

**Therapeutic association for gummy smile: gingivoplasty and  
botulinum toxin**

**Associação terapêutica para o sorriso gengival: gengivoplastia e toxina  
botulínica**

**Combinación terapéutica para sonrisa gingival: gingivoplastia y toxina  
botulínica**

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**ABSTRACT**

Gummy smile is characterised by the exposure of more than 3mm of gingiva when smiling. This clinical condition can negatively affect self-esteem and quality of life of the patients. Gingivoplasty and the application of botulinum toxin have been associated in the treatment of gummy smile. The purpose of this article is to present the case of a patient with a gummy smile treated by combining both therapeutic modalities.

**Keywords:** botulinum toxin type A; gingival overgrowth; gingivectomy; gingivoplasty; gingival smile; surgical crown lengthening.

**RESUMO**

O sorriso gengival é caracterizado pela exposição de mais de 3mm de gengiva durante o sorriso. Essa condição clínica pode interferir negativamente a autoestima e na qualidade de vida dos pacientes. A gengivoplastia e a aplicação de toxina botulínica têm sido associadas no tratamento do sorriso gengival. O propósito deste artigo é apresentar o caso de uma paciente com sorriso gengival tratada pela associação de ambas modalidades terapêuticas.

**Palavras-chave:** toxinas botulínicas tipo A; crescimento gengival excessivo; gingivectomia; gengivoplastia; sorriso gengival; alongamento de coroa cirúrgico.

**RESUMEN**

Sonrisa gingival se caracteriza por la exposición de más de 3mm de encía al

sonreír. Esta condición clínica puede afectar negativamente a la autoestima y la calidad de vida de los pacientes. La gingivoplastia y la aplicación de toxina botulínica se han asociado en el tratamiento de la sonrisa gingival. El objetivo de este artículo es presentar el caso de una paciente con sonrisa gingival tratada mediante la combinación de ambas modalidades terapéuticas.

**Palabras clave:** toxina botulínica tipo A; sobrecrecimiento gingival; gingivectomía; gengivoplastia; sonrisa gingival; alargamiento quirúrgico de corona.

**INTRODUCTION**

Gummy smile is featured by the exposure of more than 3mm of gingiva when smiling. This clinical condition can negatively affect self-esteem and quality of life<sup>1,4,6-12</sup>.

Gummy smile basically has three different aetiologies - gingival, muscular or skeletal, or a combination of these. Treatment is therefore indicated according to the aetiology. If it is gingival, gingivectomy or gingivoplasty is usually performed<sup>1-3,5-8</sup>. In cases of muscular aetiology, myectomy<sup>7</sup> or botulinum toxin application can be performed<sup>1-19</sup>. If the aetiology is skeletal, osteotomy in orthognathic surgery should be performed<sup>7,8,13</sup>. However, it may be necessary to combine therapeutic techniques. It should be considered that techniques such as myectomy or orthognathic surgery are more invasive and have greater morbidity. On the other hand, the application of botulinum

toxin is more conservative than these procedures<sup>1,6,9-12,14</sup>.

The purpose of this article is to present the case of a patient with a gummy smile treated by combining both therapeutic modalities - gingivoplasty and application of botulinum toxin.

### **CASE REPORT**

Female patient, 21-years-old, came to the dental clinic complaining of orofacial disharmony.

Clinically, the patient presented with an anatomical discrepancy between the length of the upper anterior teeth and a slight gummy smile (Figure 1).

**Figure 1** - Patient showing dentogingival discrepancy and gummy smile



The anterior maxillary teeth were used as a clinical parameter for planning the gingivoplasty. Tooth 21 had a length of

8.6mm (Figure 2). In addition, the gummy smile exposed 3.8mm, totalling 12.4mm between the incisal edge of tooth 21 and the lower margin of the upper lip during the smile (Figure 3).

**Figure 2** - Length of tooth 21 (8.6mm)



**Figure 3** - Measurement between the incisal edge of tooth 21 and the lower margin of the upper lip (12.4mm), during smiling



**Figure 5** - Dentogingival discrepancy orientated by the Chu's Proportion Gauge



**Figure 6** - Probing of the gingival sulcus to determine excess tissue



Clinically, dentogingival discrepancy was observed, also due to the malpositioning of teeth in relation to the midline (Figure 4). Chu's Proportion Gauge and probing of the gingival sulcus also helped in the diagnosis (Figures 5 and 6, respectively).

**Figure 4** - Intraoral clinical aspects presenting dentogingival discrepancy



No systemic diseases were reported. Gingivoplasty followed by botulinum toxin application was proposed. The patient agreed to the proposed treatment.

