

Periodontal aesthetic surgery: treatment option for cases with gingival smile caused by associated etiologies

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Abstract: Gingival smile can be defined as a gingival exposure greater than 3 mm of the area located in the cervical third of teeth. The literature reports that its etiology can be isolated or attributed to an association of factors. Among such causes, can be listed: skeletal aspects such as dentoalveolar extrusion and vertical maxillary growth; and even aspects related to hyperactivity of the upper lip levator muscle. **Methods:** in the present clinical case, gingival smile was

diagnosed due to an altered passive eruption, aggravated by hyperactivity of the upper lip levator muscle. A passive eruption is classified according to the amount of gingival structure in excess and according to the biological distance measured; this classification is divided into groups (Type 1- excess of gingival tissue, Type 2- a small strip of keratinized gingiva), and subtypes (Subtype A, normal biological distance and Subtype B, decreased biological distance). After a

correct diagnosis, a surgical correction of the case was performed. **Result:** The case was surgically corrected by gingivectomy. The aesthetic result is satisfactory, when the healing period is respected, and a correct indication of the treatment techniques for gingival smile correction. **Conclusion:** It is concluded that when correctly diagnosed the gingival smile, the final result obtained is highly satisfactory. **Keywords:** Esthetics. Gingivectomy. Gingiva.

INTRODUCTION

The impact of a beautiful smile directly influences human relationships, since a healthy and pleasant-looking smile facilitates a person's contact with their neighbor and enhances their body language, translating welfare in the broadest sense.⁶

The ideal smile should have the following characteristics: the level of marginal gingiva of maxillary anterior teeth should follow the shape of the upper lip; the incisal edges of the maxillary anterior teeth tend to follow the shape of the lower lip; the line of the upper lip touches the marginal gingiva of central incisors and canines; the lower lip must touch the incisal edge of the six maxillary anterior teeth; canines and central incisors have the same length and are shorter side of 1 to 2 mm; gingival architecture is parabolic and the gingival margin position is symmetrical on both sides; the most apical point of the gingival "garland" (gingival zenith) angle reflects the long axis of the tooth and the average width of the incisal edge is approximately 1.6 mm for the central incisor, 1 mm lateral to the incisive and 0,6 for the canines.

In addition to these mentioned criteria, some authors classified the type of smile with reference to the amount of gingival tissue exposure during the act of smiling. Thus, the smile line can be classified into three categories: low, when there is exposure of 75% of the height of the clinical crown of the maxillary anterior teeth; mean, when there is exposure of 75% to 100% of the height of the clinical crown of the tooth maxillary anterior and high when there is exposure to 100% of dental crowns and, furthermore, there is a continuous gingival strip exposure greater than 3mm during smile⁷. This assessment is made on the lip plane, with the lip at rest until forced smile, and skeletal plan (bipupi-

lar line). The incisal edge position should also be analyzed in order to determine the modification possibilities.

The correct diagnosis of gingival smile involves an extra and intraoral examination. Among the aspects evaluated extraoral are facial analysis, upper lip length at rest exposure of maxillary central incisors at rest, amount of gingival display during rest and speech, the smile line and contour the gingival margin. Lips represent the transition from extraoral to intraoral (dentogingival) analysis. Regarding the intraoral aspects, the periodontal condition, periodontal (thin or thick) biotype, gingival contour and zenith, interdental papilla, recessions and gingival staining should be evaluated. It is also necessary to make a dental evaluation, verifying the proportions between the teeth, symmetry, facial midline versus interincisal line, dental axes, incisal angles, and incisal edge versus inferior lip.⁹

The etiology of the gingival smile may of isolated origin or due to the association of factors such as hyperfunction of the levator muscle of the upper or short lip; dentoalveolar extrusion; hormonal, drug or bacterial plaque hyperplasia; short clinical crown; vertical growth of the maxilla and altered passive eruption. As treatment options for the gingival smile described in the literature, it is used orthognathic surgery, gingivectomy (may or not be associated with osteotomy), myectomy and botulinum toxin, and the choice of treatment depends fundamentally on the etiological factor.^{12,20,10,15} (Table 1).

Altered passive eruption is a term used to describe a failure condition in the proper positioning of the gingival margin, and occurs during dental eruption. In this condition, the gingival margin does not retreat to the level near the cemento-enamel junction, resulting in a reduction in dental crown exposure. However, there are

Table 1: Correlation among etiology, treatment and skills.

