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Banish the gummy smile: botulinum toxin to the rescue!

Elimine o sorriso gengival: a toxina botulínica ao resgate!

*Amrita A. Hongal, Shilpa Kanathur, Supriya M. Muthalgiri, Mohan Rao, and Shephali Raysingh**

Department of Dermatology, Bangalore Medical College and Research Institute, Bengaluru, Karnataka, India

Abstract

Objectives: The aim of the study was to assess the efficacy of botulinum toxin Type A in the correction of gummy smile. **Methods:** Fourteen patients with gummy smile were recruited in our study. Gummy smile was arbitrarily classified into mild (3-5 mm), moderate (5-7 mm), and severe (> 7mm) to see the degree of improvement attained with the injection. Yonsei point was chosen as the injection site. Two units of Botulinum toxin Type A were injected at each site in all patients. Baseline evaluation on the day of injection was done with photographs, and repeat assessment was done after 2 weeks. The improvement of gum exposure achieved (in mm) was measured using a computer software (Digimizer Image Analysis Software). **Results:** Average percentage of improvement seen was 68.85%, with patients with mild gummy smile showing 74.09%, moderate showing 60.89%, and severe showing 65.66% improvement. **Conclusion:** From the study, it was inferred that botulinum toxin was very effective in the treatment of gummy smile, even though the effect was temporary.

Keywords: Gummy smile. Botulinum toxin Type A. Yonsei point. Gingival hyperplasia. Treatment.

Resumo

Objetivos: Avaliar a eficácia da toxina botulínica tipo A na correção do sorriso gengival. **Métodos:** Quatorze pacientes com sorriso gengival foram incluídos neste estudo. O sorriso gengival foi classificado arbitrariamente em leve (3-5 mm), moderado (5-7 mm) e grave (> 7 mm) para avaliar o grau de melhora obtido com a injeção. O ponto de Yonsei foi escolhido como local de aplicação, e 2 unidades de toxina botulínica tipo A foram injetadas em cada lado de todos os pacientes. A avaliação inicial foi realizada no dia da aplicação e repetida após duas semanas, medindo-se a redução da exposição gengival (em mm) utilizando o software Digimizer Image Analysis. **Resultados:** A média percentual de melhora observada foi de 68.85%, com pacientes com sorriso gengival leve apresentando 74.09%, moderado 60.89% e grave 65.66% de melhora. **Conclusão:** O estudo demonstrou que a toxina botulínica tipo A é altamente eficaz no tratamento do sorriso gengival, embora seu efeito seja temporário.

Palavras-chave: Sorriso gengival. Toxina botulínica tipo A. Ponto de Yonsei. Hiperplasia gengival. Tratamento.

***Correspondence:**
Shephali Raysingh
E-mail: sheph1998@gmail.com

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Introduction

Of all the human facial expressions, the smile is probably the most pleasing and the most complex.[1] A smile is the most recognised expression and plays a key role in social interactions, influencing success, failure, and self-esteem. Smile is due to the complex interaction between lips, teeth, gums, and the muscles surrounding the oral commissure.

A smile is influenced by three components: teeth, gums, and lips. An attractive smile maintains proper proportions, with the upper lip symmetrically exposing up to 3 mm of gum following its contour. The exposure of more than 3 mm of the gum during the smile is known as a gingival or gummy smile (excessive gingival display).[1] About 10% of people aged between 20 and 30 years have gummy smiles, occurring in approximately 14% of females and 7% of males, and being more common in women.[2]

The etiology of a gummy smile is complex, meaning that multiple factors may manifest at the same time. Since the course of treatment varies depending on the etiology of the condition, professionals need to precisely determine what caused it.[3]

The causes of a gummy smile are:

1. Hypermobile upper lip/muscle hyperfunction
2. Short/inadequate upper lip length
3. Gingival hyperplasia
4. Vertical maxillary excess (VME)
5. Dentoalveolar extrusion
6. Failure of apical migration of gums during teeth eruption.

The most common cause of a gummy smile is upper lip muscle hyperfunction. A hypermobile (hyperactive) lip results from increased activity of upper lip elevator muscles,[4] particularly the levator labii superioris.[5] The other muscle involved is levator labii superioris alaeque nasi (LLSAN). Their hyperactivity raises the upper lip excessively, increasing the exposure of teeth and gingival tissues when smiling, resulting in a gummy smile.

