

Palato-Gingival Groove and Periodontal Disease

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ABSTRACT

Background: The palatogingival groove is a developmental anomaly of the maxillary incisors which has been reported to be associated with localized periodontal disease. The anomaly also has been termed the radicular anomaly, the distolingual groove, and the radicular lingual groove. Aims and Objectives: - To evaluate the relation of palatogingival groove and the periodontal health. Materials and Methods: A total number of 180 patients were examined in the outpatient department of periodontology, A M C Dental College and Hospital, Ahmedabad. Results: Statistical significance were observed for the prevalence of periodontal disease in patients with palatogingival groove. Conclusions: With the help of this study one can manage the patients having palato-gingival groove in anticipation before the tooth involved by the periodontal disease.

Keywords: Periodontal disease, palatogingival groove(PGG),Chronic inflammatory periodontal disease(CIPD).

INTRODUCTION

Abundant evidence implicates microorganisms as the primary and the most common etiologic factor in various forms of periodontal diseases^[1,2]. There are numerous morphologic anomalies that contribute to localised tissue destruction namely cervical enamel projections, enamel pearls, buccal grooves and palatogingival / palatoradicular grooves^[7,8,9]. Of these, one variant that has received little more attention is the palatogingival / palatoradicular groove. Palatogingival groove was first described as a radicular groove by Black in 1908^[10]. These developmental infolding of the inner enamel epithelium and Hertwig's epithelial root sheath (HERS), may results in defects that can pave the way to pulpal and concurrent periodontal pathology. However, they can favour the accumulation of plaque apical to or near the gingival margin, which contributes to the progress of chronic inflammatory periodontal disease (CIPD)^[3,4,5,6]. Early recognition of these factors are essential to minimise/ prevent periodontal disease

and the resulting destruction of the periodontium. Anatomic variations or anomalies of tooth morphology may predispose to CIPD, influencing treatment and maintenance. The prevalence of palato-gingival groove is maximal in the maxillary lateral incisors, many a time jeopardising treatment and ultimately aesthetics^[11,12,13]. The tube-like channel serves as an ideal focus for plaque and calculus accumulation, thus acting as a secondary local etiologic factor, encouraging the development of periodontal disease. Generally, these grooves begin in the central fossa which cross the cingulum and extend for various distances and directions along the length of the root. In rare instances, these grooves present a diagnostic and treatment dilemma. The few references in dental literature dealing with this anomaly trace the relationship of these defects to localized, severe and often hopeless periodontal diseases^[14,15]. Lee et al (1968)^[16] was the first to report an association between palato radicular grooves and localized periodontitis. They

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described eleven cases where unilateral and bilateral defects in lateral incisors were associated with moderate / severe periodontal diseases. Koracks (1971)^[17] called it as “syndesmocoronoradicular tooth,” endowing the groove with great significance, especially its alteration at the level of the cemento-enamel junction where the grooves pass from the crown to the root.

AIM: The aim of this study is to evaluate the relation of palato-gingival groove and periodontal health.

OBJECTIVES: 1) to evaluate presence of palato-gingival groove. 2) To evaluate the presence of palato-gingival groove in bilateral & unilateral central & lateral incisors. 3) To evaluate the presence of periodontal disease in teeth with & without palato-gingival groove. 4) To evaluate the mobility of the teeth with & without palato-gingival groove.

MATERIAL AND METHOD

The proposed study was conducted with Prior approval obtained from the Dean, HOD & Professor, P.G. Guide of Department of Periodontology & ethical committee at A.M.C Dental college & Hospital. 180 participants were selected with prior permission in written consent form by stratified sampling technique from the out patient department with no gender bias.

INCLUSION CRITERIA: 1). Patients include age group of $\geq 20-50 \leq$ years. 2). Participants willing to give informed consent.

EXCLUSION CRITERIA: 1) Pregnant and lactating mothers. 2) Any periodontal treatment done within past 6 months. 3) Participants having any other systemic disease. 4) Patients not mentioned in age group.