ETIOLOGY	TREATMENT	SPECIALTIES
Vertical growth of excess jaw	Orthognathic surgery / Orthodontics	CTBMF / Orthodontist
Dentoalveolar extrusion	Orthognathic Surgery / Orthodontics	CTBMF / Orthodontist
Superior short lip	Plastic surgery	Plastic surgeon
Hyperactivity of the upper lip	Plastic surgery	CTBMF - Dermatologist
Passive eruption Amended	Periodontal surgery c / s flap	Periodontist

Source: Kahn and Dias¹⁵ (2016).

Table 2: Altered passive eruption classification, according to Colset et al.¹¹

RANKING	CHARACTERISTICS
Type 1	There is a range of excessive keratinized gingiva, measuring the gingival margin to the mucogingival junction.
Type 2	There is a normal range of keratinized gingiva, measured from the gingival margin to the mucogingival junction, although the gingival tissue extends over the coronal portion of the teeth.
Subgroup A	The distance between the CEJ and bone crest presents more than 1 mm, being sufficient for the adaptation of connective tissue attachment
Subgroup B	The distance between the crest and the CEJ bone, as measured by bone scan, is less than 1 mm, being reduced, thus reducing the space for the adjustment of the conjunctive insertion; that is, the bone crest is located at the CEJ level.

Source: Ingber et al.¹¹ (1977).

several forms of clinical manifestation of altered passive eruption, which is classified into types (Type 1, in which there is an excess of keratinized gingival tissue, and Type 2, in which there is a small range of keratinized gingival tissue) and subtypes (Subtype A, in which there is a normal distance of 2mm between the bone crest and JAC)

and Subtype B, where there is a distance of less than 2 mm between the bone crest and the JAC. According to each type / subtype, there are distinct forms of therapeutic approach.^{14,11} (Table 2).

This article aims to present a case report of gingival smile and, through it, to discuss the etiology and treatment options.

CASE REPORT

Patient KMRS, 20 years, attended the Dental Clinic of Unipar - Campus Umuarama requesting periodontal evaluation, complaining of excessive gingival exposure when smiling (Fig 1). After anamnesis, physical and photographic examination, gingival smile was diagnosed, whose etiology was altered passive eruption and hyperfunction of the upper lip levator. As a therapeutic approach, gingivectomy surgery was proposed by the internal beveling technique without osteotomy. After an extra-oral asepsis with polyvinyl pyrrolidone iodine (PVP-I) and intraoral with 0.1% chlorhexidine mouthwash, the anesthetic block of the anterior superior alveolar nerve was performed bilaterally and the nasopalatine nerve, using the anesthetic mepivacaine, associated with epinephrine 1: 200,000.

The measurement of the height and width ratio of the anterior superior teeth was made with a Chu proportionality meter (Fig 2), which is measured through the tip T-bar, which measures the height and width of the tooth, according to Chu and Hochman, should be 78%. This tip presents a incisal stop, in addition two side arms and a vertical shaft that have intervals of 0.5 mm, marked with different colors; the measurement is done by positioning the lateral width intervals, and the same interval in the vertical rod represents the ideal proportion of the dental element². Transulcular survey was performed to measure the biological distance, thus confirming the classification of subtype A, in which the osteotomy is not necessary (Fig 3). Subsequently, the bleeding points were demarcated (Fig 4), from the measurement made by the Chu ruler and the trans-sulcular probing,

respecting the biological distance. Three bleeding points were performed: one in the mesial, one in the center and another in the distal marginal gingiva of each tooth. The first incision joined the bleeding points (forming the “collar”), with the blade of the scalpel positioned at an angle of 45° in the incisal-to-apical direction on the crown of the tooth, characterizing the incision technique of the internal bevel. An intrasulcular incision was made, with the blade of the scalpel positioned within the gingival sulcus until it touched the bone tissue (Fig 5), thus detaching the gingival tissue from the periosteum. The incised collared gingival tissue was removed with a McCall # 13-14 curette. This technique does not require suturing, since the papillae remain intact. However, an electric scalpel was used to refine the gingival margins (Fig 6).

