

Dual Approach for Gummy Smile Management: Combining Gingivectomy and Botulinum Toxin for Aesthetic and Functional Enhancement

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ABSTRACT

Background: A gummy smile (excessive gingival display) is a common aesthetic concern that disrupts the visual harmony between teeth, gingiva, and lips. Its etiology may be gingival, muscular, or skeletal. While multiple treatment modalities exist, selecting the optimal plan depends on accurate diagnosis of the underlying cause. **Objective:** To evaluate the effectiveness of combining gingivectomy and botulinum toxin injections in managing gummy smiles caused by altered passive eruption and hyperactivity of the upper lip elevator muscles, and to compare the outcomes with those reported in the literature. **Materials and Methods:** Diagnosis was established through clinical examination, panoramic radiography, and gingival measurements. An external bevel gingivectomy was performed without osseous recontouring, followed by botulinum toxin injections (2 units per side) at the Y-point. Outcomes were assessed in terms of aesthetic improvement, stability, and patient satisfaction. **Results:** The combined approach reduced gingival exposure and improved the crown-to-gingiva ratio, achieving high patient satisfaction. Findings were consistent with studies supporting the integration of surgery and botulinum toxin in multi-factorial cases. Botulinum toxin provided rapid but temporary improvement (4–6 months), while gingivectomy offered longer-lasting results in gingival-related cases. **Conclusion:** The combination of gingivectomy and botulinum toxin injections is an effective treatment option for gummy smiles of mixed etiology, provided that precise diagnosis and clear indications for each procedure are established. A multidisciplinary approach and well-defined diagnostic algorithms are recommended to ensure optimal aesthetic and functional outcomes.

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1. Introduction

A smile is one of the most prominent elements of beauty and facial expression, playing a pivotal role in social interaction and reinforcing first impressions, in addition to its profound impact on mental health and self-satisfaction (2021, Kaminska et al). With the increase in global interest in facial aesthetics and cosmetic dentistry, studies on what is known as the “aesthetic smile” have increased, which requires a delicate balance between the teeth, gums, and lips. One of the most prominent manifestations that negatively affects this balance and causes functional and cosmetic discomfort to the patient is the gummy smile, a clinical condition in which an excessive amount of gum tissue is visible when smiling, disrupting the natural harmony of the face (Miranda et al., 2012).

The causes of a gummy smile are due to multiple factors, including hyperactivity of the levator labii muscles, short upper lip, short clinical crown, or short clinical crown of the upper teeth, (Vertical Maxillary Excess)

This multiplicity of causes requires a thorough anatomical (Khan et al., 2022; Arcuri et al., 2023) and functional assessment of the case before selecting the most appropriate treatment plan.

2. Research Problem

Recent statistics indicate that the prevalence of gummy smiles ranges from 10% to 29% of the population, and is more common in women due to the anatomical and muscular structure of the upper lip (Jerbi, 2023). A large clinical study conducted on 450 patients in the United States reported that approximately 14% of women over the age of 20 suffer from varying degrees of gummy smile, and more than 70% of them (Miskinyar et al., 2022) expressed their aesthetic and social discomfort with it.

Although there are several options available for treating gummy smiles, the choice of the optimal method depends on the underlying cause of the condition, the sustainability of the results, and patient satisfaction. There is still a need for systematic comparative studies between surgery and Botox injections to determine the differences in clinical and aesthetic outcomes in the short and long term.

2.1 A gummy smile is a condition in which more than 3-4 mm of the upper gums are visible when smiling fully. Medically known as excessive gingival display, it is not a disease in itself but may be a symptom of a problem with the teeth, gums, or bones

3. Theory review

Gummy smile:

A condition in which more than 3-4 mm of the upper gums are visible when smiling fully. Medically known as excessive gingival display, it is not a disease in itself, but it may be indicative of a problem with the teeth, gums, or bones.