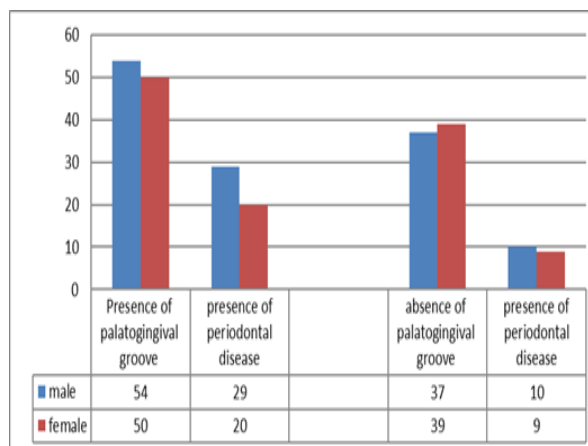
METHODOLOGY & PROCEDURE: Prior to start of the study, the purpose was explained to all participants. All procedures were done by one principal investigator only. Principal investigator had selected the samples by stratified sampling technique. 180 participants were selected randomly with no gender bias and purpose of the study was explained. Plaque index, gingival index, & periodontal pocket depth of the patients were examined.

METHOD OF COLLECTION OF DATA:- Collected data was entered in Microsoft excel (2010) spreadsheet to prepare master chart and excel sheet was forwarded to statistician for statistical analysis.

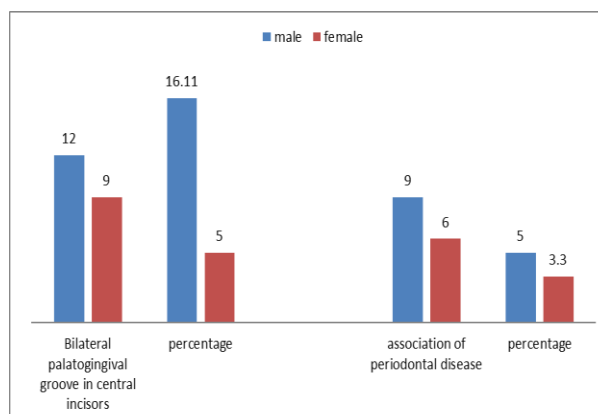
STATISTICAL ANALYSIS: sample size = $2 * (Z_{\alpha/2} + Z_{1-\beta})^2 / (m_1 - m_2 / \sigma)^2$. The Collected data was entered in Microsoft excel (2010) spreadsheet. Appropriate descriptive statistical test were computed and statistical test was done.

STATISTICAL TEST : statistical analysis using independent t test for all statistical analysis probability levels of $p < 0.05$ will consider statistically significant.

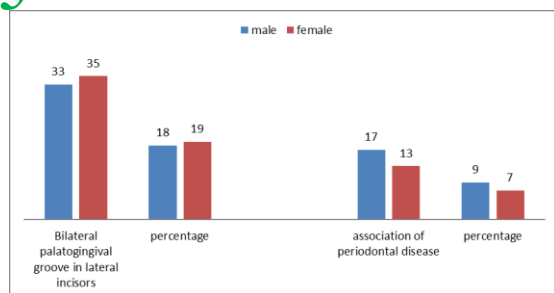
RESULTS



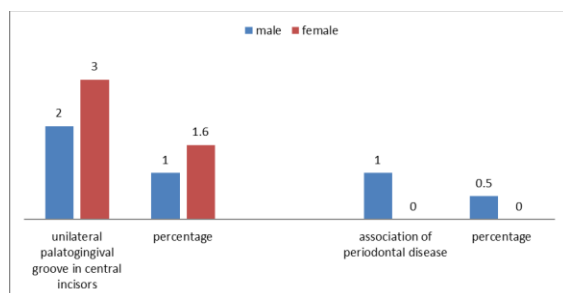
Graph 1: Presence of palatogingival groove and association of periodontal disease.



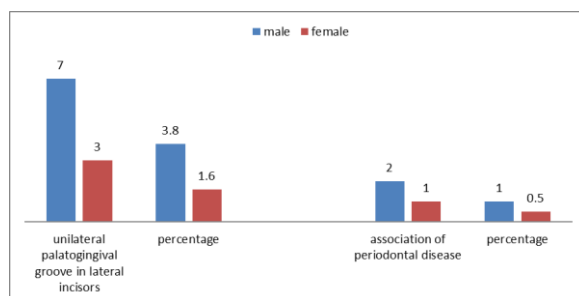
Graph 2: Presence of palatogingival groove in Bilateral central incisors and association of periodontal disease.



