

Prevalence of cervical enamel projections and enamel pearls on furcation area of Iraqi molar teeth

Raed Aziz Badea B.D.S, M.Sc.*

Abstract:

Cervical enamel projections and enamel pearls in relation to molar furcations may act as predisposing factors in periodontal attachment loss. The objectives of this study were to investigate the prevalence of cervical enamel projections and enamel pearls on furcation areas of molar teeth of Iraqi population. The material consisted of (465) extracted upper and lower molars. They were (200) upper molars and (200) lower molars extracted because of caries and pulp lesions (group 1), while the other (65) molars extracted because they were periodontally diseased (group 2). The cervical enamel projections were classified into three grades (described according to Peter et al 2000)

For group 1 the results showed that (51%) of upper molars and (66%) of lower molars had cervical enamel projections. Enamel pearls were identified on (1.5%) of upper molars and (2.5%) of lower molars. Maxillary molars had (59.8%) grade I cervical enamel projections and (28.4%) grade II and (11.7%) grade III. While mandibular molars showed (66.6%) teeth with grade I, (24.2%) teeth with grade II and (9%) teeth with grade III. For group 2 cervical enamel projections were identified on (70.7%) of the collected molars.

The results of the present study give an indication that cervical enamel projections are frequent enough to be of clinical importance.

Keywords:

Cervical enamel projections, enamel pearls, furcation area, Iraqi molars.

Introduction:

Any variation or anomaly in tooth form, especially on subgingival root surface will affect treatment planning for the patient with periodontal disease⁽¹⁻⁵⁾.

The shape of the roots and the presence of anatomical variations may contribute to development of periodontal defects by providing an environment favorable to the retention of plaque and making the removal of hard and soft deposits is difficult⁽⁶⁻¹⁶⁾.

The practitioner should periodically review the root morphology and give it an appropriate

importance during planning and treatment⁽¹⁾.

Enamel pearls are one of a number of different enamel structures that can be found on the roots of deciduous and permanent teeth, they have a distinct predilection for the furcation areas of molar teeth⁽¹⁷⁾, such an anomaly may facilitate the progression of periodontal breakdown and their early detection could be important in prevention of periodontal disease⁽⁸⁾.

Regarding the cervical enamel projection which is an extension of the enamel to the cementum in varying degrees in the cemento-enamel

*Assistant Lecturer in the Department of Periodontics, College of Dentistry, Al-Mustansiriya.

junction of molar teeth, the authors showed their importance in the involvement of these areas with periodontal disease^(18, 19).

The dento-gingival relationship of cervical enamel projection structure is peculiar for root having connective tissue attachment but only long junctional epithelium^(7, 11).

The studies showed a close relationship between cervical enamel projections and the presence of inflammatory periodontal diseases, furcation involvement of molar teeth^(12, 20).

Information on the prevalence of enamel pearls and cervical enamel projections is sparse, and ethnic, racial, and national groups variations are thought to occur^(8, 17).

For this reason the present study was undertaken to determine the prevalence of cervical enamel projections and enamel pearls in furcation area of molar teeth of Iraqi population.

Materials and methods:

The material of the present study composed of (465) extracted teeth, (233) maxillary molars and (232) mandibular molars, they were collected from the clinic of department of oral surgery in the college of dentistry (Almustansiryia University) and from a number of private clinics in the city of Baghdad, the sample was divided into 2 groups according to the cause of extraction. Group 1 is composed of (400) molars were extracted for the reason of dental caries and pulpal lesions. While group 2 included (65) upper and lower molars were extracted because of their periodontal involvement.

Teeth types included maxillary and mandibular first and second

molars. Soft tissues and debris were removed from the teeth by boiling them in water for (1) hour and then they were soaked in (6%) solution of sodium hypochlorite for (24) hours. Then they were stored in a solution of equal parts of glycerin and (3%) of hydrogen peroxide. Before examination the teeth were brushed with a soft toothbrush to remove residual debris and leave the teeth to dry and then they were examined for cervical enamel projections and enamel pearls with a dissecting microscope at a magnification of 20x. The cervical enamel projections (CEPs) were classified and recorded in (3) grades according to their extension from cemento-enamel junction (CEJ) to the furcation area⁽⁷⁾.

