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Gummy Smile and Optimization of Dentofacial Esthetics

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Abstract: *A comprehensive, inter-disciplinary treatment of the mouth involves the following aspects: assessment of facial characteristics and muscle activity as well as existing relationship between visible dentition and soft tissues to improve patients´ aesthetics and function. There are some physiological and/or pathological conditions which result in excessive exposition of the gums. This causes a negative appearance and limits facial expression. Altered or delayed eruption is one of the main causes of gummy smile. This clinical report describes a gingivoplastic and Osteoplastic procedure for reduction of excessive gingival display.*
Keywords: *Gummy smile, altered passive eruption, crown lengthening, Gingivoplastic, Osteoplastic*

I. Introduction

Gummy smile (excessive gingival display) is a condition in which a high lip-line exposes an abnormal amount of gingival tissue. Several potential factors could contribute to a gummy smile[1]. For example, the muscle controlling the movement of the upper lip could be hyperactive, resulting in an upper lip that rises higher than normal. When this occurs, more of the gingival tissue is exposed when smiling. Other factors can include, but are not limited to, delayed passive eruption and factors related to the dentogingival complex.[1,2,3]

For these challenging patients, a multidisciplinary approach can be beneficial to enhance the balance and harmony between all three components of the smile: lips, teeth, and gingivae embarrassment. In the so-called "gummy smile," the gingivae are the dominant feature when compared to the lips and teeth. At least 50% of patients exhibit some form of gingival display in a normal smile1. However, exaggerated or forced smile patterns in up to 76% of all patients may exhibit gingivae. In absolute numbers, a normal gingival display between the inferior border of the upper lip and the gingival margin of the anterior central incisors during a "normal" smile is 1-2 mm.[4] In contrast, an excessive gingivae-to-lip distance of 4 mm or more is classified as "unattractive" by lay people and general dentists.[5] Fig.1a-d

Fig.1a; Preoperative view

Fig.1b; Preoperative view

Fig.1c; Preoperative view

Fig.1d; Preoperative view

Excessive gingival display has four possible etiologies. First, it may be a result of delayed eruption in which the gingivae fail to complete the apical migration over the maxillary teeth to a position that is 1 mm coronal to the cement-enamel junctions.[4,5] In these patients, restoring the normal dentogingival relationships can be achieved with an esthetic crown lengthening, which is a well documented treatment modality that is highly effective in treating patients with delayed eruption.[6,7] The procedure involves moving the gingival margins apically through soft and possibly hard tissue resection[7]

Fig.2a ;Excessive gingival display due to attrition and compensatory eruption.

The second possibility is vertical maxillary excess in which there is an enlarged vertical dimension of the midface and incompetent lips. Treatment involves orthognathic surgery to restore normal inter- jaw relationships and to reduce the gingival display; this involves hospitalization and significant side effects for patients.[8] The third possible cause is compensatory eruption of the maxillary teeth with concomitant coronal migration of the attachment apparatus, which includes the gingival margins. Orthodontic leveling of the gingival margins of the maxillary teeth may be considered in this situation. Resective surgery is also possible but may expose the narrow root surface and necessitate a restoration.[9,10,11,12] Finally, when the patient smiles, if the upper lip moves in an apical direction and exposes the dentition and excessive gingivae, then surgical lip repositioning may be utilized to reduce the labial retraction of the elevator smile muscle and minimize he gingival display. This procedure was first described in the plastic surgery literature in 1973 and was recently published in the dental literature.[10] During patient examination, it is important to establish the etiology responsible for the excessive gingival display. A diagnosis of delayed eruption, tooth malpositioning, and excessive skeletal deformities might best be treated by crown lengthening, orthodontics, and/or orthognathic surgery. Lip repositioning is suggested as an additional treatment modality for patients with lip hypermobility exposing undesired gingivae in a smile. This clinical report describes a gingivectomy procedure for reduction of excessive gingival display[13,14,15,16,]

II. Case Report

Patient a 30-year-old female, came to Center For Dentistry & Aesthetics,J att, Israel ,For relating her dissatisfaction with her smile after the removal of a fixed orthodontic appliance, which she had worn for 2 years. On clinical examination, it was found that her periodontal condition was satisfactory, but she wanted to improve the esthetics of her smile because it "showed too much of her gum".Fig.1a-d

Fig.2b Final suture of the flap at the preestablished level

It was observed that, after the analysis of her facial thirds, which looked increased, the patient had too much gingival display while smiling, an extreme case of gummy smile measuring 7 mm from the gingival margin to the lower border of the upper lip. Patient underwent orthodontic treatment alignment for alignment of teeth with space closure and changing the gingival profile including the interdental papilla eliminating other treatment options to alter the long axis of the tooth. No alteration in the biological width was done.