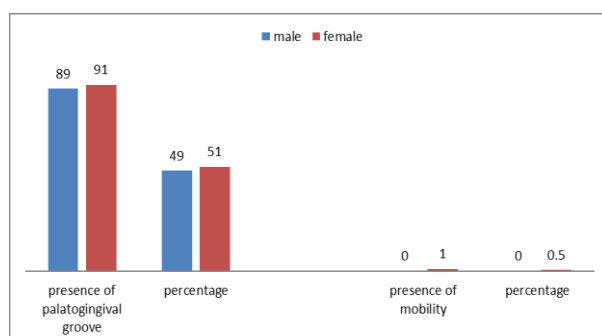
Graph 3: Presence of palatogingival groove in Bilateral lateral incisors and association of periodontal disease.



Graph 4: Presence of palatogingival groove in Unilateral central incisor and association of periodontal disease.



Graph 5: Presence of palatogingival groove in Unilateral lateral incisor and association of periodontal disease.



Graph 6: Presence of palatogingival groove and presence of mobility of teeth.

Out of 180 individuals 57.78% individuals had presence of palatogingival groove. And In 42.22% there was absence of palatogingival groove. There was presence of palatogingival groove in 104 individuals with periodontal disease in bilateral central incisor was 14 % & in unilateral central incisor is 1%. In lateral incisors the prevalence of palatogingival groove and periodontal disease is high. With periodontal disease in bilateral lateral incisor is 28% and unilateral lateral incisor is 3%. There was only one individual who had tooth mobility with palatogingival groove in right central incisor.

DISCUSSION

PGG, first described as a radicular groove by Black in 1908, is a developmental anomaly that begins near the tooth cingulum and extends towards the cemento-enamel junction (CEJ) in apical direction along the root with a wide range of depths and lengths^[10]. In 1958, Oehlers first reported radicular invagination of a maxillary lateral incisor in a Chinese female^[18]. In 1968, Lee et al. proposed the term PGG to describe a groove in the lateral incisor with palatal aspects^[18]. Several terms have been used to describe PGG: distolingual groove, coronoradicular groove, radicular lingual groove, vertical developmental radicular groove, cingulo-radicular groove, developmental radicular anomaly, interruption groove, palatal radicular groove, and palatoradicular groove.^[19,20-22]. Several etiologies have been claimed for this developmental anomaly: (i) consequence of an alteration in growth, such as an infolding of the inner enamel epithelium and epithelial sheath of Hertwig, (ii) variant of dens invaginatus, (iii) alteration of a genetic mechanism, and (iv) attempt to form another root^[23,24]. The tube-like channel serves as an ideal focus for plaque and calculus accumulation, thus acting as a secondary local etiologic factor, encouraging the development of periodontal disease.

Prevalence of palatogingival groove and association of periodontal disease has a significant relation. By examining all clinical parameters including plaque index, gingival index, periodontal pocket depth, this study concludes that palatogingival groove was present in 57.78% individuals. Out of which unilateral central incisor containing 2.6% individual

with palatogingival groove with 0.5% cases had periodontal disease. There was 21.11% had bilaterally presence of palatogingival groove in central incisors with 8.3% cases had periodontal disease. In unilateral lateral incisor palato-gingival groove was present in 5.4% individuals with association of periodontal disease was 1.5%. There was high prevalence of presence of palatogingival groove and periodontitis in bilateral lateral incisors with presence of palatogingival groove in 37% individuals with periodontal disease in 15% individuals. There was only one individual with mobility present in the tooth with palatogingival groove and periodontal disease in this study. So to prevent this association of palatogingival groove and periodontal disease careful examination of this developmental anomaly must be needed, so one can treat this type of developmental anomaly before it involves the tooth with periodontal disease. Within the limitation of this study it is concluded that there is significant correlation between palatogingival groove and periodontal disease.