As postoperative medication was prescribed to the patient an analgesic for pain control (Paracetamol® 750 mg, 1 tablet every 6 hours for 3 days), anti-inflammatory drugs (nimesulide 100 mg, 1 tablet every 12 hours for 3 days) and, for chemical biofilm control, 0.12% chlorhexidine (Periogard®), with guidance to perform rinse of 10 ml, 2 times daily, for 10 days. The patient returned after 30 (Fig 7) and 90 days (Fig 8) to evaluate the healing process. As the cause of the gingival smile was also associated with hyperactivity of the levator muscle of the lip, an additional therapeutic option would be the application of botulinum toxin to the muscle, which would temporarily reduce the gingival exposure when smiling. However, the patient was satisfied with the results obtained with periodontal surgery and did not accept to perform the therapeutic complementation with cosmiatry.



Figure 1: Initial photo of the gingival smile (altered passive eruption type 1A).

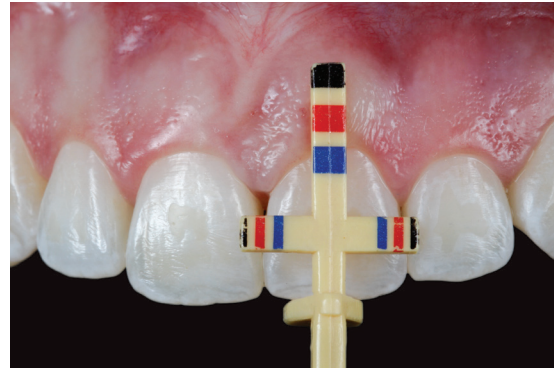


Figure 2: Chu²⁸ proportionality meter.

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Figure 3: Periodontal probe showing the 9mm clinic crown in the upper central incisor.



Figure 4: Periodontal probe determining the bleeding point which will be the limit of the internal beveling incision.

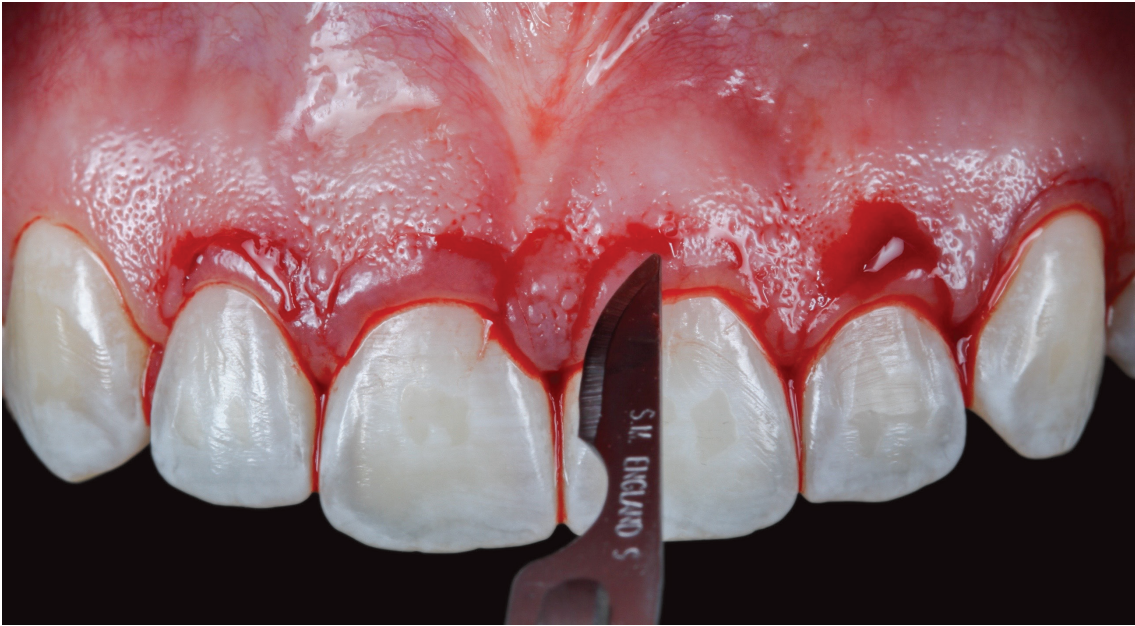


Figure 5: Blade 15c performing internal beveling.



Figure 6: Removal of excess gingival tissue.



