Cervical enamel projection with gingival fenestration in a maxillary central incisor: report of a case

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Bacterial plaque has been implicated as the primary etiologic factor in the initiation and progression of periodontal disease. Anatomic factors, such as cervical enamel projections, enamel pearls, and radicular grooves, are often associated with advanced localized periodontal destruction. Enamel projections and pearls are most often associated with molars, while radicular grooves are usually located on the palatal aspect of maxillary incisors. Gingival fenestrations are of uncertain etiology and have rarely been reported in the dental literature. An unusual case is presented of a cervical enamel projection located on the facial aspect of a maxillary central incisor in association with gingival fenestration. Rationale for therapy and likely healing results are discussed. (Quintessence Int *1992;23:103–107.*)

Introduction

Bacterial dental plaque has been implicated as the primary etiologic factor in the initiation and progression of periodontal disease.[1–4] The literature contains descriptions of several anatomic and developmental variations in tooth morphology, including furcations and root grooves commonly found on many teeth, as well as various anomalies, such as palatogingival grooves, cervical enamel projections, and enamel pearls, that may predispose the affected area to the accumulation of plaque.[5–13] The nature and location of such entities may also compromise the effective removal of plaque by both patients and health professionals.

The palatogingival groove, or radicular lingual groove,[5] is a developmental defect that has been associated with severe localized periodontal destruction.[5–8] It is most commonly found in maxillary incisors and has a reported incidence of approximately 2% in the United States.[6,8] The extent of the inflammatory lesion depends in part on the apical extension of the groove along the root surface from the coronal aspect of the enamel. A morphologically similar defect has also been reported on the facial aspect of maxillary central incisors[11,13] and has been associated with chronic inflammatory periodontal disease in a manner analogous to that of the palatogingival groove.

Cervical enamel projections (CEPs) have been defined as the extension of enamel beyond the cementoenamel junction in an apical direction toward the furcation area of molars.[14–16] Leib et al[17] found no significant differences between the prevalence of furcation involvement on surfaces with CEPs and that on surfaces without CEPs. However, several other studies have shown a positive correlation between the prevalence of CEPs and a reduced level of periodontal attachment in the furcation area of molars, as well as an association between the depth of CEPs and periodontal attachment loss in the furcation.[14–16,18,19]

The enamel pearl is defined Shiloah and Kopczyk[7]

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as an ectopic globule of enamel, most often located on the root surface, often connected to the coronal enamel by a CEP. It is characterized by a core of dentin covered by enamel, and may contain a pulp chamber.[20] Enamel pearls vary in size from 0.3 to 2.0 mm.[21] They are most commonly found on the mesial and distal surfaces of maxillary molars, and less frequently on the buccal and lingual surfaces of mandibular molars.[7,9,21] Risnes[22] found the overall incidence of enamel pearls to be 2.28% in molars. The precise nature of the junction between the periodontal ligament and the enamel pearl has not yet been described.[7] However, once breakdown occurs, a more rapid progression of disease is likely, because the anatomy of the pearl allows mechanical retention of plaque and prevents proper mechanical plaque removal.[9,20]

It has been shown that there is no attachment of connective tissue to enamel,[23] but rather an adhesion of junctional epithelium.[24–27] This may predispose an isolated area of subgingival enamel to the formation of increased pocket depth subsequent to gingival inflammation.[28]

The literature revealed no reports of enamel projections associated with anterior teeth. The purpose of this paper is to report on an enamel projection associated with localized periodontal inflammation and soft tissue fenestration on the facial surface of a maxillary central incisor.

Case report

The patient was a healthy 16-year-old black girl who presented for examination in the Department of Oral Diagnosis at The University of Tennessee, Memphis, College of Dentistry. Examination revealed carious lesions in several teeth, including a large area of cervical caries that extended apical to the free gingival margin of the facial aspect of the maxillary right central incisor. No periapical pathosis was evident, and the tooth responded positively to electric pulp testing (Fig 1).

A perforation of the facial marginal gingiva was noted, and a consultation with the Department of Periodontology was initiated (Fig 2). Clinical exploration of the perforation revealed the likelihood of some sort of tooth anomaly, possibly a hard tissue projection or parallel root grooves (Fig 3).

Informed consent to perform exploratory flap surgery in the area was obtained. Local anesthesia was accomplished by infiltration with 2% lidocaine with 1:100,000 epinephrine. Two vertical incisions were placed at the mesial and distal line angles of tooth 11, and a full thickness mucogingival flap was elevated. Flap reflection revealed that the projection extended apically from the carious lesion to at least the level of the crestal bone (Fig 4). Radiographically, it appeared to extend apically to the cementoenamel junction, giving an appearance similar to a pulp stone (see Fig 1).

