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Aesthetic Crown Lengthening Treatment for Altered Passive Eruption: Clinical Case Report

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Abstract

Supracrestal insertion measurements to achieve proportions in the smile that harmonize with the face. Excessive gummy display, also known as a "gummy smile," is a common cosmetic concern among dental patients. Excessive gingival exposure when smiling has been largely seen as unsightly, leading many patients to seek some type of treatment to address this problem. The etiology involved in the gummy smile is usually multifactorial, so an accurate diagnosis is essential before any surgical treatment. Potential causes for a gummy smile are: Short lips, Hypermobile/hyperactive lip activity, Short clinical crown, Dentoalveolar extrusion, and altered passive eruption, Vertical maxillary excess, and gingival hyperplasia. The case in this regard: A 22-year-old female patient attended the consultation with the main complaint of excessive gums when smiling, with no relevant history. A diagnosis is made, which results in altered passive eruption and as a treatment, aesthetic crown lengthening is performed to alleviate the patient's problem.

Keywords: Periodontics; Aesthetic treatment; Altered passive eruption

Introduction

Altered Passive Eruption (APE) is a genetic or developmental condition characterized by coronal positioning of the gingival margin on the enamel, resulting in short clinical crowns [1]. According to the glossary of periodontal terms, the American Association of Periodontics defines Altered Passive Eruption as: Exposure of the tooth secondary to apical migration of the gingival margin to a location at or slightly coronal to the cementoenamel junction (CEJ) [2].

Although Altered Passive Eruption (APE) leads to cosmetic deterioration, this situation is a normal variation and is not necessarily pathological. APE was described as a genetic or developmental condition [3]. The most widely accepted classification for APE was published by Coslet et al. in 1977 [4]. This classification involves considerations about the amount of keratinized gingiva:

- Type I: Wide gingiva
- Type II: Thin gingiva

And the distance from the CEJ to the alveolar crest:

- Subgroups A: alveolar crest and the CEJ ratio corresponds to the distance of 1.5 mm accepted as normal.
- Subgroups B: When the alveolar crest is at the level of the CEJ.

Chan, in his article "Predictability in the treatment of gummy smile with altered passive eruption", in 2015 mentions: A key element to reach a diagnosis is to observe the location of the cemento-enamel junction (CEJ) in the gingival sulcus. The CEJ normally resides just apical to the free gingival margin of the crown. In contrast, CEJ may reside up to 10 mm apical to the free gingival margin in altered passive eruption. If CEJ can be detected in the sulcus and all other etiologies have been ruled out, a diagnosis of altered passive eruption can be made [5].

A cosmetic crown lengthening procedure is required to treat APE. One of the most important parameters to evaluate before performing an aesthetic crown lengthening procedure is the location of the cemento-enamel junction (CEJ), which ultimately determines the clinical length of the crown. Furthermore, the

location of the alveolar ridge and its thickness determine whether a gingivectomy procedure should be performed with or without bone resection surgery. Another critical factor is understanding the interaction between the position of the gingival margin and the CEJ in relation to the alveolar ridge. Failure to establish the optimal distances between the CEJ and the alveolar crest could result in potential relapse or unwanted exposure of the root surfaces [6].

Materials and Methods

Case description

A 22-year-old female patient attended the San Francisco de Quito University (USFQ) Dental Clinic, with the main complaint: "when I smile, my gums are visible a lot". He has no significant personal or family history. Routine periodontal examinations (Periodontal Spreening and Recording (PSR), Oral Hygiene Index (OHI), Periodontogram begin to be carried out (Figure 1).

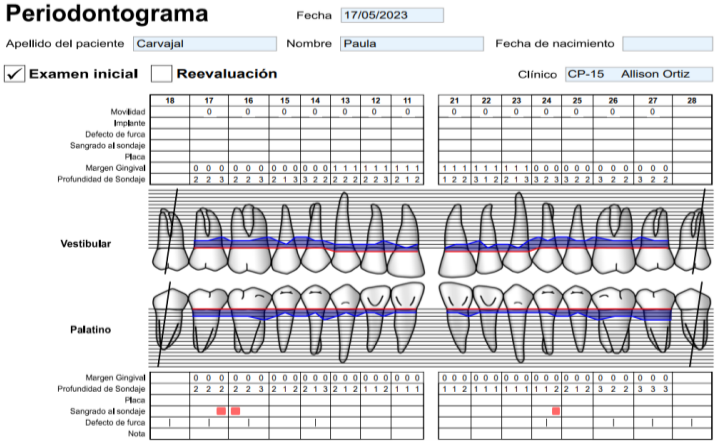

***Figure 1**: Detailed periodontogram of the patient.*

Clinical evaluations

- CEJ: This is visualized directly when there is gingival recession, however, it can be located subgingivally using the periodontal probe or an explorer.
- Alveolar Crest: Direct bone level (DBL) measurement obtained after reflection of the surgical flap is considered the most accurate method and the gold standard for detecting the location of the alveolar crest. However, it is an invasive procedure that causes discomfort to patients and may not always be applicable in the pre-surgical planning and diagnosis phases.

