

Assessment of the Efficiency of Botox and Lip Reposition in the Correction of the Gummy Smile According To the Patients' Satisfaction

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ABSTRACT

This study aims to evaluate the effectiveness of both injection botulinum toxin type A (botox) and surgical lip reposition in the correction of the gummy smile due to hyperactive upper lip according to the resulting smile and the patients' satisfaction. This is done to determine the less damaging to the tissues and more stable alternative in giving results with statistical importance and aesthetically satisfying results. The method consists of 24 patients: 12 received the BTX-A injection and the remaining 12 underwent the surgical procedure (lip reposition). The patients rated their satisfaction according to their gingival display that was defined as the difference between the lower margin of the upper lip and the superior margin of the right incisor, and patients were followed at 2 weeks, 2 months and 6 months. Post injection and post surgery with changes documented by photographs. Both groups answered a questionnaire addressing the overall appearance and they were asked to rate the improvement of their smile according to a 5-point aesthetic scale

BTX-A injection exhibits better results than those of surgery and had given safer and more satisfactory results than lip reposition. The patients rated the effects of BTX-A as highly favorable if we take into consideration that BTX-A was temporary effect but the surgical procedure (lip reposition) is 80% recurrent surgery because the lip reverted back to its original position with almost complete relapse after 6 months later and containing all the dangers affiliated with the surgical procedures.

Keywords

Botox, Lip reposition, Gummy smile, Hyperactive upper lip the patient satisfaction, Botulinum toxin type A, BTX-A.

Introduction

Gummy smile or "high smile line" or "gingival smile line" is a condition characterized by excessive exposure of maxillary gingiva during smiling, where the upper lip moves up about 6-8 mm during the smile so that it appears more than 2 mm from the gingiva and all the clinical crown length of the patients' teeth. This results in significant consequences where the patient would rather hide his/her smile in order to avoid embarrassment [1-3]. 7% of young adult males and 14% of young adult females have gummy smile [4].

The muscles of facial expression which are responsible for upper lip elevation and lateral retraction upon smiling are levator labii superioris alaeque nasi (LLSAN), levator labii superioris (LLS), zygomaticus minor (Zm), zygomaticus major (ZM), risorius, and, to a lesser degree, the depressor septi nasi muscle. All of these muscles interact with the orbicularis oris muscle in the production of a smile [5].

The various causes of gummy smile include vertical maxillary excess, anterior dentoalveolar extrusion, delayed passive dental eruption, short or hyperactive upper lip elevator muscles [4,5]. Treatment of Gummy smile by aesthetic crown lengthening with or without osseous resection is well documented [6,7]. Dentoalveolar extrusion can be treated successfully by orthodontic therapy [8].

Gummy smile due to vertical maxillary excess can be successfully treated by orthognathic surgery [9].

However, this surgery is associated with significant morbidity and requires hospitalization. Therefore, lip repositioning is recommended as an alternative treatment for gummy smile due to hyperactive upper lip. The objective of lip repositioning is to limit the retraction of elevator smile muscles. Lip repositioning results in a shallow vestibular restricting of the muscle pull; Thereby limiting the gingival display during smiling.

The procedure was first described in the literature of plastic surgery in 1973 by Rubinstein AM. There is still scarcity of work and literature regarding lip reposition surgeries with only cases being published by Rosenblatt and Simon [1] and Gupta et al. [2].

A new technique for the treatment of GS is botulinum toxin injection [13]. First reported in a pilot study by Polo in 2005, 12 botulinum toxin injection for GS treatment showed promising results, but the effect of the botulinum toxin was temporary.

Materials and Methods

Study exclusion criteria included known allergies to albumin or any other ingredients in BTX-A, patients taking aminoglycoside antibiotics or other agents interfering with neuromuscular transmission, patients with peripheral motor neuropathies or functional neuromuscular disorders, or patients who were pregnant or breastfeeding.