Grade I: Extension of cervical enamel projection on the root trunk without reaching the midway between CEJ furcation areas.

Grade II: Extension of cervical enamel projection on the root trunk reaching to the midway between CEJ and the furcation areas.

Grade III: cervical enamel projection is reaching to the furcation areas.

The teeth were examined for all aspects buccally, lingually, mesially and distally.

Results:

On group (1) CEPs were found on 234 (56%) of the 400 teeth examined. They were detected mostly on the buccal aspects. Lower molars had a higher prevalence of cervical enamel projections than upper molars, on mandibular molars cervical enamel projections were identified on 132 (66%) of the 200 upper molars examined. On maxillary molars cervical enamel projections were found on 102 (51%) of the 200 upper molars examined (Table 1).

Table (1): Shows the prevalence of CEPs on furcation area of Iraqi extracted molars.

Type of teeth	No. teeth examined	No. of teeth with CEP	%
Maxillary molars	200	102	51%
Mandibular molars	200	132	66%
Total	400	234	56%

Regarding the enamel pearls occurrence, they had a low prevalence in both upper and lower molars. They were found on 8 (2%) of the 400 teeth

examined in this study. Their presence was corresponding to cervical enamel projections. (Table2).

Table (2): Shows the prevalence of enamel pearls in extracted upper and lower molars.

Type of teeth	No. teeth examined	No. of teeth with Enamel pearls	%
Maxillary molars	200	3	1.5%
Mandibular molars	200	5	2.5%
Total	400	8	2%

Grade I cervical enamel projections were the most frequently identified on both maxillary and mandibular molars. It was found on

149 (63.6 %) of the teeth with cervical enamel projections, while teeth with grade II were 62 (26.4%) and grade III was 24 (10.2%) (Table3).

Table (3): Shows the occurrence of CEPs according to their grades on furcation areas of molar teeth.

Type of teeth with CEP	No. of teeth with CEP grade I With %		No. of teeth with CEP grade II With %		No. of teeth with CEP grade III With %	
Maxillary molars	61/102	59.8%	29/102	28.4%	12/102	11.7 %
Mandibular molars	88/132	66.6%	32/132	24.2%	12/132	9 %
Total	149/234	63.6%	61/234	26%	24/234	10.2 %

For group 2 the occurrence of CEPs on periodontally involved teeth was the greatest, they were identified

on 46(70.7%)of the periodontally involved teeth that were examined in this study (Table 4).

Table (4): Shows the presence of CEPs on periodontally diseased extracted molars.

Type of periodontally involved molar teeth	No. teeth examined	No. of teeth with CEP	%
Maxillary molars	33	19	57.5%
Mandibular molars	32	27	84.3%
Total	65	46	70.7%

Discussion:

Limited data are available documenting the occurrence of cervical enamel projections and enamel pearls in Iraqi molar teeth. The results of the present study showed that cervical enamel projections occur frequently enough to be of clinical importance. The findings of the present study are similar to the results obtained by Swan and Hurt⁽¹³⁾ who examined the CEPs on Indian molars and found that (51%) of lower molars and (45%) of upper molars had CEPs. On the other hand the results of the present study showed that the prevalence of the cervical enamel projections in Iraqi molars is less than that of Eskimo population (72%)⁽¹⁴⁾ and more than that of German molars (30%)⁽⁹⁾.

These differences in the occurrence of cervical enamel projections are attributed to the ethnic, racial, and national groups variations^(8,17). The high prevalence of CEPs on periodontally involved teeth may support the idea about the involvement of CEP as a predisposing factor periodontal disease. Mandibular molars revealed more frequent occurrence of cervical enamel projections and enamel pearls most commonly in the buccal aspect, however both maxillary and mandibular molars had cervical enamel projections and enamel pearls which are significantly present to merit consideration when treatment planning.

The presence of cervical enamel projections and enamel pearls in furcation areas could be a potential problem in teeth with a normal level of attachment and could further jeopardize an already compromised situation in periodontally involved teeth. Teeth exhibiting cervical enamel projections were found to have deeper root concavities compared to teeth without cervical enamel projections⁽⁹⁾. The presence of root concavities

complicates the treatment and prognosis of furcation involved teeth by restricting access of periodontal instruments. Cervical enamel projections and enamel pearls are covered by junctional epithelium rather than cementum and connective tissue fibers.

