ^[1].

The etiology of EGD is various: plaque or drug induced gingival enlargement, altered or delayed passive eruption, anterior dento-alveolar extrusion, vertical maxillary excess, short upper lip, a hyperactive upper lip, or a combination. Proper diagnosis of the etiologic factor is essential for the selection of the right treatment protocol ^[1].

The treatment for correcting a gummy smile depends on the etiologic factor involved. In severe cases with excess of maxillary growth orthognathic surgery is required. In cases in which gingival overgrowth is seen can be corrected with crown lengthening or a gingivectomy procedure. In cases where the etiologic factor is hypermobile upper lip caused by levator muscles, Botox injection may be used temporarily. However, a more permanent treatment is advisable. Lip repositioning is hence indicated as a treatment modality for patients with excessive gingival display. The objective of lip repositioning is to shorten vestibule and limit retraction of lip elevator muscles by removing a strip of mucosa from maxillary buccal vestibule and attaching the lip mucosa to the mucogingival line so as to reduce the gingival display while smiling ^[2].

The aim of this article is to describe the surgical technique of lip repositioning in the following case reports and brief review of literature of past 10 years to evaluate its effectiveness in the treatment of excessive gingival display and hypermobility of upper lip.

2. Review of literature

The PRISMA protocol was followed for the review. Search engines and medical databases like Pubmed were tapped for information. The search words like lip repositioning, and gummy smile were typed for the retrieval of data. An analysis of using lip repositioning as the technique for reducing the excessive gingival display was done to evaluate its effectiveness for the same. A total of 105 articles were published in a 10 year study, out of which 21 articles met the inclusion criteria and were included in the study.

Table 1: Literature search- (Lip repositioning) and (gummy smile) from 2008 to 2018, search engines-pubmed title of relevant studies were selected