Figure 7: 30-day postoperative.

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Figure 8: 90-day postoperative.

DISCUSSION

The smile can be classified as low, which is characterized by the exposure of only 75% of the clinical crown of anterior superior teeth, medium, exposing the total height of the anterior superior teeth and exposes the interdental papillae; and high; in which total height of the tooth is visualized and a greater amount of gingiva that 3 mm is exposed during the smile, which characterizes the so-called gingival smile.⁷ The smile is considered esthetic when it presents 1 to 3 mm of exposure of gingival tissue. Based on this classification, the patient of the present study presented a high smile.

The literature reports various etiologies for the gingival smile, including vertical jaw growth, muscle hyperfunction of the levator muscle of the upper lip and altered passive eruption, which is characterized as a clinical condition related to gingival asymmetry, due to the coronary positioning of the margin gingival to the cementum-enamel junction, giving short clinical crowns of different sizes.^{1,10} According to some authors,¹⁵ a total of 12.1% of 1,025 patients studied had altered passive eruption, corroborating the results of other researchers,^{3,26} that reported an incidence of approximately 12% of patients, with an average age of 24 years.

The altered passive eruption was classified having as parameters the mucogingival junction (MGJ) and bone crest. In the present clinical case, altered passive eruption type 1, characterized by the excessive presence of keratinized gingiva, could be observed; subtype A, with a distance equal to or greater than 2mm between the cemento-enamel junction and the bone crest, and gingivectomy is the most indicated treatment, with no need for osteotomy, as described in works.^{1,18,22,25}

The classical Gingivectomy technique was first described by Robicsek in 1884 and consists in the removal of the excess gingival tissue through an incision by the blade of the knife 45° to the

crown, resulting in connective tissue exposure, being suitable for cases without the need for osteotomy, due to the impossibility of folding flap to expose the bone tissue.²¹ The literature reports advantages of this technique: simplified execution and low cost.⁴ A study compared gingivectomy to the internal bevel technique and found, in a sample of 31 patients, statistically significant differences in the apical deviation of the mucogingival junction in the cases treated with the internal bevelling technique. In the technique with gingivectomy, this position change was not observed. However, in both techniques, the elimination of the pouch and maintenance of the results after six months was effective.²⁷ The postoperative contour of the tissues is considerably better in the internal bezel.¹⁶

Regarding the gingival smile caused by hyperactivity of the upper lip levator muscle, the treatment options can be surgical, with the use of myectomy and lip repositioning, not surgical, through the application of botulinum toxin.^{24,22} The myectomy is performed through the incision levator muscle of the upper lip or portion thereof, in order to reduce the elevation of the upper lip during the smile.^{12,24} Authors carried out the technique in 14 patients and obtained a mean reduction of 3.3 mm, 6 months after surgery.²⁹

In the lip repositioning technique, the inner upper lip mucosa is incised and an elliptical fragment is removed after dissection of the area; subsequently, it is sutured in a lower region of the periosteum and, therefore, it is expected that there is a stabilization of the lip in the keratinized tissue 4 mm above the gingival margin. This reinsertion process restricts the elevation of the upper lip during the smile, limiting the amount of exposed gingival tissue.²³

Botulinum toxin type A is a purified protein, with low antigenic potential, used in the correction of facial deformities through relaxation of a specif-

ic muscle group. In the case of gingival smile, it is indicated to reduce the labial hyperfunction and, consequently, to promote a lower tissue exposure when smiling. It has advantages such as the technical ease of execution, low rate of complications and a natural and practically immediate effect. However, it has as main disadvantage the permanence of the effect for less than 6 months, necessitating applications of maintenance doses.¹⁷

CONCLUSION

A smile can be considered gingival if more than 3mm of gingiva are exposed during a spontaneous smile. It may be considered more or less exposed,

and among its etiologies is the altered passive eruption, which is classified according to the width of the gingival band inserted and the distance between the cementum-enamel junction and the alveolar crest. The treatment of gingival smile requires a correct diagnosis of the etiology, so that the most satisfactory treatment option can be indicated.. In the case presented, the patient had an aggravating factor in the etiology of gingival smile, which was the presence of hyperfunction of the upper lip. Thus, the surgery performed to increase the clinical crown helped to minimize the exposure of the gingiva caused by muscular activity.

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