Case Report

Clinical Short Crowns: A Report on Perioplastic Management of Altered Passive Eruption of Three Cases

Ninad Milind Padhye, Ashvini Mukul Padhye, Tushar Sakal Pathak
Department of Periodontics, Mahatma Gandhi Mission’s Dental College and Hospital, Navi Mumbai, Maharashtra, India

Abstract

A gummy smile is a frequent encounter in patients requiring esthetic treatment. A common cause for it is a coronally situated gingival complex that failed to recede normally during eruption known as altered passive eruption (APE). The biggest challenge lies in the determination of clinical presentation, diagnosis, and knowledge of the periodontal plastic surgical methods to eliminate the condition. A careful preoperative planning is necessary to avoid complications, enhance postsurgical stability of the gingival margin, and bring about biological harmony. This case series brings forward the surgical management of three cases of APE treated with different techniques, with a 3–9-month follow-up. The correction of the gummy smile resulted in a significant improvement in the esthetics along with suitable hard and soft-tissue harmony. These cases illustrate the predictability of such treatment through a proper diagnosis and treatment planning.

Keywords: Altered passive eruption, esthetics, gummy smile

Introduction

An esthetically pleasant smile is considered as a symbol of beauty and well-being in the modern society. A myriad factors play a role in achieving an appealing smile, and among them, the form, position, and the gingival tissue level are among the forefront.[1] Amid the smile disharmonies, excessive gingival display, commonly called the “Gummy Smile,” can be associated with vertical maxillary excess, dentoalveolar extrusion, short upper lip, altered passive eruption (APE), or a combination of these factors.[2]

Gottlieb and Orban[3] described dental eruption phases and divided them into active and passive dental eruption. Passive dental eruption is the apical migration of the gingival tissue until it reaches at or very close to the cementoenamel junction (CEJ), determining the gingival margin position.[4] APE was described as a genetic or developmental condition, which results in excessive gingival display. It was classified by Coslet et al.[5] based on the relationship between the gingiva and the clinical tooth structure and also the relationship between the CEJ and the bone crest.

Type I: The gingival margin is incisal or occlusal to the CEJ and the mucogingival junction (MGJ) is apical to the crest of the bone, the dimension of keratinized gingiva is wider than usual, and the clinical crowns are short.

Type II: The dimension of the gingiva from the gingival margin to the MGJ appears normal. The free gingival margin is incisal or occlusal to the CEJ, and the MGJ is positioned at the CEJ. These two types can be further divided depending on the position of the CEJ from the alveolar crest.

Subgroup A: The alveolar crest is located 1.5–2 mm from the CEJ.

Subgroup B: The alveolar crest is coincident with the CEJ.

Early research to define the ideal values for tooth dimension was done by Levin,[6] who brought forward the mathematic proportions described by the ancient Greeks and said that it could be used even today to define a concept of the ideal in dental esthetics. Ward[7] took this notion even further to develop a new set of proportionate values that today are generally accepted by dentists as the ideal. The preferred width-to-height

Address for correspondence: Dr. Ninad Milind Padhye, Department of Periodontics, Mahatma Gandhi Mission’s Dental College and Hospital, Navi Mumbai, Maharashtra, India.
E-mail: ninadpadhye91@gmail.com

How to cite this article: Padhye NM, Padhye AM, Pathak TS. Clinical short crowns: A report on perioplastic management of altered passive eruption of three cases. Indian J Dent Sci 2019;11:56-60.
ratio in his study was 78% although the acceptable range was 66%–80%. In the last decade, great interest was focused on periodontal plastic surgery as a reliable tool to enhance esthetics. This article brings forward the management of three cases of APE.

**Case Reports**

**Case 1**
A 28-year-old male patient presented with a complaint of disproportionate size of the teeth. Clinical examination showed no signs of plaque-induced gingival disease but asymmetric gingival zenith with respect to the canines and central and lateral incisors of the maxillary arches [Figure 1]. The proportion for the clinical crown was 82% for maxillary right central incisor, 78% for maxillary right lateral incisor, 98% for the maxillary left central incisor, and 85% for maxillary left lateral incisor. Radiographic examination revealed 1.5-mm distance between the CEJ and the alveolar crest of the bone. Thus, a diagnosis of Type I subgroup A APE was made.

A written informed consent was obtained and after completion of Phase I therapy, the CEJ of individual teeth, the MGJ and the alveolar crest levels of each tooth were analyzed [Figure 2]. A full-thickness internal bevel incision was placed from tooth #13 to 23 till the CEJ using a no. 15 blade. The incision lines followed the normal gingival scallop with special attention given to the gingival zenith of individual teeth. The incised tissue was removed from the labial surface, which resulted in elimination of pseudopockets and also increased the crown height clinically [Figure 3].