Under local anaesthesia, bleeding points were made using a millimetre probe and these points were joined using an electric scalpel. The length of the teeth was increased, characterising the new dental zenith. Subsequently, scraping was carried out, similar to the external bevelling technique, with the aim of increasing tissue repair (Figures 7 and 8). There was no need to use surgical cement, as the wound repair process occurs by second intention. The patient was counselled and post-operative analgesics were administered.

**Figure 7** - Immediate post-operative evaluation of teeth 21, 22 and 23 after gingivoplasty



**Figure 9** - Post-operative evaluation (40 days) after gingivoplasty, with Chu's Proportion Gauge showing improvement and harmony of dental proportions



**Figure 8** - Immediate post-operative evaluation of anterior maxillary teeth after gingivoplasty



The length of tooth 21 increased to 9mm (Figure 10). The gummy smile reduced to 12.3mm, but the gummy smile still persisted (Figure 11). At the same appointment, botulinum toxin was applied. The skin was previously disinfected with alcohol to avoid local infection and to remove oil from the skin. A local anaesthetic (Emla™, Astra, São Paulo, Brazil) was applied to promote comfort during the procedure. Botulinum toxin type A (Botox™ 200 units, Allergan Pharmaceuticals, Westport, Ireland) was diluted in 2ml of saline solution, according to the manufacturer's instructions, and 2 units were injected into the recommended site, laterally to each nostril, at the level of the wing of the nose, at the insertion of the levator labii superioris muscle of the wing of the nose. The patient was instructed not to lower her head and not to engage in physical activity for the first 4 hours after the procedure.

The patient was evaluated weekly and no complaints or complications were reported.

After 40 days, satisfactory tissue repair was observed. Chu's Proportion Gauge showed an improvement in the proportionality between the length and width of tooth 11 after the new dental zenith was determined (Figure 9).

**Figure 10** - Increase in the length of tooth 21 (9mm)



After 15 days, the patient was evaluated. Uniform dehiscence of the upper lip was observed (Figure 12). The gummy smile was reduced to 9mm, the same length as tooth 21 (Figure 13). No side effects or complaints were reported. The patient was instructed on the clinical effect of botulinum toxin application for 6 months.

**Figure 12** - Clinical result after 15 days of botulinum toxin application



**Figure 11** - Reduction in the size of the gummy smile (12.3mm), despite its persistence



**Figure 13** - Reduction of the gingival smile to 9mm



## DISCUSSION

The aetiological factors of the gummy smile can occur in isolation and association, determining the type of treatment to be used. Reduced clinical crown length of the teeth [1-3,9-12] and delayed passive eruption<sup>1,4,7,9-13</sup> indicate the need for gingivectomy or gingivoplasty. In cases of vertical maxillary excess, orthognathic surgery is indicated<sup>1,5-13</sup>. In cases of hyperfunction of the muscles involved in smiling, myectomy or botulinum toxin application can be performed<sup>1,7,9-13</sup>. However, the treatment of choice is botulinum toxin. As this is a more conservative, easier and safer technique, it can also be predictive of the results presented by myectomy<sup>1,5,9-12,15</sup>.

In terms of muscular aetiology, the muscles involved are elevator muscle of the upper lip, elevator muscle of the upper lip and wing of the nose,

zygomaticus major and minor muscles<sup>1,5-14</sup>. Topographically, there is a point of convergence - next to the wing of the nose - which is considered a point of choice for the application of botulinum toxin [1,5,8-14]. Botulinum toxin diffuses approximately 20mm, reaching the fibres of these four muscles<sup>1,5,6</sup>. The clinical effect is a temporary reduction in muscle contraction, reducing gingival exposure<sup>5-13</sup>.

Botulinum toxin is synthesised by the Gram-positive anaerobic bacterium *Clostridium botulinum*. There are seven different serotypes, designated by the letters A, B, C1, D, E, F and G. Only types A, B and E have therapeutic functions. Type A toxin is the most potent. Botulinum toxin inhibits the release of acetylcholine at the neuromuscular junction, temporarily reducing muscle contraction<sup>1,6-13</sup>.

Botulinum toxin is commercially presented as a hydrophilic, vacuum-stored, sterile and stable powder. It should be diluted by adding 0.9% sodium chloride. It should be stored at 2 to 8°C<sup>1,7-13</sup>. The clinical effects appear 7 to 10 days after application, lasting 3 to 6 months<sup>1,5,6,7,9-13</sup>.

Contraindications for the application of botulinum toxin include autoimmune and neurodegenerative diseases, pregnancy and lactation, and the simultaneous administration of macrolide antibiotics<sup>1,9-13</sup>.

The combination of gingivoplasty and the application of botulinum toxin gave the patient excellent aesthetic results. Gingivoplasty promoted a new gingival recontouring by increasing the dental zenith. The application of botulinum toxin led to a reduction in the gummy smile due to the dehiscence of the upper

lip. Orofacial harmony was achieved by comparing Figures 1 and 12. We can see the smoothness of the facial smile lines, attenuating the nasolabial fold, bilaterally adjacent to the nostrils.

