Periodontal Plastic Surgery for the Management of Altered Passive Eruption: 5 Months Follow-Up Case Report

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ABSTRACT
Background: Altered passive eruption (APE) is defined as the situation in which “the gingival margin in the adult is located incisal to the cervical convexity of the crown and removed from the cemento enamel junction (CEJ) of the tooth. Clinical features of APE include excessive display of gingiva upon smiling associated to short clinical crown appearance, since the gingival margin overlaps the anatomical crown. This condition may create esthetic concerns. In fact, teeth seem to be hidden, clinical crowns appear square in shape, and the gingival festooning is flattened.

Case Report: This case present the management of a case of APE type I diagnosed in a 20-year-old systemically healthy female. The patient was unhappy with her smile. In fact, she was especially uncomfortable with gingival display when smiling and with “The black hole” between teeth 11 and 21. Initial periodontal therapy (IPT) was applied including oral hygiene instructions and scaling. Then, an external bevel gingivectomy was performed followed by the frenectomy of the upper labial frenum. Gingival healing was uneventful. The gingival line steel stable 5 months postoperative, and the papilla between teeth 11 and 21 filled the whole interproximal space.

Conclusions: The proper treatment of APE may enhance the smile. From this point of view, external bevel gingivectomy is an effective procedure in case of APE type I. In some cases, frenectomy may improve the aesthetic result. These techniques, lead to stable results.

KEYWORDS
Altered passive eruption, Gummy smile, External bevel gingivectomy, Gingival overgrowth.

INTRODUCTION
Altered passive eruption (APE) was first defined by Coslet et al. in 1977.1 It is the situation in which “the gingival margin in the adult is located incisal to the cervical convexity of the crown and removed from the cemento enamel junction (CEJ) of the tooth”. 2 Retarded passive eruption or “delayed passive eruption” have been also proposed to define this periodontal status.3

The term APE refers to the mechanism underlying production of this morphological variant. Indeed, it is attributed to failure in concluding the passive eruption phase.5 The Glossary of Periodontal terms of The American Academy of Periodontology defined this eruption stage as the tooth exposure secondarily to apical migration of the gingival margin to a location at or slightly coronal to the CEJ.6 This variation in habitual morphology is considered as a physiological situations and in any case as a pathological one.4

Clinical features of APE include excessive display of gingiva upon smiling associated to short clinical crown appearance, since the gingival margin overlaps the anatomical crown.7 This condition may create esthetic concerns. In fact, teeth seem to be hidden, clinical crowns appear square in shape,8,9 and the gingival festooning is flattened.4

The classification proposed by Coslet et al.6 is the most frequently cited in the literature. According to which, APE has been divided into two main types.6,8 The Type I is characterized by an excessive amount of attached gingiva, while type2 is associated with a normal gingival dimension. Two possible subclasses were also suggested. In subcategory A, the distance Osseous Crest - CEJ is greater than 1mm, while in subcategory B the bone crest is in the CEJ.1 However, several authors criticized the fact that this classification did not take into account the altered active eruption (AAE).10 The latter physiologic variation, characterized by the proximity or coincidence of the alveolar crest to the CEJ,1,10,11 was described as the subgroup B of the APE. Moreover, the possible association between APE and AAE was not well described. Recently, a modification of the previous classification based on eruptive and biological concepts has been suggested.10

Firstly, This modified classification preserved APE Type I and Type II according to amount of keratinized gingiva, but values were added to facilitate diagnosis (Type I- >2mm of keratinized tissue/ Type II- ≥ 2mm).11 Secondly, the subgroups A, B were excluded while categories of APE alone or APE associated with AAE were included.10

Except its esthetic consequences, several authors consider that APE is a risk situation for the periodontal health. Indeed, difficulties in oral hygiene and narrow connective attachment are both highlighted.4 It is particularly important for APE I-AAE, APE II associated or not to AAE.10 Moreover, for Volchkonsky9 there is a positive correlation between APE and acute necrotizing ulcerative gingivitis. From this point of view, APE should be treated even if patient has not esthetic demand.

Periodontal surgery leads to improving the esthetic aspect of the lower third of the face by establishing the proper tooth proportion and by placing the gingival margin in a suitable position relative to the lip.10,11,12 The type of treatment proposed for each one of the different clinical situations of APE is based on its classification.10

The aim of this paper is to present the management of a case of APE type I with an external bevel gingivectomy associated to frenectomy and its 5-month follow-up.

CASE DESCRIPTION
A 20-year-old systemically healthy female, was referred to the department of periodontology of the faculty of dental medicine of Monastir (Tunisia) with a chief complaint of an unacceptable aesthetic result following orthodontic treatment.

The patient was unhappy with her smile. She was especially uncomfortable with gingival display when smiling. Moreover, she didn’t like “The black hole” between teeth 11 and 21.

The clinical examination revealed short and square in shape clinical crown appearance. The “black hole” between teeth 11 and 21 was effectively present. In addition, transgingival probing revealed that the bone crest was situated 3mm apically to the CEJ. Finally, gingival overlapping was noted when smiling, especially in regards to teeth 12 and 22. (Figure 1a-b)

Regarding these clinical parameters this patient was diagnosed with type I APE, according to the classification of Ragghianti.14

The treatment protocol included an initial periodontal therapy whose objective is to reduce gingival inflammation. Then, periodontal surgery aiming the enhancement of the smile by establishing the proper tooth proportion was performed.