References	Type of study	Surgical Technique	Pre-operative gingival display	Post-operative gingival display	Results	Follow Up
1. Farista <i>et al.</i>	Case report	Laser assisted lip repositioning	Mild vertical maxillary excess with display 5mm	2mm	Viable minimally invasive alternative to orthognathic surgery	1 year
2. Littuma GJS <i>et al.</i>	Case report	Lip repositioning with smile elevator muscle containment	-	-	Successful and stable result foe EGD giving esthetic results.	-
3. Khan MN <i>et al.</i>	Case series 3 patients	Lip repositioning	Case1- 6mm Case2 – 6mm Case3- 4mm	1to 2mm display in all cases	Effective in mild to moderate degree of EGD but long term stability is debatable	6 months
4. ALY LA <i>et al.</i>	Case series 7 patients	Botox as adjunct to lip repositioning	8mm –avg	3mm -avg	Useful adjunct to enhance esthetics	6 months
5. Sanchez IM <i>et al.</i>	Case report	Modified lip repositioning with esthetic crown lengthening	4-TO 8 mm	2 mm	Modified lip repositioning and crown lengthening can be used predictably to treat EGD with less morbidity compared to orthognathic surgery	16 weeks
6. Mantovani <i>et al.</i>	Case report	Modified lip repositioning with esthetic crown lengthening	5mm	1mm	Effective procedure for reducing EGD caused by hypermobility of upper lip and APE.	9 months
7. Mahn DN <i>et al.</i>	Case report	Crown lengthening with lip repositioning	-	-	Effective to reduce EGD when smiling	12 weeks
8. Muthukumar <i>et al.</i>	Case report	Lip repositioning	5-6mm	1 to 2mm	Resulted in narrow vestibule and restricted muscle pull reducing gingival display	1year
9. Rao AG <i>et al.</i>	Case report	Modified lip repositioning	6mm	1mm	Considering all the perspectives, Modified lip repositioning definitely is a promising surgical approach to treat gummy smile.	1 month
10. Dayakar <i>et al.</i>	Case report	Lip repositioning	5.8mm	3mm	Successful treatment of EGD Complication - relapse	3-6 month 12 months
11. Jananni M	CASE REPORT	Mucosal strip technique for EGD IN class1 vertical maxillary excess	5mm	Reduced by 4mm	Simple, alternative to other morbid techniques	18 months
12.Ozturan <i>et al.</i>	Case series 10 patients	Laser assisted lip repositioning	4.8+_ 1.8mm	1.1 mm	Laser assisted lip repositioning successfully reduced the preoperative gingival display without any complications	6 to 12 months
13.Gaddale <i>et al.</i>	Case report	Lip repositioning ETIOLOGY- moderate vertical maxillary excess, upper lip hypermobility	-	-	Surgical lip repositioning is an effective procedure to reduce gingival display by positioning the upper lip in a more coronal location. The long-term stability of the results remains to be seen, but it is a promising alternative treatment modality in esthetic rehabilitation	12 months
14.Grover HS <i>et al.</i>	Case report	Lip repositioning	4-5mm	1mm	Less invasive, viable substitute for patient. Good stability and fast recovery compared to orthognathic surgery	1 year
15.Gabric PD <i>et al.</i>	Case report	Lip repositioning with laser gingivectomy	5.5mm to 10mm	0 to 2mm	Successful treatment as an alternative to orthognathic surgery in complex etiology cases	6 month
16.SHETH T <i>et al.</i>	Case report	Lip repositioning	8 to 10mm	4-6 mm	treatment of "a gummy smile" through a periodontal plastic procedure called lip repositioning with enormous patient motivation and satisfaction by improvement of esthetics	3 months
17.Reiberio <i>et al.</i>	2 patients	Modified lip repositioning	7mm 6mm	1mm 1mm	Significant improvement in the amount of gingival exposure and esthetic satisfaction.	6 months
18.Jacobs <i>et al.</i>	Case series 7 patients	Laser assisted lip repositioning	5.3 +_ 1.5mm	1.1 +_ 2.5mm	Excellent alternative to more costly and time consuming treatments for EGD	3 years
19.Silva CO <i>et al.</i>	Case series 13 patients	Modified lip repositioning technique	5.8mm +_ 2.1mm	1.4 +_ 1.0mm	Results in high level of patient satisfaction and predictable outcomes that are stable in the short term	6 months
20.Gupta <i>et al.</i>	Case report	Lip repositioning	4-5mm	1-2mm	Easy and less time consuming cost-effective way to give satisfactory results to the patient.	6months
21.Ishida <i>et al.</i>	Case series 14 patients	Myotomy of levatorlabii superioris and lip repositioning	5.22 +_ 1.48mm	1.91mm +_ 1.50mm	Efficient in reducing the amount of exposed gum during smile in all patients in this series.	6 months

2.1. Case report

A 25 years old man reported to Department of Oral and Maxillofacial Surgery, Y.M.T Dental College with chief complaint of a gummy smile. The patient did not have any relevant medical history and no medication intake; there were no contraindications of surgical treatment. During clinical evaluation, it was verified that 6 mm of gingival display in medial line leading to diagnosis of excessive gingival display, after patient refused orthognathic surgical treatment a lip repositioning technique was proposed.

The patient was consoled on management options. The patient's expectations were clarified and realistic outcome was presented including possibility of full or partial relapse.

Written informed consent was obtained after explanation of risk, potential benefits and treatment alternatives intra and extra-oral photographs were taken for planning and records

2.2 Surgical technique

Surgical technique was performed after following complete aseptic precautions. Standard skin preparation was carried out by 10% povidone-iodine solution and draping was done. Local infiltration was done using local anesthetic

solution 2% lignocaine with 1: 2000000 adrenaline) in vestibular mucosa and lip extending from right first molar to left first molar. Outlined marked using marker procedure was initiated with 15 no. Bard-parker blade giving a partial thickness incision following mucogingival junction extending from right first premolar to left first premolar (Fig 1).

