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A successful management of sever gummy smile using gingivectomy and botulinum toxin injection: A case report

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ABSTRACT

INTRODUCTION: A gummy smile (GS) affects the esthetic and the psychological status as it usually decreases the self-confidence leading to hidden or controlling the smile. A smile with more than 2 mm exposed gingiva is called gummy smile. It may be due to one or more of the following etiologies; altered passive eruption of teeth, dentoalveolar extrusion, vertical maxillary excess, and short or hyperactive lip muscles. The treatment of gummy smile should be planned according to its cause/causes. The purpose of this case report was to highlight the ability of combined treatment of gingivectomy and Botox injection technique in managing a severe gummy smile. Also, techniques, advantages, disadvantages, indication and contraindications of Botulinum toxin (BT) are discussed at the literacy.

PRESENTATION OF THE CASE: A 24 year old female patient with a severe gummy smile was refereed to the periodontal clinics of our institution. Clinical examination revealed that she has a GS of an 11–12 mm gingival exposed area that was indicated for orthognathic surgery. The GS was treated by a gingivectomy surgery to increase the clinical crowns of upper anterior teeth and the use of Botox injections. The treatment showed remarkable and satisfactory results instead of doing extensive surgery.

DISCUSSION AND CONCLUSION: It is important to assess the patients' esthetic expectations and show the possible therapeutic solutions that fit him. We revealed that BT is considered as one of the minimally invasive, quick and affordable modalities that can replace extensive surgical procedures for corrections of sever GS.

1. Introduction

As facial esthetic awareness of society increases, the demands of dental esthetics become more than before to meet the patients' expectations. The shape, the position, and the color of teeth with the gingival tissues determine the harmony of a smile. Nowadays, both patients and dentists are more conscious of the impact of the gingiva on the beauty of the smile, particularly the periodontist who can contribute greatly to fix patients' smiles [1]. Moreover, recent studies have revealed that the amount of gingival display of smiling affects the smile attractiveness [2,3]. Although displaying a certain amount of gingiva is esthetically acceptable and in many cases imparts a youthful appearance [4], a smile with more than 2 mm exposed gingiva is known to be gummy smile (GS). It is one of the most common alterations among the population, with prevalence 10.5%–29% in which females predominate [5,6].

The various causes of GS include altered passive eruption of teeth, dentoalveolar extrusion, vertical maxillary excess, short or hyperactive upper lip muscles (levator labii superioris, levator labii superioris alaquae nasii, levator anguli oris, and the zygomaticus muscles), or combinations of them [7,8]. Accordingly, to get GS accurate diagnosis and proper treatment, dentists should recognize its main cause\s.

The clinical diagnosis of GS should include the determination of clinical crown length (gingival margin to incisal edge), anatomic crown length (cementoenamel junction to incisal edge), probing depth (gingival margin to the base of gingival sulcus), width of keratinized gingiva (free gingival margin to mucogingival junction), frenal attachment, overjet and overbite space of teeth, and the vertical limits of the smile. Besides, radiographic examination should be done to determine bone level, any protrusion of maxilla and excessive vertical maxilla.

Treatment of GS by esthetic crown lengthening with or without osseous resection is well documented. It is done to increase extension of the clinical crown to restore the normal dentogingival relationships, aiming improvement of the functional and esthetic aspects [9,10]. It remodels the attachment apparatus, eliminates the excessive exposure of gingiva, and shows the correct dimensions of teeth [11]. The procedure involves two types of surgeries, which are gingivectomy, and osseous surgery, depending on the amount of biological width available in the patient. In more illustration, if there are appropriate osseous levels, more than 3 mm

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of gingival tissues (from bone to gingival crest) and the adequate zone of attached gingiva, gingivectomy could be done with beveled incisions to remove soft tissues from the facial surface without disturbing the papillary tissue [12]. However, if osseous levels approximate the CEJ, a simple gingivectomy exposing the entire anatomic crown will be contraindicated because the biologic width of the gingival attachment can be violated. Therefore, a full thickness periodontal flap with osteotomy is indicated [13].

When GS caused by Dentoalveolar extrusion, it can be treated successfully by orthodontic therapy [14]. While, a GS caused by vertical maxillary excess, can be treated by orthognathic surgery, which is associated with significant morbidity and requires hospitalization [15]. However, lip repositioning is recommended as an alternative treatment for GS which done by removing a strip of mucosa from the maxillary labial vestibule and creating a partial-thickness flap between the mucogingival junction and the upper lip musculature. Then, lip mucosa sutured to the mucogingival line, resulting in restriction the muscle pull and reduction of gingival display area [16].

Lately, Botulinum toxin (BT) injection has been considered as a minimal invasive treatment of GS. It is recommended for patients whose gummy smiles are mainly caused by hyperactive lip muscles. When injected BT intramuscularly, it cleaves the synaptosome-associated protein SNAP-25, thereby, blocking the release of acetylcholine and enables the repolarization of the postsynaptic term which produces partial chemical denervation of the muscle, resulting in localized reduction in elevator muscle activities and relaxes the pulling up action of the lip during smiling [17].