The most important muscles of the upper lip:

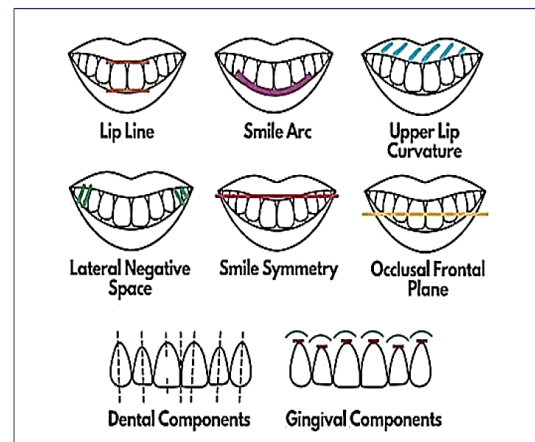
- 1- Orbicularis Oris muscle
- 2- Levator Labii Superioris muscle
- 3- Levator Labii Superioris Anterioris muscle (LLSAN)
- 4- Zygomaticus major and minor muscles

Elements of the perfect smile:

The perfect smile is the result of harmony between the teeth, gums, lips, and face as a whole. Many researchers have identified specific characteristics that determine the beauty of a smile.

The most important of these characteristics are:

- Lip Line
- Smile Arc
- Upper Lip Curvature
- Lateral Negative Space
- Smile Symmetry
- Occlusal Frontal Plane
- Dental Components
- Gingival Components



Amount of gum exposure: The literature indicates that 1-2 mm of gum exposure is normal and aesthetically acceptable, while exposure of more than 3 mm is considered a sign of a gummy smile. Subsequent studies have confirmed this value, with 85% of participants finding that a smile exposing more than 3 mm of gum appears “excessive” and less attractive.

Smile line: This is the relationship between the upper lip and the gum line during a natural full smile and is determined by the length of the clinical crown of the incisors (from the incisal edge to the free gingiva).

Types of smiles:

Rubin's classification:

1- Mona Lisa Smile:

- The corners of the mouth rise diagonally without a significant rise in the upper lip.
- This is the most common type of smile, found in 67% of the population.

2- Canine smile:

- The upper lip rises vertically and most of the gums above the incisors are exposed, resulting in a gummy smile.

3- Complex smile (Gummy Smile or Complex)

It is accompanied by clear gum exposure with excessive elevation of the lip and is often treated cosmetically.

Classification of the causes of gummy smile:

No.	Cause	Classification	Brief Description
1	Neurological diseases	Neurological	Neurological disorders resulting from brain injury or damage that changes or reduces control over the muscles involved in speech production.
2	Cerebral palsy	Mixed / Neurological	A congenital neurological disorder that affects the motor system and results in speech impairment.
3	Cleft lip and palate	Structural / Developmental	Structural anomaly of the oral cavity that leads to speech sound disorders due to incomplete closure of the velopharyngeal mechanism (VPM).
4	Hearing loss	Sensory / Auditory	Hearing impairment that prevents the child from properly perceiving speech sounds, leading to speech errors.
5	Enlarged adenoids	Structural	Enlargement of adenoid tissues obstructs nasal airflow and affects speech resonance.
6	Enlarged tonsils	Structural	Enlargement of tonsils obstructs oral airflow and affects speech resonance.
7	Syndromes (genetic - structural - neurological - combined)	Mixed (neurological/structural)	Genetic syndromes that may be accompanied by neurological, structural, or combined disorders, leading to speech difficulties.

Table 2: Classification of Organic Causes of Dysarthria

Diagnosis:

We used panoramic imaging to evaluate the macrostructure, as well as calipers and gingival probes to assess the clinical crown length of the anterior teeth.



We adopted a treatment plan involving surgical gum resection followed by Botox injections due to hyperactivity of the levator labii superioris muscle.

Both methods were used to avoid bone resection.

Materials and methods:

The procedure was performed using

1. A surgical scalpel with a 15 blade without modifying the superficial alveolar bone.



Pre-operative condition:

The smile reveals excessive gum exposure (gummy smile) with apparently short crowns. The images show failure of the gingival retraction from the CEJ, which is confirmed by gingival probing measurements greater than 3 mm.



Immediately after external bevel gingivectomy, we observe a uniform elevation of the gum line, revealing the crown surfaces better and improving the aesthetic proportion between the tooth and the gum.