Mazzuco and Hexsel classified excessive gingival display into four types: posterior, anterior, asymmetric, and mixed gummy smiles.[1] Clinical diagnosis of gummy smile involves measurement of the width of keratinized gingiva, frenal attachment, clinical crown, vertical smile limits, overbite, overjet, anatomic crown length, and probing depth.[1]

The etiology of a gummy smile determines therapy options. When factors like VME and hypermobile lip coexist, multiple treatments may be used. Botulinum toxin and hyaluronic acid injections are less invasive options, while gingivectomy, modified lip repositioning, and orthognathic surgery are surgical treatments reserved for severe VME due to morbidity and hospitalization.[6] In some cases, orthodontic therapy alone can correct a gummy smile.

The most common cause of gummy smile is hyperfunction of the upper lip muscles, which can be effectively treated with botulinum toxin injections. The toxin inhibits presynaptic acetylcholine release at the neuromuscular junction, causing temporary muscle paralysis. It is injected into the LLSAN and levator labii superioris muscles at the Yonsei point – center of the triangle formed by the levator labii superioris, LLSAN, and zygomaticus minor. Around 2 units are injected on each side, reducing upper lip elevation and gingival display.[7] The effect lasts approximately 3-6 months after treatment.

Materials and methods

After obtaining Institutional Ethics Committee clearance and valid patient consent, 14 patients with gummy smile were recruited in our study, 13 females and 1 male. The average age of the study subjects was 38.28 years. None of the patients had a prior history of lip or nasolabial filler injections.

Yonsei point was chosen as the injection site. Two units of Botulinum toxin Type A were injected at each site in all patients. Botulinum toxin was administered using a 31G insulin syringe, injected intramuscularly at a depth of approximately 6-7 mm at an angle of 90°.

Baseline evaluation was performed on the day of injection with photographs, and a repeat assessment was done after 2 weeks. The improvement of gum exposure achieved (in mm) was measured using a computer software (Digimizer Image Analysis Software).

Gummy smile was arbitrarily classified into mild (3-5 mm), moderate (5-7 mm), and severe (> 7 mm) to see the degree of improvement attained with the injection.

Results

A total of 14 patients with different grades of gummy smile were enrolled in the study. The study population consisted of 13 females and 1 male, with an average age of 38.28 years. All patients completed the study and were evaluated at baseline and at 2 weeks post-treatment.

Patients were categorized according to the severity of gummy smile based on gingival exposure:

– Mild (3-5 mm): 7 patients
– Moderate (5-7 mm): 3 patients
– Severe (> 7 mm): 4 patients.

Figure 1. Patient 1 pre-procedure photograph.

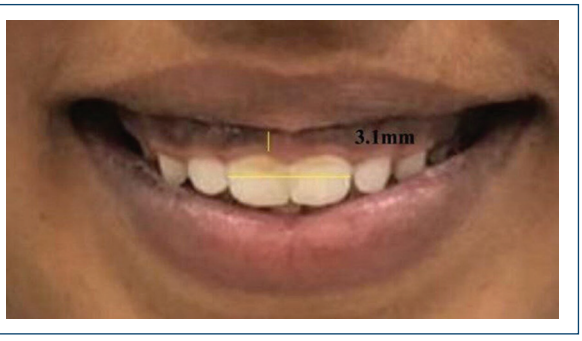

Figure 2. Patient 1 post-procedure photograph.

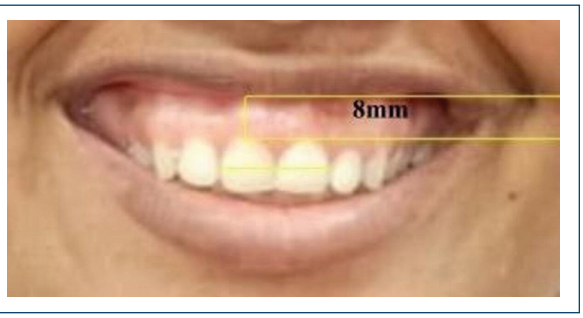

Figure 3. Patient 2 pre-procedure photograph.

Following injection of two units of Botulinum toxin type A at the Yonsei point bilaterally, all patients demonstrated a measurable reduction in gingival display at the 2-week follow-up.