Photographs

The series of extraoral and intraoral pre-surgical photographs is taken of the patient:

- Extraoral: Frontal at rest (Figure 2), Frontal with a wide smile (Figure 3), Lateral right and Lateral left (Figure 4).
- Intraoral: Frontal (Figure 5), Upper Occlusal and Lower Occlusal (Figure 6), Right Lateral and Left Lateral (Figure 7).

Classification

For this clinical case, it was decided to opt for the modified classification of Ragghianti, in 2016 (7). Where the altered passive eruption is accompanied by the altered active eruption, complementing the Colset classification.

Where the thickness of the gingiva is maintained in Type I and Type II, it is classified as altered passive eruption alone or is supplemented by altered active eruption. Highlighting as follows:

- Keratinized gingiva >2mm with a distance of 1.5mm from the cemento-enamel junction (CEJ) to the alveolar crest. (Type I, altered passive eruption alone).
- Keratinized gingiva ≤2mm with a distance of 1.5mm from the cemento-enamel junction (CEJ) to the alveolar crest. (Type II, altered passive eruption alone).
- Keratinized gingiva >2mm with insufficient distance from the cemento-enamel junction (CEJ) to the alveolar crest. (Type I, altered passive eruption accompanied by altered active eruption).
- Keratinized gingiva ≤2mm with insufficient distance from the cemento-enamel junction (CEJ) to the alveolar crest. (Type II, altered passive eruption accompanied by altered active eruption).

Decision making

Classifying the patient as: Keratinized gingiva >2mm (Figure 8) with insufficient distance from the cemento-enamel junction (CEJ) to the alveolar crest. (Type I, altered passive eruption accompanied by altered active eruption). It was decided to make internal bevel incisions modifying the future gingival contour plus bone resective surgery to restore the measurements of the supracrestal insertions.

Surgical Procedure

Bleeding Points (Bone Probing): The esthetic crown lengthening procedure has traditionally been guided on the basis of clinical evaluation of parameters by direct visual assessment and bone probing [8]. We perforated the gingival tissues, at the zenith according to the dental piece, with a periodontal probe (Hu-Friedy /CP15), thus creating bleeding points (Figure 9). It was performed with a periodontal probe (Hu-Friedy /CP15) and the points were connected in a scalloped form (15c scalpel).

These points are then connected in a scalloped form (15c scalpel) to represent the future gingival contour of all the teeth to be treated (pz # 15 to 25) (Figure 10). The internal bevel technique at 45° of the scalpel blade was used, subsequently, the soft tissue

was removed with a universal curette (Hu-Friedy), all this preserving the interdental papillae.

Figure 2: *Extraoral frontal photograph of the patient at rest, verifying facial symmetry.*

Figure 3: *Extraoral frontal photograph with a wide smile of the patient, gingival excess is evident when smiling.*

Figure 4: *Extraoral photographs of the patient on the right side (A) and left side (B).*

Figure 5: *Frontal intraoral photograph, we observe gingival health in periodontal tissues.*

