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Enamel Pearl as a Predisposing Factor to Localized Severe Attachment Loss: A Case Report

[1]Z. Alizadeh Tabari, [1]M. Kadkhodazadeh and [2]M. Khademi
[1]Department of Periodontology, Faculty of Dentistry,
Shahid Beheshti University of Medical Sciences, Tehran, Iran
[2]Department of Periodontology, Faculty of Dentistry,
Ahvaz University of Medical Sciences, Ahvaz, Iran

Abstract: Dental plaque has been implicated as the primary etiology in periodontal disease. Developmental aberrations in tooth morphology such as enamel pearls may predispose the affected area to plaque accumulation and consequently cause periodontal breakdown. Enamel pearl is defined as an ectopic globule of enamel that is firmly attached to the tooth root. The enamel pearls occurred more commonly on the roots of maxillary 2nd and 3rd molars. The most common type of enamel pearls are consisted of enamel and dentin. The aim of this study was to present a maxillary second molar with enamel pearl, associated with localized severe attachment loss and to report the pearl structural analysis.

Key words: Enamel pearl, furcation defect, periodontal destruction, pearl structure, tooth, Iran

INTRODUCTION

Enamel which is normally restricted to the anatomic crowns of human teeth may be found ectopically on the root, either as cervical enamel projections or enamel pearls (Risnes *et al*., 2000). These developmental aberrations in tooth morphology may predispose the affected area to plaque accumulation and consequently cause periodontal breakdown. Early diagnosis of these anomalies may improve the prognosis of the involved teeth (Machtei *et al*., 1997). Enamel pearl is defined as an ectopic globule of enamel that is firmly attached to the tooth root (Darwazeh and Hamasha, 2000). According to Kupietzky and Rozenfarb (1993) the enamel pearl anomaly was first described in 1824 by Linder and Linder. The size of clinically recognizable enamel pearls may vary from 0.3-4 mm (Goldstein, 1979). Risnes (1974) observed enamel pearls on 2.28% molars of 8854 teeth examined grossly. The enamel pearls occurred more commonly on the roots of maxillary molars, especially third molars. Turner reported an incidence of 0.2% for maxillary molars and 0.03% for mandibular molars. The common site of location of the enamel pearl is adjacent to the furcation or furrow of the root, especially the bifurcation or trifurcation areas of maxillary and mandibular molars. Maxillary 2nd and 3rd molars are more commonly involved than the first molars (Saini *et al*., 2008).

Enamel pearls may consist entirely of enamel connected to cementum or root dentin or may show incorporation of a cone of dentin with or without pulpal extension, the last two are referred to as composite enamel pearls and the composite type without pulpal extention is the most common type of macroscopically detected enamel pearls (Darwazeh and Hamasha, 2000).

The aim of this study was to present a maxillary 2nd molar with enamel pearl, associated with localized severe attachment loss and to report the pearl structural analysis.

CASE REPORT

A 41 years old, systemically healthy, nonsmoking female with chief complaint of gum disease, referred to the Periodontic Department of the Faculty of Dentistry, Shahid Beheshti University of Medical Sciences. The dental history showed that the patient had infrequent dental visits. The date of last scaling was 3 months before her 1st appointment. A periodontal and radiographic examinations and charting was performed. Her oral hygiene was poor with an O'Leary plaque index of 85%. All of the quadrants except maxillary right quadrant had severe chronic periodontitis. In this quadrant, only teeth no 16 and 17 had severe attachment loss (Table 1) (Fig. 1). Initial periodontal treatment including oral hygiene instructions and supragingival and subgingival scaling and root planning were performed. After 1 month,

Corresponding Author: Z. Alizadeh Tabari, Department of Periodontology, Faculty of Dentistry,
Shahid Beheshti University of Medical Sciences, Tehran, Iran

Table 1: Periodontal charting of maxillary right quadrant teeth

No. of teeth	BPD/CAL	PPD/CAL	MOB.	F.I.
17	538/648	667/667	I	III (D)/I (B)/III (M)
16	632/732	523/623	-	III (D)
15	222/121	233/232	-	-
14	222/131	323/222	-	-
13	322/222	323/323	-	-
12	313/313	223/222	-	-
11	212/212	222/112	-	-

BPD: Buccal Pocket Depth, CAL: Clinical Attachment Level, PPD: Palatal Pocket Depth, MOB.: Mobility, F.I: Furcation Involvement

Fig. 1: Radiographic view of maxillary right quadrant

at the reevaluation appointment, plaque index, periodontal pocket depth and presence of plaque and calculus were assessed. Remained deep pockets (≥5 mm) were scheduled for surgical interventions. One of these sites was posterior of maxillary right quadrant in site of teeth No. 16 and 17. In this area under local anesthesia, incision and flap reflection were done and root surfaces were debrided thoroughly. At this time we noticed an enamel pearl 2.5 mm apical of CEJ and adjacent to the mesial furcation between mesiobuccal and palatal roots which resulted in severe attachment loss of maxillary right second molar and distal aspect of the first molar (Fig. 2). Due to severe bone loss and mesial and distal grade III

Fig. 2: Enamel pearl on maxillary right second molar with severe attachment loss and furcation involvement

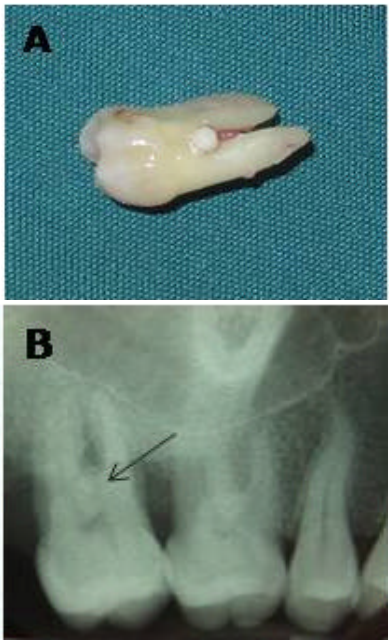

Fig. 3: A) Enamel pearl was located adjacent the furcation between palatal and mesiobuccal roots; B) Radiographic view of the enamel pearl (arrow head)

furcation involvement maxillary right 2nd molar was extracted (Fig. 3). Then the flaps were reapproximated and sutured.