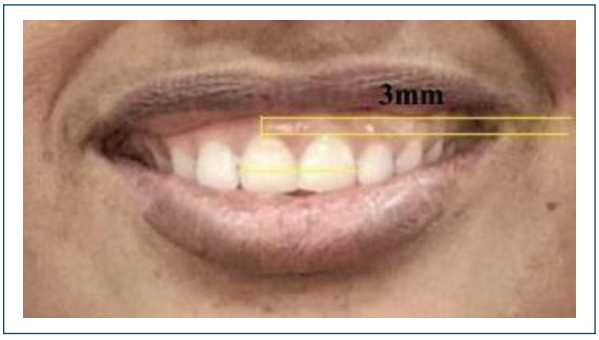

Figure 4. Patient 2 post-procedure photograph.

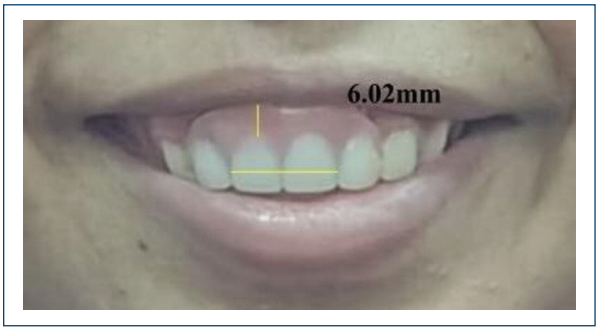

Figure 5. Patient 3 pre-procedure photograph.

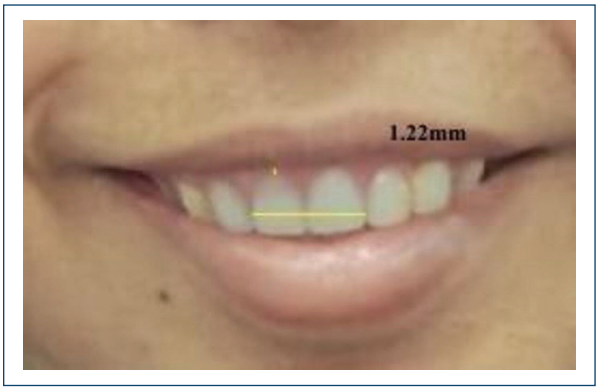

Figure 6. Patient 3 post-procedure photograph.

The overall mean percentage improvement in gingival exposure among all patients was 68.85%.

Improvement according to severity showed:

– Mild group: Mean improvement of 74.09%
– Moderate group: mean improvement of 60.89%
– Severe group: mean improvement of 65.66%.

Patients with mild gummy smile demonstrated the greatest percentage reduction in gingival display, while

Table 1. Pre- and post-treatment gingival display and improvement in patients treated with botulinum toxin for gummy smile

SL. No.	Age/gender	Pre	Post	Improvement (mm)	Improvement (%)
1	42 years, Male	4.16	1.77	2.39	57.45
2	35 years, Female	3.37	0	3.37	100
3	25 years, Female	3.50	0	3.50	100
4	40 years, Female	4.00	1.66	2.34	58.50
5	38 years, Female	4.38	1.57	2.81	64.15
6	54 years, Female	4.86	1.37	3.49	71.80
7	52 years, Female	3.52	1.17	2.35	66.76
Mean percentage improvement in mild group					(74.09)
8	32 years, Female	5.23	2.56	2.67	51.05
9	34 years, Female	6.01	2.89	3.12	51.91
10	36 years, Female	6.02	1.22	4.8	79.73
Mean percentage improvement in moderate group					(60.89)
11	40 years, Female	7.08	3.25	3.83	54.09
12	28 years, Female	7.50	3.10	4.4	58.66
13	32 years, Female	8.00	3.00	5	62.5
14	48 years, Female	8.04	1.01	7.03	87.4
Mean percentage improvement in severe group					(65.66)
				Average of all subjects	68.85

moderate and severe groups also showed substantial improvement. Representative pre- and post-procedure clinical photographs of patients in the study demonstrating reduction in gingival display following botulinum toxin injection are shown in figures 1-8.

Individual patient outcomes

Pre- and post-treatment measurements of the gingival display showed consistent reductions across all patients. The maximum improvement observed was 100% reduction in the gingival display in two patients with mild gummy smile. The minimum improvement recorded was approximately 51.05% in one patient with a moderate gummy smile.