A 3-day course of ibuprofen was prescribed for the postoperative pain, and at the follow-up visit, the surgical site healed completely without any pain or sensitivity reported by the patient. The results of the procedure remained stable at a 6-month follow-up visit [Figure 4].

**Case 2**
A 21-year-old female presented with a complaint of a gummy smile and excessive gum display while smiling and grinning. She has undergone orthodontic therapy for correction of protruded maxillary anterior teeth which was completed 4 years back. Her extraoral examination revealed a Liebert’s Class I, that is, a high smile line. Intraorally, she presented a thick gingival biotype with bulbous contours [Figure 5].

The crown width of the maxillary anterior teeth were found to be greater in dimensions as compared to the crown height with the proportions being 93% for the maxillary right central incisor, 98% for maxillary left central incisors, 83% for right lateral incisors, 95% for left lateral incisor, 83% for the canines, and 85% for premolars. Adequate width of attached gingiva was noted, with the MGJ present 4 mm apical to the gingival margin. Intraoral radiographs showed the alveolar crest to be coincident with the CEJ. Thus, a diagnosis of Type I Subgroup B APE was made.

After obtaining informed written consent, internal bevel gingivectomy was performed to expose crown structure from tooth #14 to 24 [Figure 6], following which full-thickness mucoperiosteal flaps were reflected to expose the alveolar crest margins. Special attention was taken to not harm the interdental papilla as this would lead to future recessions. Following ostectomy to the desired levels, the flaps were approximated and sutured.

The postoperative period was uneventful and the sutures were removed after 10 days. The results of the procedure remained stable as noted at 3 months [Figure 7] with the presence of adequate width of attached gingiva.

**Case 3**
A 23-year-old female patient reported with a complaint of short upper front teeth and a gummy smile. Extraoral examination revealed a Liebert’s Class I, that is, a high smile line. Intraorally, no visible plaque-induced periodontal disease was noted. Clinical examination revealed a thick gingival morphotype with thick bulbous contours of the gingiva.

The crown width of the maxillary anterior teeth was found to be greater in dimensions as compared to the crown height with the proportions being 90% for the maxillary right and left central incisors, 98% for the lateral incisors, and 88% for the canines [Figure 8]. The MGJ was found to be 4–5 mm from the gingival margins. Furthermore, on radiographic examination, the alveolar crest was found to be coincident with the CEJ.

![Figure 1: Case 1 – Asymmetric crown length due to uneven gingival zenith](image1)

![Figure 2: Case 1 – Alveolar crest and mucogingival junction determined](image2)
with the CEJ. Thus, a diagnosis of Type I Subgroup B APE was made.

Informed written consent was obtained, and following Phase I therapy, internal bevel gingivectomy at a distance of 1.5 mm from gingival margin was performed [Figure 9] and a full-thickness mucoperiosteal flap was raised to execute osseous reduction. Ostectomy was performed using rotary and hand instruments so as to establish a new biologic width by creating a distance of 1.5 mm between the crestal bone and CEJ [Figure 10].

The results of the surgical procedure remained constant at a 9-month follow-up with adequate attached gingiva [Figure 11] along with elimination of the gummy smile [Figure 12].

**Discussion**

An increasing demand for esthetic improvements is a part of the current periodontal practice. The harmony and flow of an esthetically appealing smile are derived from a summation of all its parts. Gingival shape, size, and contour along with its apparent position form the chief aspects that affect the final esthetic outcome. Ideally, the smile shows the full length of the maxillary anteriors, with an incisal curve of the teeth which is parallel of the curvature of the lower lip.[9]

APE is the term used when the tissue fails to adequately recede to a level apical to the cervical convexity of the crown. Of utmost importance is diagnosing the condition acceptably and...
then classifying it. A diagnosis of APE is made on a collective clinical and radiographic examination. It begins with analyzing the gingival display, the alveolar crest level, as well as the lip line of the patient. In addition, the CEJ and the MGJ of individual teeth are detected. The CEJ is detected with the help of an explorer; whereas, the MGJ may be detected by a roll test. Location of the CEJ in the normal position in the gingival sulcus suggests that the short clinical crown is possibly the result of incisal wear. However, if the CEJ more apically located or cannot be detected in the sulcus, then a diagnosis of APE can be made. The periodontal biotype should also be taken into consideration while planning the surgical procedure that is to be undertaken. A flat-thick periodontium indicates the presence of dense and fibrotic soft tissue, a large amount of keratinized gingiva, and thick and flat underlying bone. On the other hand, a thin-scalloped periodontium has thin soft tissue and a small amount of keratinized gingiva with long and narrow papillae over a thin-scalloped bone.\[10\]

The major factor to be considered in such procedures is the preservation of the biologic width, which is the summation of the junctional epithelium and supracrestal connective tissue attachment.\[11\] Alteration of the biologic width may cause gingivitis, recession, and alveolar bone loss. Another factor to be considered is the esthetic outcome after the surgical procedure. Ward\[7\] and Gillen\[12\] in their study on facial esthetics said that a proportionate comparison of width-to-length ratio is most reliable as a true indicator of ideal clinical crown size based on current esthetic philosophy and past research.