Prior to examination the tooth was immersed in 96% ethanol for 24 h. Then it was embedded in transparent acrylic resin (Melio Dent, Bayer Dental, UK) and the tooth was sectioned longitudinally through the enamel pearl using a cooled rotating diamond wheel. The 400 μ section was observed under light microscopy (Fig. 4).

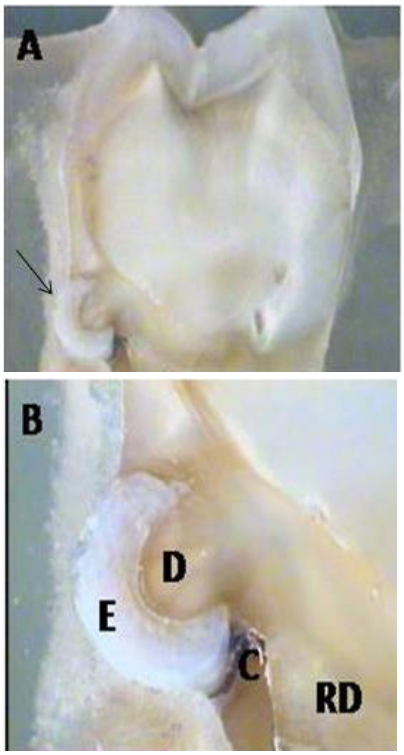

Fig. 4: A) Longitudinal section through the Enamel Pearl (EP) (the arrow head); B) the EP was consisted of Enamel (E) and Dentin (D) which was continuous with Root Dentin (RD). The Calculus (C) was located under the pearl

As shown in Fig. 4, the enamel pearl was a composite one and consisted of enamel and dentin. The dentin of the pearl was connected to the root dentin. Calculus was observed at the apical junction of the pearl to the root.

DISCUSSION

Although, bacterial plaque is a primary cause of the initiation and progression of periodontal disease, anatomic factors such as enamel pearls are often associated with advanced localized periodontal destruction. Both enamel pearls and cervical enamel projection in furcations predispose to attachmet loss (Risnes *et al*., 2000). In the present case, the enamel pearl adjacent to the maxillary second molar's mesial furcation, resulted in severe attachment loss of this tooth and distal proximal surface of maxillary 1st molar.

During normal tooth development, ameloblasts lose their activity after crown formation and become part of Hertwig's epithelial root sheath. Occasionally for unknown reasons, ameloblasts retain their enamel competence, resulting in prolonged (CEPs) or delayed (enamel pearls) ectopic enamel production (Goldstein, 1979).

The average distance of the enamel pearl from the cementoenamel junction was found to be 2.8±1.00 mm (Goldstein, 1979). In the case, the enamel pearl was located 2.5 mm apical of cementoenamel junction.

The enamel covering the cervical enamel projection prevents the formation of a connective tissue attachment. Instead, the gingival tissue adjoining the ectopic enamel is attached to the tooth by an epithelial attachment which is less resistant to the insult of bacterial plaque (Atkinson, 1949). Goldstein described this attachment as locus minori resistance (Goldstein, 1979).

The morphology of enamel pearl enables the adherence of dental plaque. This together with a reduced access for oral hygiene measures and the proximity to the furcation area might enhance periodontal breakdown in the furcation (Hou and Tsai, 1987). In the present case, the retention of calculus was observed under the pearl in the images obtained with light microscopy and the calculus is a most plaque retentive factor which can result in periodontal destruction.

Ectopic enamel removal is generally recommended during periodontal surgeries to allow new attachment to form (Goldstein, 1979). But in this case, the attachment loss was too much and the tooth was not maintainable.

The architecture of the enamel in the pearl is similar to the occlusal enamel with some variations in the direction of enamel rod, interprismatic substance and the presence of Hunter-Shreger bands (Risnes, 1989). Enamel pearls may show a superficial covering of enamel by acellular cementum which is not a developmental component of the pearl and may facilitate the attachment of periodontal ligament fibers (Moskow and Canut, 1990). The quality of the enamel in the enamel pearls has been studied, demonstrating areas of hypomineralization and the presence of superficial concavities filled with organic matter on the enamel surface (Takiguchi and Funaki, 1977).

The dentin core in composite enamel pearls is continuous with dentin of the carrier root and contains large area of interglobular dentin. The dentin core at the base of large pearls which was not covered by enamel, exhibited Tomes' granular layer and a structure less layer above it. The cementum covering the dentin core at the pearl base was thin and acellular close to the enamel border but it was thicker and cellular close to the root of the carrier teeth.

CONCLUSION

The classical morphologic appearance of the enamel pearl is characterized by a sessile fusion with the root dentin (Gaspersic, 1995). In the present case, the pearl was the most common type and consisted of enamel and dentin which had a sessile fusion with the root dentin.

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