The mean reduction in gingival exposure in millimeters varied depending on baseline severity, with greater absolute reductions generally seen in patients with higher pre-treatment gingival display.

Clinical observations

All patients showed visible improvement in smile aesthetics at the 2-week evaluation. No significant adverse effects or complications were reported during the study period. Injection sites healed uneventfully, and patient compliance was satisfactory.

Detailed patient-wise data, including pre-treatment gingival display, post-treatment measurements, and percentage improvement, are summarized in Table 1.

Discussion

Elevator muscle hyperfunction is the most common cause of a gummy smile. These elevator muscles can be relaxed using Botulinum toxin. This study demonstrates the efficacy of botulinum toxin Type A in managing excessive gingival display (gummy smile) caused primarily by hyperactivity of upper lip elevator muscles. A total of 14 patients, 13 females and 1 male, were treated with two units of botulinum toxin at the Yonsei point on each side.

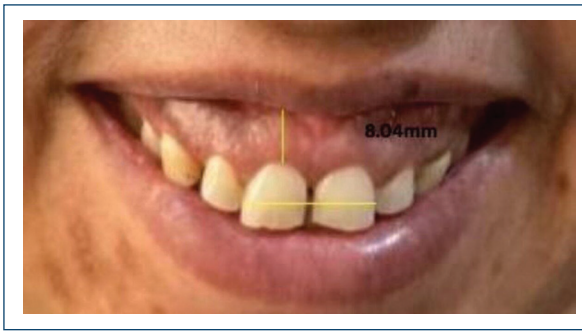

Figure 7. Patient 4 pre-procedure photograph.

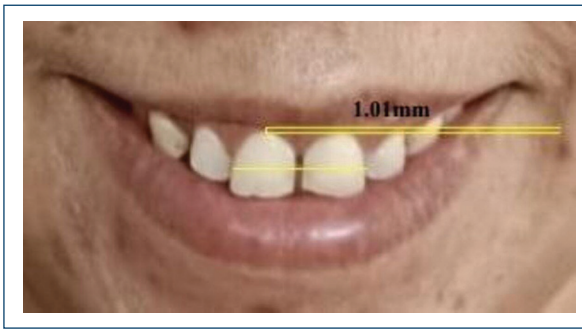

Figure 8. Patient 4 post-procedure photograph.

Results showed a significant mean improvement of 68.85% in gingival exposure, with the mild group achieving the highest reduction (74.09%), followed by severe (65.66%) and moderate (60.89%) cases. This highlights the role of muscle hyperfunction as a dominant etiological factor responsive to botulinum toxin injection.

This is a less invasive, less time-consuming, and outpatient-based procedure. There is also an excellent quick reduction of the gum exposure during smile with the results being seen in as early as 2 weeks post-procedure. The effect of Botulinum toxin is usually observed between 1 and 2 weeks and lasts for 3-6 months.

A potential complication is asymmetry of the smile, which is relatively common due to complex muscle dynamics in the perioral region. Proper injection technique and accurate placement are essential to minimize this risk.

Moderate and severe gummy smiles are usually due to composite causes, contributing to the excessive gingival display. Such cases need an additional surgical correction. Thus, treating gummy smile with botulinum toxin injection gives quick results and satisfactorily good results.

Botulinum toxin for gummy smile effectively addresses the muscular component, giving satisfactory results in all grades of gummy smile. Although repeated injections are required, it is a safe and minimally invasive procedure.

Overall, botulinum toxin injection provides a safe, rapid, and reversible alternative to surgery for patients with a gummy smile. When applied with proper technique and dosage, it offers high patient satisfaction and reinforces its role as a reliable aesthetic intervention for correcting gummy smile.

Funding

None.

Conflicts of interest

None.

Ethical considerations

Protection of humans and animals. The authors declare that the procedures followed complied with the ethical standards of the responsible human experimentation committee and adhered to the World Medical Association and the Declaration of Helsinki. The procedures were approved by the institutional Ethics Committee.

Confidentiality, informed consent, and ethical approval. The authors have followed their institution's confidentiality protocols, obtained informed consent from patients, and received approval from the Ethics Committee. The SAGER guidelines were followed according to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

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