In Stomatology, botulinum toxin has been indicated for parafunctional habits and other symptomatic temporomandibular dysfunctions, such as bruxism, clenching, masseteric hypertrophy; trismus, temporomandibular joint dislocation, ankylosis; in cases of orofacial pain; orofacial or oromandibular dystonia; facial palsy; and sialorrhoea<sup>1,4-18</sup>. Botulinum toxin can also be used as a preventative method to reduce chewing forces in patients with osseointegrated implants, to prevent implant and prosthesis fractures<sup>1,4,11,17</sup>.

## CONCLUSION

The application of botulinum toxin combined with gingivoplasty favoured the gingivo-dental-facial harmony of the patient, improving her quality of life. Carrying out the procedures alone did not achieve the results obtained by combining the therapeutic modalities, and the results were satisfactory for the patient. However, the patient should be advised about the recurrence of gummy smile due to the duration of action of botulinum toxin.

## REFERENCES

1. Pedron IG. Toxina botulínica - Aplicações em Odontologia. Florianópolis: Ed. Ponto. 2016. 195 págs.
2. Narayan S, Narayan TV, Jacob PC. Correction of gummy smile: a report of two cases. *J Indian Soc Periodontol* 2011;15:421-4.
3. Pedron IG, Utumi ER, Silva LPN, Moretto EML, Lima TCF, Ribeiro MA. Gingival resective surgery to the treatment of disharmony of smile. *Rev Odontol Bras Central* 2010;18:87-91.
4. Pedron IG. Orofacial harmonization and botulinum toxin application in the context of Dentistry. *SAODS* 2019;2 (9):10-11.
5. Hwang WS, Hur MS, Hu KS, Song WC, Koh KS, Baik HS, et al. Surface anatomy of the lip elevator muscles for the treatment of gummy smile using botulinum toxin. *Angle Orthod* 2009;79:70-7.
6. Mazzuco R, Hexsel D. Gummy smile and botulinum toxin: A new approach based on the gingival exposure area. *J Am Acad Dermatol* 2010;63:1042-51.
7. Polo M. Botulinum toxin type A in the treatment of excessive gingival display. *Am J Orthod Dentofacial Orthop* 2005;127:214-8.
8. Indra AS, Biswas PP, Vineet VT, Yeshaswini T. Botox as an adjunct to orthognathic surgery for a case of severe vertical maxillary excess. *J Maxillofac Oral Surg* 2011;10:226-70.9.
9. Pedron IG. Gingivoplastia complementada por la aplicación de la toxina botulínica en el manejo de la sonrisa gingival. *Rev Maxillaris España* 2021;23(252):56-61.
10. Vale AS, Pedron I, Pedron TG, Shitsuka C, Pedron IG. Orthodontics, Visagism, Harmonization and

- Attactiveness: the tetrad of the new Dentistry. SAODS 2020;3(10):05-10.
11. Pedron IG. Therapeutic indications of the botulinum toxin type A in Dentistry. SAODS 2020;3(2):13-14.
  12. Campos RM, Dias Jr JP, Barros FC, Maia MLP, Shitsuka C, Pedron IG. Smile harmony after dental implant rehabilitation optimized by application of botulinum toxin. SAODS 2020;3(4):01-04.
  13. Pedron IG. Comment on “Botulinum toxin type-A as an alternative treatment for gummy smile: a case report”. Dermatol Online J 2019;25(6):13030/qt1qk3183b.
  14. Jaspers GWC, Pijpe J, Jansma J. The use of botulinum toxin type A in cosmetic facial procedures. Int J Oral Maxillofac Surg 2011;40:127-33.
  15. Sucupira E, Abramovitz A. A simplified method for smile enhancement: botulinum toxin injection for gummy smile. Plast Reconstr Surg 2012;130:726-8.
  16. Niamtu J 3rd. Botox injections for gummy smiles. Am J Orthod Dentofacial Orthop 2008;133:782-3.
  17. Pedron IG. Therapeutic indications of the botulinum toxin type A in Dentistry. SAODS 2020;3(2):13-14.
  18. Pedron IG, Mendes TB, Roque Neto A, Shitsuka C, Yokoyama PJI, Shinohara EH. Aplicação da toxina botulínica em paralisia facial idiopática. Relato de um caso. Rev Maxillaris Portugal 2020;16(106):58-63.
  19. Santos AE, Santos MAT, Varoli FP, Shitsuka C, Pedron IG. How to get better outcomes in the management of symptomatic bruxism: association between occlusal splint and botulinum toxin. SAODS 2020;3(7):31-36.