After initial consultation and evaluation, 24 female patients were enrolled in this study, 12 received the BTX-A injection and the remaining 12 underwent the surgical procedure (lip reposition). Measurements were taken from the gum line at the midline of the central incisors and canines to the lowest portion of the upper lip. To obtain maximal patient smile during measurement, funny jokes were made.

Surgical procedure technique

Adequate local anesthetic (lignocaine 2% with epinephrine 1:100,000) was administered in vestibular mucosa and lip from maxillary right first molar to maxillary left first molar. The surgical site was marked with an indelible pencil. A partial thickness flap was raised from mesial line angle of right maxillary first molar to the mesial line angle of left maxillary first molar at the mucogingival junction. A second incision 11-14 mm above the first incision was made in the labial mucosa. The two incisions were joined on either side and a strip of partial thickness flap was removed, exposing the underlying connective tissue [Figure 1].

The two incisions were then approximated using continuous interlocking sutures [Figure 1]. Patient was prescribed nonsteroidal anti-inflammatory drugs (diclofenac sodium 50 mg three times daily for 3 days) and oral antibiotics (Augmentin 1g two times daily for 5 days). Patient was instructed to apply ice pack post operatively and minimize lip movement for 10 days. Sutures were removed 3 weeks post operatively.



Figure 1: The phases of lip reposition.



Comparison between the averages of satisfaction of the two types of treatment in various periods.

Injections technique

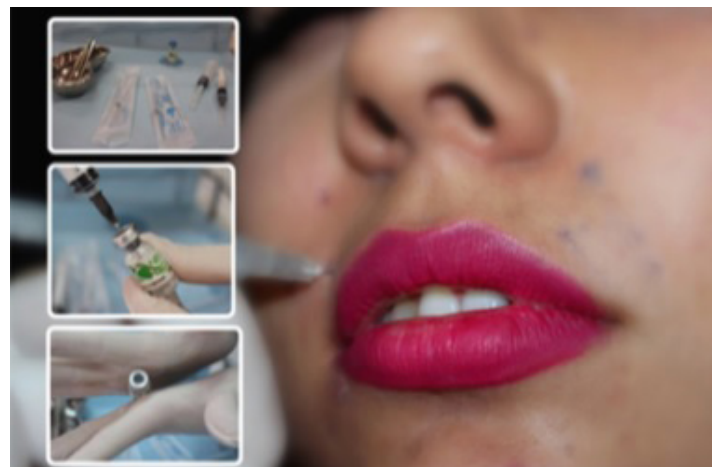


Figure 2: The phases of BTX-A Injection.

Each patient underwent injections of BTX-A at 3 sites bilaterally into the levator labii superioris and levator labii superioris alaeque nasi muscles. The superficial facial landmarks used for injection sites were as the following: 2 mm lateral to the alar-facial groove at the level of the nasal passage, followed by an injection 2 mm

lateral to the first injection in the same horizontal line, with the last injection 2 mm inferior and between the first 2 sites. The resulting injection sites were mapped in an inverted triangle. Furthermore, the bony landmark was the anterior maxilla that correlates with the overlying musculature described above.

BTX-A was diluted according to the manufacturer's recommendations to yield 2.5 units per 0.1 mL by adding 4.0 mL normal saline solution to 100 units of vacuum-dried Clostridium botulinum toxin type A. Under sterile conditions, 2.5 units were then injected in all subjects at previous sites.

On the first follow-up visits, each patient from both groups answered a questionnaire addressing the following aspects:

- The overall the appearance.
- Rate the improvement of their smile according to a 5-point aesthetic scale (5 = excellent, 4 = very good, 3 good, 2 = fair, 1 = poor).
- Their willingness to repeat the treatment.
- The level of satisfaction during the followed periods (after two weeks, after two months, after six months).
- Whether they would recommend this treatment to others with a similar diagnosis.

Pretreatment and posttreatment questionnaire responses, in addition to directly questioning the patients, enabled us to evaluate the patients' satisfaction.

Results

In order to study patients' satisfaction with the outcome, the results were as the following table 1.