The conventional non-surgical therapy consisted in a full mouth scaling. In addition, the patient was advised to perform and maintain her oral hygiene by brushing 3 times a day and to use a chlorhexidine mouth rinse of 0.2% twice daily.

The surgical therapy comprised an external bevel gingivectomy concerning only the 4 maxillary incisors; associated with frenectomy of the upper labial frenum. First, the pockets were probed and bleeding points produced. Then, the primary incision was made with

(FIG. 1) a) Pretreatment view of upper anterior teeth. Note the short and square in shape clinical crown appearance
b) Photography of the pre-treatment smile showing gingival overlapping when smiling
 Gingivectomy realized, we performed maxillary labial gingivoplasty using a fine pair of gingival scissors. Once with a 15 blade, the gingival contour was corrected by Kirkland knife; while the secondary one was made with Orban knife.

Following surgical operation, paracetamol 2x3 for 5 days (Adol® 500mg, SAIPH, Tunis, Tunisia) and chlorhexidine oral rinse 1x2 for 10 days (Eludril® 90mL SIMED, Tunis, Tunisia) were prescribed. The pack and the sutures were removed 1 week post-operatively.

1 week after surgery, healing was uneventful and the gingival margin was situated in the CEJ with a scalloped gingival architecture. The gingival line steel stable 5 months postoperative, and the papilla between teeth 11 and 21 filled the whole interproximal space (Figure 2a-b). Moreover, the smile was enhanced and the patient was satisfied of the final clinical outcomes (Figure 3).

To diagnose APE, clinicians must take in account the patient age. Nevertheless, there is controversy surrounding the life time at which a diagnosis of APE can be made. In fact, all authors agreed to say that we can speak of an APE only when the passive phase of the eruption remains incomplete after the patient has completed its growth, it is rather the age at which the passive eruption ends which creates disagreement. Evian CE\(^2\) believed that the anterior teeth typically undergo passive eruption in the early teen years. On the other hand, Zucchelli G.\(^3\) stated that passive eruption continuous until patients had completed their growth i.e.18 to 20 years for the woman and 20 to 22 years for man. However, Volchansky A.\(^4\) indicated that by the age of 20 years passive eruption had not yet ceased in the anterior teeth. Weinberg M.\(^5\) agreed and stated that no study had investigated what happens past 20 years of age.

To establish a diagnosis of APE we have to proceed of elimination. Etiology of gingival display while smiling, other than APE, must be excluded:

1. **Vertical maxillary excess (VME):** A visual diagnosis of VME is made when the lower third of the face is longer than the remaining thirds; cephalometric analysis can be, also, useful.\(^6\) In this case, the lower third of the face was proportionate to the remaining thirds.

2. **Hypermobile upper lip (HUL):** during smiling there was 8mm of lip rising. Thus, the diagnosis of hyperactive upper lip was excluded. In fact, according to Garber et Salama\(^7\) the normal shift of the upper lip during smiling is 6 to 8mm and it is 1.5 to 2 time higher in cases of hyperactivity of the upper lip.

3. **A short upper lip:** measured from the subnasale to the inferior border of the upper lip, the length of the upper lip of our patient was 21.5mm which is in the normal range of the maxillary lip length i.e. 20 to 22mm in young adult females.\(^8\)

4. **Incisal Attrition with compensatory eruption:** was also excluded since there is no generalized tooth surface loss.\(^9\)

5. **Gingival overgrowth:** since CEJ was not detectable in the sulcus this etiology was discarded too.\(^10\)
6. Regarding these parameters, only APE could explain the gingival display while smiling. Moreover, teeth seem to be hidden, clinical crowns appeared square in shape, and the gingival festooning was flattened. This effectively corresponds to the clinical aspect of APE.

The second step is to verify if AAE was associated to APE. In fact, the creetal bone, landmarked by bone sounding, was 3mm apically to the CEJ which was enough to the connective tissue attachment and junction epithelium. The tissue width was also verified by X-ray. Whatever, radiographic interpretations are only diagnostic on the interproximal area. On the facial aspect of teeth they cannot identify the violations of biologic width because of tooth superimposition. Thus AAE was excluded.

Regarding all these clinical data, our patient was diagnosed with type 1 APE, according to the classification of Ragghianti. In fact, a wide band of keratinized gingiva (>2mm) in the buccal aspect of incisors was noted. Moreover, and the smile was enhanced. The papilla between teeth inserted in the papilla.

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CONCLUSION

APE is an uncommon physiologic variation of the morphology of the dentogingival unit. Although it implies very important esthetic concerns and it is, also, considered as a risk factor for periodontium. Thus, the treatment of APE should be undertaken even if patient doesn't express esthetic demand. The proper treatment of APE may enhance the smile. From this point of view, external bevel gingivectomy is an effective procedure in case of APE type 1. In some cases, frenectomy may improve the aesthetic result. These techniques, lead to stable results.

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CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

REFERENCES