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REVIEW

Significance of Cervical Enamel Projections in Periodontal Treatment

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ABSTRACT:

Periodontitis is primarily a dental plaque induced inflammatory disease. Anatomic factors such as cervical enamel projections, enamel pearls, and developmental grooves are often associated with advanced, localized periodontal destruction. Enamel projections and pearls are mostly associated with molars. Enamel projections in the furcation areas of molars have no true attachment and are therefore highly susceptible to the creation of a deep periodontal pocket. A close association has been reported in the past between enamel projection and furcation involvement. Here is a article which is a review of cervical enamel projections and its management.

Key words: ***Cervical-enamel projection,dental plaque, furcation, anatomic factors, periodontal pocket,tooth abnormalities***

INTRODUCTION

Periodontitis is primarily a dental plaque induced inflammatory disease, local factors that facilitate the accumulation of bacteria may contribute to the progression of the disease. Periodontal disease is not a single entity nor is there a single causative factor that elicits a consistent periodontal response. The primary cause of gingival inflammation is bacterial plaque along with other predisposing factors. Dental plaque has been implicated as the primary etiological factor in periodontal disease. Host response to this etiological factor presents a wide range of responses. The irreversible damage follows the form of inflammatory periodontal disease when etiological factors remain undetected or ignored and their effects, over a period of time, surpass the resistance capacity of the host. It is of paramount importance to disclose and reverse the factors producing the changes early in the genesis of the disease process.

Additional local factors contributing to inflammatory and degenerative results include:

Factors propagating plaque retention and accumulation include calculus, topography of the root, inadequate restoration, overhangs, food impaction, orthodontic appliances, tooth position, iatrogenic factors, extraction of third molars, periodontal pockets, and dental caries.

1. Anatomic aberrances like palatoradicular grooves, cervical enamel projection, enamel pearls, cysts, foreign bodies, palatal rugae, etc.
2. Habits and self-inflicted injuries.
3. Mechanical factors include improper tooth brushing, use of abrasive dentrifices and other oral hygiene modalities like dental floss and oral lavage. Thermal and radiation factors include

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tissue burn due to hot food, electrosurgery, and biochemical factors include injury due to use of dental materials, tobacco, and chemical dessicants.

Factors such as tooth anatomy and restorative and endodontic considerations have been linked to gingival inflammation and attachment and tooth loss.[1] Of all anatomic factors, the cervical enamel projection (CEP) is probably the most common and associated with attachment loss in the molar furcation area. Developmental abnormalities such as cervical enamel projection, enamel pearl, or palatogingival grooves, may predispose the affected area to plaque accumulation, making oral hygiene procedure, scaling, and root planing difficult, and consequently, cause periodontal breakdown. "Cervical enamel projections (CEPs) are the focal apical extension of the coronal enamel beyond the normally smooth cervical margin on to the root of the tooth". They are flat ectopic deposits of enamel that are triangular in shape and tapering in form, extending apically into the furcation area. It is defined as a dipping of enamel from the cemento- enamel junction (CEJ) of a molar toward and often into the furcation area.[2]

Prevalence of Cervical Enamel Projections

Several studies[2-10] reported the prevalence of CEPs ranging from 8.6% to 85%. The variations might have resulted from different study designs and ethnic populations. A study by Grewe et al.[3] generated the largest sample size (5,230 extracted molars) and found the CEP prevalence to be 25.2% in mandibular molars and 15.8% in maxillary molars.

Furthermore, they found the most common site as the buccal side of the mandibular second molar. Bissada and Abdelmalek[2] reported the lowest CEP prevalence of 8.6% after assessing 1,138 molars from Egyptian skulls. In the study, the second mandibular molar was the most common site. Hou and Tsai[4] examined mandibular molars with Class III furcation involvement in a Taiwanese population and reported the highest prevalence of CEPs at 85%.