The projection was removed with a diamond stone, and the tooth was finished to a level confluent with the surrounding enamel (Fig 5). The carious lesion was then excavated and a calcium hydroxide provisional restoration was placed. The flap was replaced and sutured with two interrupted 6-0 braided silk sutures (Fig 6), and an oral adhesive bandage and a periodontal dressing were placed. Postoperative instructions were given, as was a prescription for acetaminophen with 15 mg codeine to reduce postoperative discomfort. The patient was seen 1 week postsurgically for suture removal. Healing progressed uneventfully. At 3 weeks, there was a decrease in gingival inflammation, there was no bleeding on probing, and the sulcus resisted gentle probing (Figs 7 and 8). The provisional restoration was subsequently replaced with a composite resin material.

Discussion

The precise cause of the gingival ulceration in this patient could not be determined. Lane[29] described three gingival fenestrations as occurring in areas of thin keratinized mucosa associated with a thick nodular deposit of subgingival calculus, representing a transitory stage in the development of a gingival cleft. As a result of inflammation, gingival fibers are lost, rendering the tissue freely movable by forces such as mastication and toothbrushing, which, combined with subgingival plaque, may result in a window in the gingiva.[29]

Conceivably, the projection in the present case was of sufficient bulk and size to render the overlying gingiva susceptible to physical injury from routine toothbrushing or mastication. The carious lesion was well-advanced at the time of initial examination, and neither cause nor duration of the lesion could be determined. However, the combined presence of the projection and the carious lesion in the same area may have made plaque control both uncomfortable and ineffective. This may have contributed to the development of inflammation in the gingival tissues, leading to the ulceration found at the time of initial presentation thus developing in a manner similar to that proposed by Lane.[29]

In the present case, the most viable therapeutic approach was thought to be an exploratory surgical

Fig 1 Periapical radiograph taken at the initial presentation of the patient. There is no suggestion of periapical pathosis.

Fig 2 Clinical appearance at the initial presentation. The carious lesion extends beyond the gingival margin, which appears to be ulcerated or fenestrated.

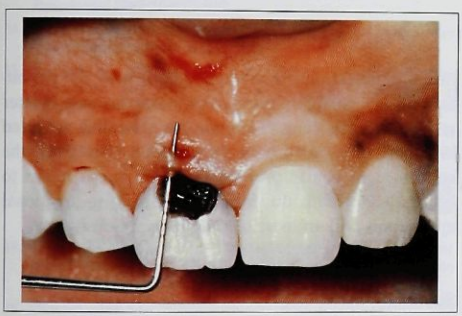

Fig 3 Clinical appearance at the initial presentation. A fenestration of the gingival tissues is confirmed by passage of a periodontal probe through the tissues.

Fig 4 Surgical exposure by flap elevation reveals the apical extent of the carious lesion. The projection extends apically from the carious lesion to or beyond the alveolar crest.

Fig 5 After removal of the projection, the tooth structure apical to the carious lesion is confluent with the surrounding enamel.

Fig 6 The flap is repositioned and secured by two interrupted silk sutures.

Fig 7 Healing is well-advanced 3 weeks postsurgery.

Fig 8 Although the vertical incision lines are still apparent, the sulcus depth is minimal and the area resists gentle probing without bleeding.

procedure to determine the nature of the entity and to render such treatment as was deemed appropriate.[30] The actual treatment performed was uncomplicated and consisted primarily of the removal of the anomaly. This resulted in a smooth surface of hard tooth structure, which allowed for proper adaptation of the soft tissue flap.

Previous reports in the dental literature suggest that tooth anomalies most closely resembling the one in this case are either enamel pearls or cervical enamel projections.[7,9,20–22] The exact nature of the projection could not be determined, but it was uniform throughout and resembled the surrounding hard tissue. From these findings and the clinical appearance, it was judged to be enamel. The means of gingival attachment to such entities has never been described. Various investigators have described the "attachment" between epithelium and enamel as a junction composed of hemidesmosomes and a basal lamina.[24–27] Goldstein[20] theorized that this form of attachment would constitute an area of lessened resistance to plaque-associated inflammatory degradation. However, the concept of the hemidesmosomal adhesion or long junctional epithelium as a *locus minoris resistentiae,* an area of increased susceptibility to inflammatory degradation, has not been supported by animal studies.[31,32]

Numerous studies have established that periodontal probe penetrability is related to the extent of inflammation of the gingival tissues.[33–36] As the level of inflammation increases, probe penetration apical to the junctional epithelium occurs more readily. Following periodontal therapy, reduction in inflammation and probe penetration occur concomitant with the deposition of new collagen fibers, which may provide greater resistance to probing.[36] The nature of healing achieved in this case could not be determined. However, the resistance to gentle probing that was found seems to be consistent with the formation of a long junctional epithelium and an increase in collagen density.

Summary

An unusual case of an isolated region of periodontal inflammation and soft tissue fenestration in the area of an enamel projection on the facial surface of a maxillary central incisor has been presented. Subsequent flap reflection and removal of the projection resulted in resolution of the inflammation and the fenestration.

Acknowledgments

The authors would like to thank Ms Delphia Neal and Mr Ulysses Edwards for preparation of the manuscript.

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22nd International Meeting on Dental Implants and Transplants

Bologna (Italy), May 29–31, 1992

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