An epithelial attachment is potentially weaker than a connective tissue attachment and could represent a possible pathway for early involvement of a furcation. The high occurrence of cervical enamel projections and enamel pearls in the present study may be attributed to the high magnification of 20x that was used in this study, so that slight deviations of cemento-enamel junction were noticed and recorded, thus an increase in the prevalence of cervical enamel projections could be anticipated.

References:

1. Gher ME, Vernino A R: Root morphology-clinical significance in pathogenesis and treatment of periodontal disease. *J Am Dent Assoc* 1980; 101(4):627-633.
2. Holton WL, Hancock EB, Pelleu GB Jr: Prevalence and distribution of attached cementicles on human root surfaces. *J Periodontol* 1986; 57 (5) : 321-324.
3. Fermin A, Carranza , Michael G Newman: *Clinical periodontology*. 8th Ed W B Saunders company, 1996 pp395.
4. Lindhe J, Karring T, Lang NP: *Clinical periodontology and implant dentistry*. 3rd Ed Munksguard, Copenhagen, 1998 pp 450,705.
5. Al-Shammari K F, Kazor C E, Wang H L: Molar root anatomy management of furcation defects. *J Clin periodontol* 2001; 28(8): 730-740.
6. Paolantonio M, Centobeni R, Scogna G, Di Muro c: The anatomical characteristics of the root furcations in the molar teeth. *Minerva Stomatol* 1992; 41(3): 105-120.
7. Peter F Fedi, Arthur R, Vernino, John L Gray: *The periodontic syllabus*. 4th Ed Lippincott Williams & Wilkins, 2000, pp 9-10.
8. Darwazah A, Hamasha A A: Radiographic Evidence of enamel pearls in Jordanian dental patients. *Oral Surg Oral Med Oral Pathol Oral Radio Endod* 2000; 89(2): 255-258.

9. Roussa E: Anatomic characteristics of the furcation and root surfaces of molar teeth and their significance in the clinical management of marginal periodontitis. *Clin Anat* 1998; (3):177-186.
10. Risens S, segura J J, Casado A, Jimnez-Rubio A: Enamel pearls and cervical enamel projections on 2 maxillary molars with localized periodontal disease: case report and histologic study. *Oral surg Oral Med Oral Pathol Oral Radiol endod* 2000; 89(4):493-497.
11. Zee K Y, Chiu M L, Holmgren C J, walker R T, Corbet EF: Cervical enamel projections in Chinese first permanent molars. *Aust Dent J* 1991; 36(5):356-360.
12. Lima A F, Hebling E: Cervical enamel projection related to furcations involvement. *Braz Dent J* 1994;5(2) : 121-127.
13. Swan R H, Hurt W C: Cervical enamel Projections as an etiologic factor in furcation involvement. *J AM Dent Assoc* 1976; 93(2):342-345.
14. Zee K Y, Bratthall G: Prevalence of cervical enamel projection and its correlation with furcation involvement in Eskimos dry skulls. *Sweed Dent J* 2003;27(1):43-48.
15. Abitbol T, Lopresti J, Santi E: Influence of root anatomy on periodontal disease. *Gen Dent* 1997;45 (2):186-189.
16. J D Manson, B M Eley: Outline of Periodontics, 4th Ed Wright 2000 pp 220.
17. Mosckow B S, Canut P M: Studies on root enamel (2). Enamel pearls. A review of their morphology. Localization, nomenclature, occurrence, classification, histogenesis and incidence. *J Clin Periodontol* 1990; 17(5):275-281.
18. Moskow B S, Canut P M: Studies on root enamel. (1) Some historical notes on cervical enamel Projections. *J Clin periodontol* 1990;17(1):29-31.
19. Hou G L, Tsai C C: Cervical enamel projection and intermediate bifurcational ridge correlated with molar furcations involvements. *J Periodontol* 1997;68(7):687-693.
20. Askenas B G, Fry H R, Davis J W: Cervical enamel projection with gingival fenestration in a maxillary central incisor: report of a case. *Quintessence Int* 1992; 23(2):103-107.