Following first incision, second incision (horizontal) parallel to first incision was made which were connected to each other by an elliptical pattern (Fig 2). The partial thickness flap was excised leaving underlying connective tissue exposed to oral cavity (Fig 3.4). Hemostasis was achieved and margins of parallel incisions were approximated with an interrupted sutures using vicryl 4-0 at the midline to ensure proper alignment of midline of lip to teeth (Fig 5). Multiple sutures were taken on either side of midline suture to approximate flap margins (Fig 6).

Non-steroidal anti-inflammatory drugs along with oral antibiotics were prescribed post operatively. Post-operative symptoms included mild pain and swelling were removed after a week. Site healed successfully with scar formation at suture line. The patient was followed up for 1 year (Fig 8).



Fig 1: Incision for raising partial thickness flap



Fig 2: Pre-operative, excessive gingival display



Fig 3: Excision of partial thickness flap



Fig 4: After removal of partial thickness flap



Fig 5: Anchoring the suture in the midline



Fig 6: Closure using resorbable sutures



Fig 7: Pre-operative, excessive gingival display



Fig 8: Post-operative, 1 year

3. Results & discussion

Lip repositioning technique was first described by Rubeinstein and Kostianovsky in 1973. Miskinyar in 1983 reported little success with lip repositioning technique but saw no relapse in 27 patients he treated with myectomy and partial resection of levator labii superioris muscle bilaterally [3]. In 2010, Ishida *et al.*, reported a case series of 14 patients in which myotomy of levator labii superioris and lip repositioning was carried out showing excellent results of reduction in EGD from $5.22 \pm 1.48\text{mm}$ to $1.91 \pm 1.5\text{mm}$ with a 6 month follow up period [4]. Garber and Salama proposed a classification system based on degree of gingival display. For degree 1 (2 to 4mm display) lip repositioning, esthetic crown lengthening, and botox were suggested; while for moderate display degree 2 (4 to 8 mm) lip stabilization or orthognathic surgery and for severe EGD degree 3 (> 8mm) only orthognathic surgery, is recommended. The lip repositioning technique reduces the mild to moderate gingival display by removing a partial thickness strip of mucosa from the maxillary buccal vestibule and suturing the lip mucosa to the mucogingival line [5]. This limits the pull of the elevator smile muscles (zygomaticus minor, levator anguli oris, orbicularis oris and levator labii superioris), resulting in a narrow vestibule.

Silva *et al.* in 2012 reported a case series of 13 patients in which modified lip repositioning technique was used wherein EGD improved from $5.8\text{mm} \pm 2.1\text{mm}$ to $1.4 \pm 1.0\text{mm}$ which resulted in high level satisfaction and predictable outcomes that are stable in short term [6]. Jacobs *et al.* in 2013 did a study on 7 patients with laser assisted lip repositioning technique which brought the EGD from $5.3 \pm 1.1\text{mm}$ to $1.1 \pm 2.5\text{mm}$. the results proved excellent alternative to more costly and time consuming treatments for EGD with follow up of 3 years [7].

Bhola *et al.* in 2015 has given a classification and management protocol for excessive gingival display which gives indications for lip stabilization from mild cases of EGD (B) degree 1 and 2 to EGD (E) subclasses 1,2,3. This technique has the advantage of addressing unilateral EGD with additional option of reversibility, if necessary, via a vestibular extension procedure [8].

Aly *et al.* did a study on 7 patients using botox as an adjunct to lip repositioning technique wherein the EGD reduced from avg 8mm to 3mm with 6 month follow up period. Ozturan *et al.* also did a study on 10 patients with laser assisted lip repositioning with reduction of EGD from 4.8mm to 1.1mm on average with follow up of 6 to 12 months [9].

The case report published also had the EGD of 6 mm so the procedure of lip repositioning was done and it gave satisfactory results reducing the EGD to 3 mm.

4. Conclusion

Based on the results reviewed after doing the review of literature and the case reports, lip repositioning is an effective, excellent alternative to more time consuming and costly treatments available. since this technique has a reversible nature it also proves best for both patient and the doctor to preview the results before going further for treatments having high morbidity.

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