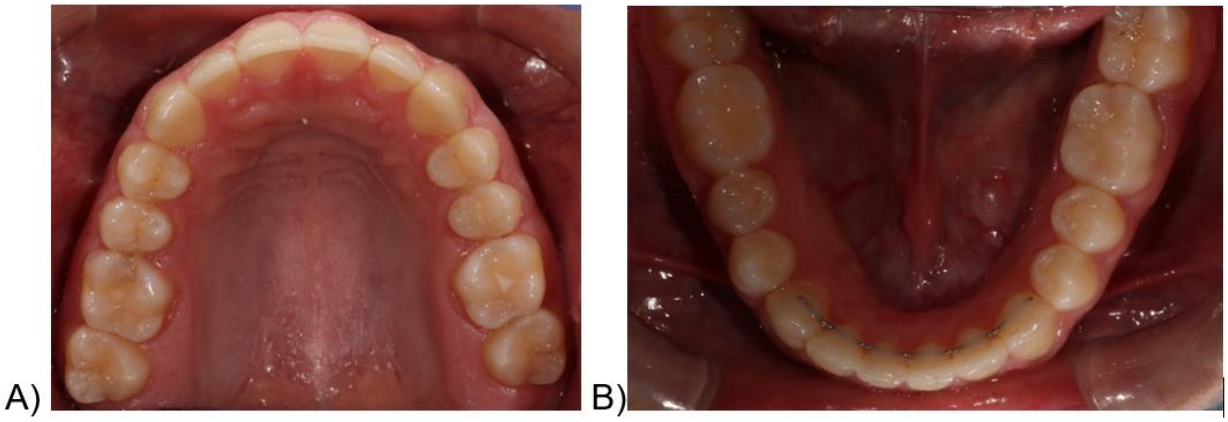

Figure 6: *Upper occlusal (A) and lower occlusal (B) intraoral photographs.*

Figure 7: *Right lateral (A) and left lateral (B) intraoral photographs.*

Intrasulcular incisions were made to raise a full-thickness flap, without exceeding the mucogingival line, using a 2-9 molt curette (Supremo) (Figure 11).

To preshape bone recontouring (ostectomy and osteoplasty), leaving the bone crest 2 to 3 mm from the newly outlined gingival margins and thus limiting the amount of gingival rebound. The amount of bone resection should be gradually reduced with a high powered turbine and burs intended for gingival lengthening, towards the line angles to avoid loss of interdental bonding and black triangles (Figure 12).

We finished the surgery by repositioning the flap and making sutures. A vertical mattress was placed on the interdental papilla of the incisors, while suspensory stitches were made in the other areas (Nylon 5.0 suture thread) (Figure 13).

Post-surgical measures: The patient was prescribed 0.12% chlorhexidine (Encident) as a rinse for 15 days until the stitches were removed. Suspension of tooth brushing in the area. A non-steroidal anti-inflammatory drug (sodium naproxen, 550mg, every 12h x 3 days) and an analgesic (paracetamol, 1g, every 12h x 3 days) were also prescribed.

Results

Stitches were removed 15 days after surgery without incident (Figure 14). The last photograph of the post-surgical patient was taken, evidencing the change and improving the proportion of the dental pieces (Figure 15).

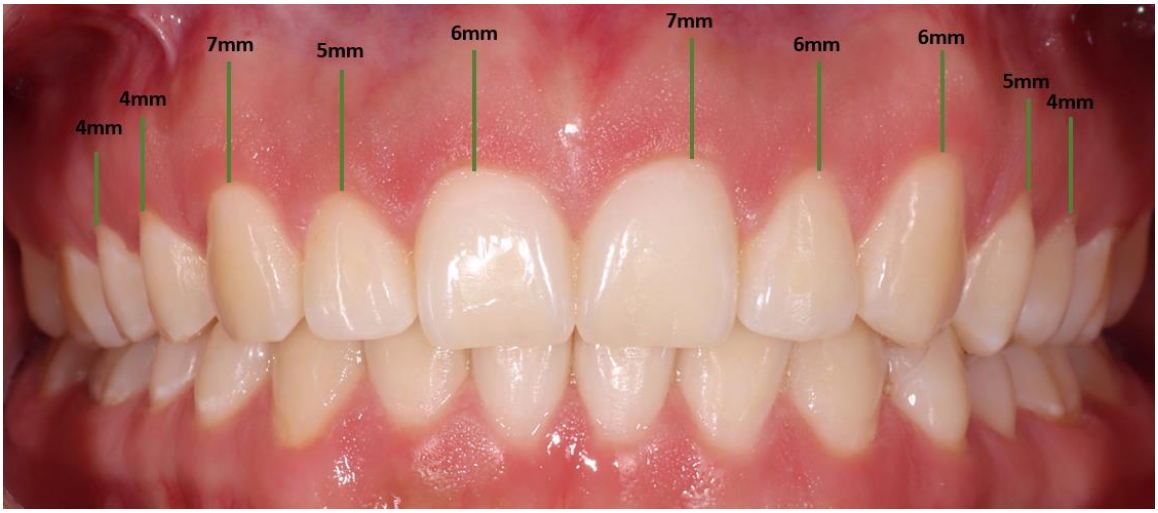

Figure 8: *Frontal intraoral photograph of the patient, evidencing the amount of keratinized gingiva in the pieces to be treated.*