However, muscles of facial expression responsible for the upper lip elevation and lateral retraction upon smiling are Levator labii superioris, Levator labii superioris alaeque nasii, Zygomaticus major, Zygomaticus minor and Depressor septii. All of these muscles interact with the orbicularis oris muscle in the production of a smile [18].

As the injection of BT is intermuscular, the dosage of BT injection varies between females and males, depend on the lip muscle volume. In general, males have a larger muscle volume and require more units of BT to achieve the same results as female patients [19]. Moreover, There is an appropriate and effective point of intramuscular BT injection where elevator lip muscles pass by, it is called Yonsei point [20]. This point is located at the center of the triangle formed by Levator labii superioris, Levator labii superioris alaeque nasi and Zygomaticus minor.

The effect of BT is seen within 1–2 weeks, and usually lasts for 4–6 months. However, Some authors conducted that several injections of BT could prolong the reduction of gingival exposure [21,22]. One explanation of this process is that the prolonged muscle paralysis that occurs after several injections can lately lead to partial muscle atrophy and permanent decrease in contraction ability, even after the disappearance of the toxic effect [23].

It is important not to give injections before its effect has completely faded to avoid the formation of antibodies against the toxins, which can lead to disappointing results later on. It is contraindicated for pregnant or lactating women, neuromuscular patients, patients, those under treatment of calcium channel blockers, cyclosporine and aminoglycosides drugs and patients with a history of hypersensitivity to Botox toxin or saline solution [24].

Generally, the Botox treatment is safe when its technique and quantity are administered properly. However, there are some localized side effects which are seen rarely including; pain, infection, bruising, inflammation, edema, loss of muscle strength, nerve palsy, hematoma. In addition, improper injection technique may result in asymmetrical appearance of a smile, some difficulties in speech, chewing and/or drinking. Over-administration could cause drooping or ptosis of the lip below the gingival margin causing obstruction of visible teeth on full smile [25,26].

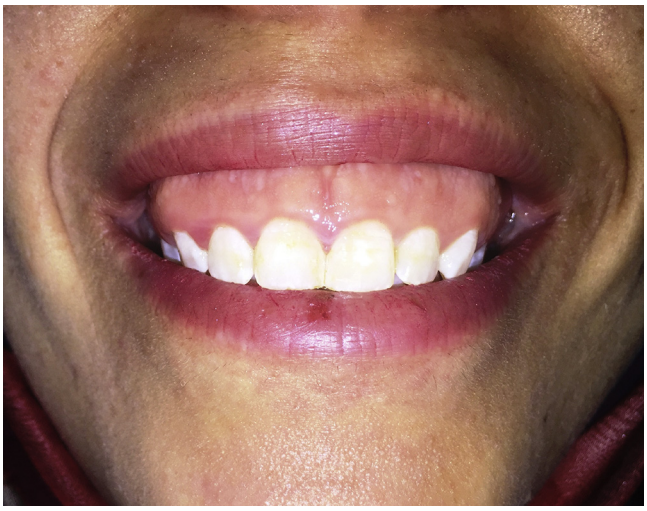

Fig. 1. Sever gingival display during smiling.

In this case, a successful management of sever gummy smile using gingivectomy surgical procedures combined with BT injections had achieved satisfactory results without the need for an extensive surgery. This manuscript has been reported in accordance with the SCARE criteria [27].

2. Case presentation

A 24 year old female patient presented to the periodontal clinics, in our institution with the chief complaint of excessive gingival display during smiling (as shown in Fig. 1) which affected her confidence and physiological state and corresponding to that she used to hide her smile by her hands. The medical and dental histories revealed that she was systemically and dentally healthy with unremarkable use of any drugs. However, she had a positive family history of gummy smile related to her mother.

2.1. Examination and periodontal evaluation

Clinical observation revealed excessive anterior facial height, primarily in the lower third of the face (the vertical facial proportion from the midface to lower 1/3 ratio of 60/40%), facial symmetry, and high smile (gummy smile). Her upper lip when measured from the sub-nasal to the inferior border of the upper lip was 20 mm, which is considered to be within normal limits. While, the incisor display at rest position measured from upper lip to incisal edges of maxillary incisors was 6 mm (Fig. 2).

On periodontal examination, it was observed that this patient had maintained a relatively good oral hygiene as minimal amounts of plaque and calculus deposits were recorded. The gingiva was firm, pink and thick biotype. However, on initial probing depth measurements of maxillary anterior teeth, relatively 2–3 mm were measured by UNC-15 probe without clinical attachment loss or bleeding. Also, the osseous crest was in a normal relationship to the cementoenamel junction. On spontaneous smiling, patient's teeth were visible from maxillary right first premolar to maxillary left first premolar. Also, 11–12 mm of vertical exposure of gingiva was measured from the inferior border of the upper lip and gingival margins of maxillary anterior teeth.

The area of gingival exposure was measured 1 day prior to gingivectomy procedures, before Botox administration, 5th and 14th day of Botox administration. Thus, four recordings were done. Pre-