The choice of the periodontal surgical procedure depends on the gingival architecture, level of crestal bone, gingival biotype, and the amount of keratinized tissue. A mere gingivectomy would suffice if there is a presence of 2–3 mm of supracrestal keratinized gingiva after the surgery. However, if it is anticipated that gingivectomy would result in a biologic width infringement, then an undisplaced flap may be performed to contour the alveolar crest margins. Osseous recontouring may also be indicated when insufficient root is exposed for a proper biologic width.

In Case 1, only gingival margin contouring was sufficient without altering the osseous crest levels due to the presence of sufficient supracrestal tissue. The internal bevel incisions were given in such a way so as to mimic the ideal gingival zenith and contour. However, in Cases 2 and 3, due to the lack of supracrestal soft tissue after gingivectomy, it was necessary to reflect a full-thickness flap and perform ostectomy to maintain a 3-mm distance of the osseous crest from the gingival margin. The final goal of all the surgical procedures was to expose the clinical crown structure such that the marginal gingiva lies at the CEJ or slightly incisal to it.\[13\] The correct diagnosis and apt surgical procedure employed ensured successful stable results.

**Conclusion**

The predictability of the desired outcomes of periodontal plastic surgery and osseous resective surgery in the treatment of APE/gummy smile can be successfully achieved through meticulous preoperative diagnosis and treatment planning of the same.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given

---

Figure 9: Case 3 – Internal bevel incisions placed

Figure 10: Case 3 – Ostectomy completed

Figure 11: Case 3 – 9-month follow-up with stable results

Figure 12: Case 3 – Preoperative and postoperative smile
their consent for their images and other clinical information to be reported in the journal. The patients understand that names and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

References
1. Sepolia S, Sepolia G, Kaur R, Gautam DK, Jindal V, Gupta SC, et al. Visibility of gingiva – An important determinant for an esthetic smile. J Indian Soc Periodontol 2014;18:488-92.
2. Silberberg N, Goldstein M, Smidt A. Excessive gingival display – Etiology, diagnosis, and treatment modalities. Quintessence Int 2009;40:809-18.
3. Gottlieb B, Orban B. Active and passive continuous eruptions of teeth. J Dent Res 1931;13:214.
4. Cairo F, Graziani F, Franchi L, Defraia E, Pini Prato GP. Periodontal plastic surgery to improve aesthetics in patients with altered passive eruption/gummy smile: A case series study. Int J Dent 2012;2012:837658.
5. Coslet JG, Vanarsdall R, Weisgold A. Diagnosis and classification of delayed passive eruption of the dentogingival junction in the adult. Alpha Omegan 1977;70:24-8.
6. Levin EI. Dental esthetics and the golden proportion. J Prosthet Dent 1978;40:244-52.
7. Ward DH. Proportional smile design using the recurring esthetic dental (red) proportion. Dent Clin North Am 2001;45:143-54.
8. Liebert MF, Fouque-Deruelle C, Santini A, Dillier FL, Monnet-Corti V, Glise JM, et al. Smile line and periodontium visibility. Perio 2004;1:17-25.
9. Tjian AH, Miller GD, The JG. Some esthetic factors in a smile. J Prosthet Dent 1984;51:24-8.
10. De Rouck T, Eghbali R, Collys K, De Bruyn H, Cosyn J. The gingival biotype revisited: Transparency of the periodontal probe through the gingival margin as a method to discriminate thin from thick gingiva. J Clin Periodontol 2009;36:428-33.
11. Yadav SR, Madaan V, Kini VV, Padhye AM. Altered passive eruption: Report on management of two cases. J Contemp Dent 2015;5:173-7.
12. Gillen RJ, Schwartz RS, Hilton TJ, Evans DB. An analysis of selected normative tooth proportions. Int J Prosthodont 1994;7:410-7.
13. Sawai MA. Altered passive eruption treated with external and internal bevel gingivectomy. Univ Res J Dent 2016;6:150.