Figure 9: *Bleeding points at the zenith according to the piece in question: Central incisives, slightly towards the distal part of the piece. Lateral incisives, medial point of the piece. Canines, medial point of the piece located on the axis. Premolars, the point located in the middle of the piece.*

Figure 10: *Representation of the gingival contour of the pieces to be treated, from piece #15 to piece #25.*

Figure 11: *Elevation of the flap to full thickness.*

Figure 12: *Bone resection using a specific diamond bur for crown lengthening. Leaving the bone crest 2 – 3mm from the newly modified gingival margin.*

Figure 13: *Replacement of the flap and fixation with sutures in the interdental papillae, vertical mattress stitch in the central papilla and suspensories in the other papillae.*

Figure 14: *Post-surgical photograph 15 days after the removal of stitches.*

Figure 15: *Final post-surgical frontal photograph with the patient's wide smile.*

Discussion

APE was once classified as a typical variation and not necessarily pathologic, but it is often associated with a “gummy smile” and requires surgical intervention to correct [9]. The diagnosis of APE is the first step in therapy, there are multiple clinical and imaging techniques described to help the dentist. Coslet et al. in 1977 [4] described the location of the CEJ that was used to determine if the anatomical crown is really short. This author suggests that the CEJ should be located around 1.5mm from the distance between the alveolar crest and the connective junction. The location of this structure is more challenging when the bony crest is close to or coincides with the CEJ.

In addition, the periodontal biotype must be understood by clinicians for their surgical practice. A flat-thick periodontium means: the presence of thick, fibrotic soft tissue, significant amounts of keratinized gingiva, thick, short papilla, and thicker, flatter bone. In contrast, a thin-scalloped periodontium has thin soft tissue and keratinized gingiva with long narrow papillae on comparatively thin-skinned bone [10].

The most predictable APE treatment protocol can only be indicated by a careful diagnosis and treatment plan. Transgingival probing (Tp) is the most common method used to determine the clinical dimensions of the crown, which is used to detect subgingival CEJ. The soft tissue height can be measured with a periodontal probe in the alveolar bone, which can be used to guide the amount of bone to be removed. Studies comparing Tp with direct bone level measurements immediately after flap reflection indicate that both methods are accurate in determining alveolar bone levels [11].

In type I, due to the amount of keratinized gingiva, a marginal band of gingiva can be removed through an external or internal

beveled incision. In type II, the keratinized gingiva is narrow and requires an intrasulcular incision with an apically repositioned flap. In cases where removal of the gingival collar may result in less than 2 mm of keratinized gingiva remaining, at least 2 mm of keratinized gingiva should be maintained on the flap and associated with apical repositioning to preserve its proper height.

Type I is where most variations of the technique are found and requires identification of a specific periodontal biotype to plan the incision. If AAE is not related to APE, gingivectomy is the recommended course of action. In this situation, osseous approaches are not required. Cases associated with APE with AAE may require flap resection and internal bevel incisions. When the periodontal biotype is thick, it is important to alter the height and thickness of the gingival tissue while aligning the angulation of the scalpel for the internal bevel incision approximately 45 degrees to the long axis of the tooth. Type I cases may present a thin periodontium and extensive keratinized gingiva at the same time. To avoid loss of gingival height, the incision must have a 90 degree angle with respect to the long axis of the tooth [4].

The esthetic crown lengthening procedure has been found to result in less soft tissue rebound when the postoperative gingival margin is placed 3 mm coronal to the surgically reduced alveolar bone, based on clinical studies [12]. Full-thickness flaps are necessary to allow access to the bone when bone resection is suspected. If apical repositioning is indicated, you should use a mixed (full and partial thickness) flap to create flap anchorage to the periosteum. Vertical incisions may be indicated for the apical flap, depending on operator preference. When a minimal ostectomy of the marginal ridge is necessary, but not enough to remove the bulk by osteoplasty, flapless techniques are used. When dealing with a thin gingival margin, it is important to use Mini- Ochsenbein chisels. Flaps are usually repositioned with a mattress pad or simple sutures, depending on the stability of the gingival margin near the CEJ. To achieve predictable and reliable results, it is essential to carefully design and evaluate all technical steps [13].

“Gold standard” aesthetic proportion determines that the width of the maxillary central incisors should be approximately 80% of their length, with an accepted variation between 65 and 85%; while the upper lateral incisors present around 70% [14].

Conclusion

Surgical procedure involving gingivectomy, full-thickness flap, and bone resection is an expected protocol to reduce APE related “gummy smiles.” Thus improving the dental proportion, harmonizing the face of the patient.

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