They found CEPs most commonly on mandibular first molars. The other category of ectopic enamel formation, the enamel pearl, presents a lower prevalence compared to CEPs. The enamel pearl is defined as an ectopic globule of enamel that is often connected to coronal enamel by a CEP.[11] Risnes[12] studied 8,854 extracted molars and reported that 2.28% had enamel pearls. The enamel pearls occurred more commonly on the roots of maxillary molars, especially third molars. Another study[13] using radiographs to examine the presence of enamel pearls found a similar prevalence(1.6%). However, in contrast to the study of Risnes,[12] the most common site of the enamel pearls was on the roots of first molars.[13]

Development of CEP

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. This phenomenon was supported by structure analysis revealing that CEPs and enamel pearls have characteristics of enamel including enamel rods, striae of Retzius, Hunter-Schreger bands, and areas of prism-free enamel.[14-16] However, the enamel structure of CEPs is more irregular, resembling the cervical enamel. On the other hand, enamel pearls generally exhibit structure comparable with, although somewhat more irregular than, coronal enamel. Based on these structure studies, it can be implied that amelogenesis in CEPs is a continuation of cervical enamel formation. In contrast, amelogenesis of enamel pearls may follow a similar pattern as in the crown from the dentinal tip to the cervical region.

The current periodontal disease classification endorsed by the American Academy of Periodontology recognizes tooth aberration as a contributing factor.[17]

Association Between CEPs and Periodontal Disease

Masters and Hoskins[7] were the first to suggest the association of the CEP with periodontal disease. They also classified the projections into three grades

based on the location of adjacent CEJs and furcations, which are still widely used today. Grade I indicates a short but distinct change in the contour of the CEJ extending toward the furcation, Grade II designates when the CEP approaches the furcation without making contact with it, and Grade III denotes that the CEP extends into the furcation. Most studies [2-5,9,18,22] agree with Masters and Hoskins[7] on the positive association between CEPs and furcation involvement except those by Leib et al.[6] and Zee et al.[10] These conflicting results could be attributed to small sample sizes and the differences in methodologies. Grewe et al.[3] found a statistically significant relationship between periodontally involved molars and CEPs. Bissada and Abdelmalek[2] reported that 50% of teeth with CEPs had furcation involvement.

Similarly, Hou and Tsai[4] examined 719 molars with periodontal disease and reported that 82.5% of teeth with CEPs had furcation involvement. In that study, a higher grade of CEP was significantly associated with a higher degree of furcation involvement. Swan and Hurt[8] evaluated 2,000 molars from 200 Indian skulls and found only Grade II and III CEPs to be significantly associated with furcation involvement, suggesting that Grade I CEPs do not always need to be removed.

Enamel pearls were associated with localized periodontitis in some case reports.[23-25] The most common location of enamel pearls was on the proximal surfaces of maxillary molars where localized periodontal destruction was found. Because of the low prevalence of enamel pearls, these case reports[23-25] provide the only available evidence implying an association between enamel pearls and periodontal disease.

Possible Pathogenesis

Connective tissue cannot form an attachment to enamel.[26] Instead, the junctional epithelium is present in these areas and consists of hemidesmosomes and basal lamina. As a result, when enamel forms on roots, it may predispose the area to increased probing depths in the presence of gingival inflammation.Goldstein[15] described this attachment as a "locus minori resistente" and hypothesized that this form of attachment would constitute an area of less resistance to plaque-associated inflammatory degradation. Together with its plaque retentive nature, ectopic enamel might enhance periodontal breakdown.

Treatment of CEP

Ectopic enamel removal is generally recommended during periodontal surgeries to allow new attachment to form.[15]One study[27] showed that mandibular molars with Class II furcation involvement and CEPs could achieve similar results when enamoplasty/odontoplasty was performed as compared to those without CEPs using various surgical modalities. Machtei et al.[18] found that, although CEPs were associated with deeper probing depths at baseline, teeth with CEPs gained more attachment after enamoplasty/ odontoplasty in conjunction with guided tissue regeneration procedures than teeth without CEPs that received the same surgical approaches. However, the removal of ectopic enamel may have disadvantages in that the development of dentin hypersensitivity is a possibility.

CONCLUSION

Cervical enamel projections might be considered a secondary etiological factor in periodontal breakdown and attachment loss. Although at a greater risk for breakdown, mandibular teeth with CEPs should be considered good candidates for regenerative procedures.

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