The Treatment	Statistical index	After Two Weeks	After Two Months	After Six Months
Lip reposition	mean	2.08	3.92	1.67
	number	12	12	12
	standard deviation	.793	.900	.651
	less value	1	2	1
	greater value	3	5	3
BTX-A	mean	2.42	4.50	1.33
	number	12	12	12
	standard deviation	.996	.522	.492
	less value	1	4	1
	greater value	4	5	2

Table 1: The patient satisfaction about the outcome results.

Patients with injection treatment, depending on the answers of the questionnaire and the interview with the patient, they felt the smile seemed more beautiful than before during the first three days after injection. When asked when they felt change, smiling responses ranged from (1-7 days) and average (3.5 days).

Patients with surgery treatment, depending on the answers of the questionnaire and the interview with the patient, they felt the smile

seemed more beautiful than before during the first day after the lip reposition procedure, but they reported mild pain and tension while smiling during the first week after surgery. When asked when they felt change, smiling responses ranged from (1-5 days) and average (2.5 days).

Concerning the satisfaction with the Botox treatment, the values of the patients and their awareness to improve the aesthetics of their smile were with an average of 4.50 out of 5, a number of high level of satisfaction. As for the desire to re-treatment again, responses were (9 yes), (2 maybe) and (1 responded in the negative). When they would be asked whether they advise others who have the same situation to undergo this treatment, the answers were (11 yes) and (1 No).

But In terms of satisfaction with the surgical treatment, the values of the patients and their desire to improve the aesthetics of their smile with an average of 2 out of 5, a number of poor level of satisfaction due to the lip reverted back to its original position with almost complete relapse after 6 months from surgical procedure. As for the desire to re-treatment again responded (yes 1) and (1 maybe) and (10 responded in the negative). When they asked whether they advise others who have the same situation to do this treatment answered (yes, 1) and (11 no).

The patients complain about feeling that they cannot laugh or smile during the first two weeks and attribute this to the obstruction of the lips that cannot be explained, but after two months, they were enabling to adapt the new situation and learn how to smile.

No prolapse in the upper lip or protrusion of the lower lip was mentioned. Also an asymmetry between the lips, drooling, difficult speaking and eating after either surgery or injections were mentioned.

Discussion

A gummy smile is the excessive display of gingival tissue in the maxilla upon smiling. It can be self-conscious, embarrassing or even psychologically mortifying, and thus needs intervention [11-13]. The proper diagnosis and determination of its etiology are essential for the selection of the right treatment modality [5]. Different techniques have been used in cases of hyperactive upper lip: botulinum toxin injections, lip elongations with rhinoplasties, lip muscle detachments, myotomies, and lip repositions.

The lip repositioning technique is an excellent alternative to more costly procedures with higher morbidity rates [1,2]. The lip reposition surgery was originally described in the medical literature by Rubenstein and Kostianovsky in 1973. Previously Polo [10], reported the benefits of BTX-A was reported in 5 patients with gummy smiles. The purpose of that pilot study was to determine whether injecting BTX-A at particular muscle sites could provide an alternative therapy for gummy smiles caused by hypercontractibility or excessive muscle contraction. The effect of the botulinum toxin was temporary, and the gingival display

gradually increased from the second week to baseline values after the 32nd week [14,15].

Our study found the effect of the botulinum toxin was temporary and that the gingival display gradually increased after the 32 weeks, but in lip reposition (the surgery procedure), the lip reverted back to its original position with almost complete relapse after 6 months of surgical procedure.

We noticed that the highest level of satisfaction was after two months in the cases of the patients who were injected with toxin type A (Botox) but that satisfaction dropped after six months and the same result was noticed in the cases of the patient who were treated by surgery.

However, we note that in the three comparisons remains satisfaction, the treatment by injecting toxin type A (Botox) is higher than treatment with surgery.

Conclusion

BTX-A injection exhibits better results than those of surgery and had given safer and more satisfactory results than lip reposition. The Patients rated the effects of BTX-A as highly favorable if we take into consideration that the surgical procedure (lip reposition) is 80% recurrent surgery containing all the dangers affiliated with the surgical procedures.

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