A close-up image of the surgical site shows the incisions made precisely around the dental necks. A sufficient biological distance of 2 mm was observed, which is a good indicator of healing without complications.

We used Botox as a safe, fast-acting, low-interference treatment option that can be easily applied in a dental or dermatology clinic without the need for general anesthesia or an operating room.



We used the two-point technique and injected the usual dose (2 units on each side) into the Y-Point area, which is the intersection of the levator muscles of the upper lip and the wing of the nose.



Method	Main Response	Functional Duration (Months)	Stability Duration (Months)	Side Effects	Patient Acceptance Level
Tongue Resection	Immediate and variable depending on surgery	Moderate (5–4 m)	Limited stability	Moderate risk – speech/articulation relapse	Moderate
Tongue Repositioning	Moderate and limited muscular effect	Good (6–12 m)	Moderate stability	Relapse and limited stability	Moderate
Muscle Grafting	Gradual, muscle-based effect	Moderate (4–6 m)	Moderate stability	Possible muscle atrophy, relapse	Moderate
Free Flap or Vascularized Myocutaneous Flap	Strong and relatively permanent	Long-term (2–3 y)	Long-term stability	Relapse possible, donor site complications	Very acceptable

Table 4: Comparative Clinical Analysis of the Four Main Treatment Approaches

4. Results and discussion

Kaminska's study (2021) indicated that achieving an aesthetic smile requires a harmonious balance between the teeth, gums, and lips, noting that simple interventions such as Botox injections may be effective in cases of muscular origin. Miranda et al. (2012) also clarified that a gingival smile is multifactorial and that surgical intervention at the gum level is appropriate in cases of excessive eruption or gingival hypertrophy.

In the same context, Khan et al. (2023) and Arcuri et al. (2022) emphasized the importance of comprehensive anatomical and functional assessment before choosing a treatment plan, noting that combining more than one treatment technique may provide optimal results. The study by Miskinyar et al. (2022) showed that a significant proportion of patients are dissatisfied with the appearance of their gingival smile and that cosmetic interventions, whether surgical or using Botox, contributed significantly to improving psychological and social satisfaction.

These results are consistent with the treatment approach applied in your case, where surgery was used to treat apparent crown shortening, along with Botox to treat muscle hyperactivity.

Some literature has indicated that Botox alone may be sufficient to treat simple muscular cases, without the need for any surgical intervention, especially in the absence of aggressive eruptions or gingival hypertrophy. In contrast, other studies have shown that surgical resection alone may achieve long-term results in cases of purely dental or gingival origin, while Botox is considered a short-term option that requires re-injection every 4–6 months, which may be considered a weakness in terms of sustainability.

Some researchers have pointed out that combining surgery and Botox may be excessive intervention in simple cases, and that the combination is particularly recommended in complex or multi-causal cases.

What we have done is consistent with the multi-level approach recommended by several recent studies (especially when there is more than one cause).

The main disagreement in the literature is about the extent to which it is necessary to combine the two methods.

5. Conclusion

1. A gingival smile is a multifactorial condition involving gingival factors such as hypertrophy or hyperplasia, muscle factors such as hyperactivity of the levator labii muscles, or skeletal factors such as excessive vertical growth of the maxilla, requiring careful anatomical and dynamic assessment of each individual case.

2. Surgical resection of the gingiva is the best treatment option in cases of hyperplasia or gingival hypertrophy, provided that the biological distance and alveolar bone planning are carefully considered.

3. Botox injections have proven to be highly effective in mild to moderate muscular cases, with results appearing within one week and lasting for 4-6 months, but treatment must be repeated to maintain the results.

6. Recommendation

1. Doctors and practitioners are advised to adopt a multi-level diagnostic analysis, including dynamic, radiographic, and photographic evaluation, before initiating any treatment for gummy smile.
2. Botox is a safe and easy-to-apply first-line option in muscular cases and is recommended for use with the Y-point technique when needed.
3. Multidisciplinary collaboration (surgery-cosmetic-gum) is recommended in complex or mixed cases to ensure sustainable aesthetic and functional balance.
4. Simplified visual clinical algorithms are proposed to facilitate treatment decision-making by general practitioners, especially in resource-limited settings.

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