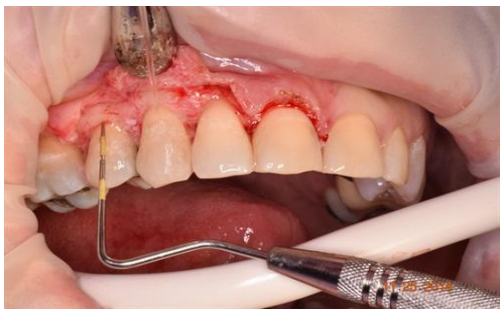

Fig.3a Incision with the marking

Fig.3b ;After excision

After local anesthesia (2% lidocaine with 1:100,000 epinephrine), bleeding points were created from 13-23. A pocket marker was used to puncture the gingival to create bleeding points.

Fig.3c ;Soft tissue healing 6 months after surgery.

Internal bevel incision was given simulating bleeding points following a scalloped pattern to excise a thick, fibrous gingival tissue with a 15 no. blade. Inverse bevel incision was given in order to remove the pocket lining and to further maintain the periodontal health. This was followed by a second incision into the intracrevicular sulcus. Subsequently, the gingivectomy was completed and a full‑thickness mucoperiosteal flap reflected from 13-23. After flap reflection ostectomy was performed in order to provide harmony with adjacent teeth, ostectomy and osteoplasty in interdental areas were performed. Fig.2a-b Fig.3a-cThe buccal flap was replaced and stabilized with simple interrupted sutures . Periodontal dressing was placed on the operated site. Patient was given appropriate postoperative instructions. Postoperative analgesicsand antibiotics were given to control any infections. The sutures were removed 10 days after the procedure. The surgical site was examined for uneventful healing. There were no postoperative complications and healing was satisfactory. Fig.4

Fig.4 ;Post operative

The patient did not have any postoperative morbidity. The patient was instructedto use soft tooth brush for mechanical plaque control in the surgical area.

III. Discussion

Gummy smile correction is done by gingivoplasty to increase the crown lengths for either aesthetic or functional purposes. The surgical procedure is aimed at re-establishing the biological width, apically, while exposing more tooth structure. During the early times, the conventional surgical techniques were the main treatment modalities for performing soft tissue surgeries.[6,7]

Facial photographs in maximum smile were used for analysis. As proposed by Peck et al. [16] to reach the maximum smile, each subject was trained to achieve the same lip configuration at least twice successively before any photograph was taken. To analyze the photographs, appropriate software was used . A vertical line was drawn in each tooth from 12 to 22, from the incisal border, passing through the zenith, up to the inferior border of the lip. The parameters corresponded to the height of the lip line (HLL), which was divided into the length of the crown (LC), and the length of gingiva (LG). To calibrate the images obtained in different periods, all values were transformed into a ratio, considering the length of periodontal probe in both photographs. Fig.1a-b Each measure was performed in triplicate, recorded at least one day apart, and their mean values were representative of each tooth. Mean values of all teeth were representative of the subject. The values were expressed in percentage. One examiner performed all measurements, and intraexaminer reliability was determined by calculating the Spearman correlation coefficient (CC) between the first and second measure (CC = 0.998, p = 0.0000), the second and third measure (CC = 0.998, p = 0.0000), and the first and third measure (CC = 0.998, p =0.0000).[16] Fig.3c Garber & Salama classified four types of smiles as low, which is characterized by exposure of only 75% to less than the height of the clinical crown of the anterior superior teeth, the mean grin, which exposes the total height of the tooth along the interdental papillae or 75% of this, and high when the total height of the tooth is visualized and an amount of greater than 3 mm gingiva is exposed during smiling, which characterizes the so-called “gummy smile." These authors considered the exposure of the gingival margin of the maxillary incisors between 1-3 mm in the act of smiling as the standard more aesthetic smile. Based on this classification, the patients in this study had a high type of smile, and etiology of altered passive eruption it was excessive gingiva on the crown of the teeth, giving appearance of short teeth, associated with the vertical growth of the maxilla.[17]

According Cairo et al. , the dentist must make a correct diagnosis and identification of possible etiologies of the patient's smile, evaluating quirks and ways of treatment.[18]

Other information cited by Zanetti et al. also deserve to be considered, for these authors, the complete harmony of the smiling also depends on the shape, texture and tooth and gum´s color as well as facial features such as facial contours, midline, labial line and interpupillary line.[19]

Pedron et al. stated that periodontal surgeries are appropriate to restore the anatomical characteristics and the relationship between teeth and gum procedures.[20]

Literature concerning treatment of gummy smile is generally anecdotal and sparse with no data supported by statistical analysis. Case reports generally described the use of periodontal surgery with no clear difference between gi sungivectomy and osseous resective surgery. Multidisciplinary treatment plans including prosthodontics and orthodontics are generally suggested for cases showing excessive growth of the maxillary process [17,21,22]. In this case series, the reported outcomes showed that osseous resection is strongly recommended to obtain stable improvement of the smile.[21,22]

IV. Conclusion

The correct diagnosis of the etiology of "gummy smile" as well as the multidisciplinary knowledge of aesthetic and functional characteristics is of paramount importance to the treatment plan.

In conclusion, the completion of the surgical protocol proposed resulted in clinical crown increase and reduction of gingival exposure in the patients.

Furthermore, the upper lip slightly dropped and was less tensioned, which provided a more harmonic aspect to the patients. These results suggest that the technique presented is a useful resource for esthetic improvements in gummy smile patients.

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