CONCLUSION

With the help of this study one can manage the patients having palatogingival groove in anticipation before the tooth involved by the periodontal disease.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. Socransky S.S, Haffajee AD; Microbial mechanisms in the pathogenesis of destructive periodontal disease; a critical assessment. *J Periodontol Research* 26 (3). 195-199. May 1991.
2. Socransky SS, Haffajee AD; The nature of periodontal diseases. *Ann Periodont* 2 (1). 3-10. Mar 1997.
3. Albaricci MF, de Toledo BE, Zuza EP, Gomes DA, Rosetti EP Prevalence and features of palato-radicular grooves: an in-vitro study. *J Int Acad Periodontol*. 10 (1). 2-5. Jan 2008.
4. Hou GL, Tsai CC. Relationship between palato-radicular grooves and localized periodontitis. *J Clin Periodontol*;20(9). 678-682. Oct 1993.
5. Simon JH, Glick DH, Frank AL. The relationship of endodontic-periodontic lesions. *J Periodontol*. 43(4). 202-208. Apr 1972.
6. Withers JA, Brunsvold MA. Killoy WJ, Rahe AJ: The relationship of palato-gingival grooves to localized periodontal disease. *J Periodontol* 52(1). 41-44, Jan 1981.
7. Brunsvold MA. Palato-gingival grooves: hidden etiologic factors of periodontitis. *Tex Dent J*. 108 (1). 27-31. Jan 1991.
8. Everett FG, Kramer GM. The disto-lingual groove in the maxillary lateral incisor; a periodontal hazard. *J Periodontol*; 43 (6). 352-361. Jun 1972.
9. Koracks I. A systematic description of dental roots. *Dental Morphology and Evolution*. Chicago, IL: University of Chicago Press, 1971: 283-288.
10. Black GV. Operative dentistry: pathology of the hard tissues of teeth. Chicago: Medico-Dental Publishing; 1908
11. Kogan SL. The prevalence, location and conformation of palato-radicular grooves in maxillary incisors. *J Periodontol* 57 (5). 288-93. May 1986.
12. Kerezoudis NP, Siskos GJ, Tsatsas V Bilateral buccal radicular groove in maxillary incisors: case report. *Int Endod J*. 36 (12). 898-906. Dec 2003.
13. Schäfer E, Cankay R, Ott K. Malformations in maxillary incisors: case report of radicular palatal groove. *Endod Dent Traumatol*. 16 (3). 132-137. Jun 2000.
14. Tom G. Gound, Glenn I. Maze. Treatment options for the radicular lingual groove: A review and discussion. *Pract Periodont Aesthet Dent*. 10 (30). 369-375. Apr 1998.
15. Tavano, De Sousa SM, Branmarte CM. Dens invaginatus in first mandibular premolar. *Endod Dent Traumatol*. 10 (1), 27-29. Feb 1994.
16. Lee KW, Lee EC, Poon KY. Palato-gingival grooves in maxillary incisors. A possible predisposing factor to localised periodontal disease. *Br Dent J*. 124 (1). 14-18. Jan 1968.
17. Koracks I. A systematic description of dental roots. *Dental Morphology and Evolution*. Chicago, IL: University of Chicago Press, 1971: 283-288.
18. Oehlers FA. The radicular variety of dens invaginatus. *Oral Surg Oral Med Oral Pathol* 1958;11:1251-1260.

19. Lee KW, Lee EC, Poon KY. Palato-gingival grooves in maxillary incisors. A possible predisposing factor to localised periodontal disease. Br Dent J 1968;124:1418.
20. Simon JH, Glick DH, Frank AL. Predictable endodontic and periodontic failures as a result of radicular anomalies. Oral Surg Oral Med Oral Pathol 1971;31:823826.
21. Everett FG, Kramer GM. The disto-lingual groove in the maxillary lateral incisor; a periodontal hazard. J Periodontol 1972;43:352-361.
22. Kogon SL. The prevalence, location and conformation of palato-radicular grooves in maxillary incisors. J Periodontol 1986;57:231-234.
23. Simon JH, Glick DH, Frank AL. Predictable endodontic and periodontic failures as a result of radicular anomalies. Oral Surg Oral Med Oral Pathol 1971;31:823826.
24. Peikoff MD, Perry JB, Chapnick LA. Endodontic failure attributable to a complex radicular lingual groove. J Endod 1985;11:573-577.