

Palato-Radicular Groove and Localized Periodontitis: A Series of Case Reports

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Abstract

Aim: The aim of this report is to present the management of three cases of different magnitude affecting the periodontal attachment apparatus due to the presence of a palato-radicular groove (PRG).

Background: The palato-radicular groove is a developmental anomaly often associated with localized periodontitis and pulpal necrosis.

Case description: The authors present three cases involving the management of teeth with a palato-radicular groove. In the first case, a 20-year-old woman presented with a 5 mm periodontal pocket associated with the maxillary right central incisor but no evidence of pulpal involvement. In the second case, there was extensive bone loss and pulpal necrosis of the maxillary right lateral incisor in a 35-year-old man. The third case involved severe localized periodontitis of the right and left maxillary lateral incisors of a 47-year-old man. This report describes the diagnosis and periodontal management of these three clinical situations.

Summary: Periodontal complications due to a palatal-radicular groove are relatively rare. However, when they do occur, the diagnosis of a pulpal or localized periodontal lesion can sometimes present a dilemma for the general dentist, particularly if a palato-radicular groove is the etiologic factor. This is because a radicular groove can act like a “funnel,” aiding microbial



plaque accumulation, and lead to gingivitis, localized periodontitis, and even pulpal necrosis. But with a timely diagnosis and proper clinical management, the tooth or teeth involved can be treated and often retained.

Clinical Significance: Thorough examination of the morphological anomalies associated with the lateral and central incisors, in particular, aided by appropriate diagnostic aids, can lead to accurate diagnosis and management of a tooth or teeth with a palato-radicular groove.

Keywords: Palato-radicular groove, PRG, localized periodontitis, root canal treatment, endo-periodontal lesion

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Introduction

Periodontitis is an inflammatory disease characterized by the destruction of the periodontal ligament and the alveolar bone.¹ It results from the interaction of the host defense mechanism with the dental plaque microorganisms.² Local factors such as irregularities in root anatomy, developmental abnormalities, subgingival restoration margins, and overhanging dental restorations play a significant role in the pathogenesis of periodontitis. Inherent anatomic and morphologic features of the teeth can have a significant impact on the diagnosis, management, and prognosis of the involved tooth/teeth.³ A palato-radicular groove (PRG) is a developmental groove most often found on the lingual surface of the maxillary lateral incisors or central incisors, and less often on the other teeth.⁴ It has often been related to localized destruction of the periodontal tissue and endodontic complications.⁵

In the dental literature, other terms used to describe PRG are radicular-lingual groove, disto-lingual groove, radicular anomaly,^{6,7} and syndesmocoronaradicular tooth.⁸ The infolding of the inner enamel epithelium and the Hertwig's epithelial root sheath creates a groove that passes from the cingulum of the affected maxillary incisors apically on the root.⁹ These grooves usually begin in the central fossa, pass through the cingulum, and extend various distances and directions down the root.¹⁰ Although these grooves are noteworthy in general, they are of particular concern to dentists and their patients.¹⁰ This is because the grooves can actually act as "funnels," accumulating microbial dental plaque down to the base of the groove, which is inaccessible to both patients and clinicians.⁹

Depending on their depth and direction, focal loss of periodontal attachment can sometimes extend to the apical third of the root and result in a hopeless prognosis of the involved tooth.¹⁰

Although there are numerous studies on the prevalence of the PRG, there are few case

reports in the dental literature that deal with the relationship between the PRG and periodontal destruction.

This report includes three cases involving PRG and describes the relationship between the PRG, its effects on the periodontium, and the clinical management of such situations.

Case Reports

Case 1

A 20-year-old female patient was referred to the Department of Periodontics, People's College of Dental Sciences, Bhopal, India, from the Department of Orthodontics for recurrent inflammation of the gingiva on the palatal aspects of the maxillary anterior incisors. Dental history revealed that the patient had undergone fixed orthodontics and was wearing retainers. She also complained of "bleeding gums" for the past six months. Periodontal examination revealed fair oral hygiene, but there was a periodontal pocket measuring 5 mm on the distal aspect of the maxillary right central incisor (Figure 1). Examination under magnification revealed the presence of a PRG in the mid-palatal aspect of the central incisor (Figure 2).

There were no significant changes noted on the periapical radiograph, however (Figure 3).

A heat vitality test proved to be positive so no endodontic treatment was performed. The etiology of the patient's chief complaint was explained to her and with her informed written consent, basic



Figure 1. Case 1. Mirror view showing a 5 mm pocket on the distal aspect of the maxillary right central incisor measured using a William's Graduated Periodontal Probe.

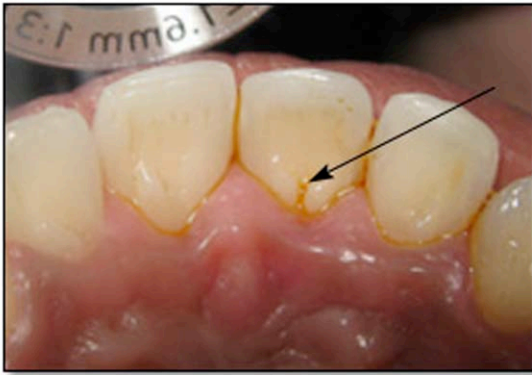


Figure 2. Mirror view of the radicular groove in the mid-palatal aspect of the maxillary right central incisor.



Figure 3. Periapical radiograph of the maxillary right central incisor showing radiographic evidence of crestal bone loss.



Figure 4. Mirror view of a full thickness mucoperiosteal flap revealing groove terminating at CEJ of the maxillary right central incisor.

initial periodontal therapy, consisting of scaling and root planing, was carried out. The patient was instructed in proper oral hygiene measures. At her two-week follow-up visit, little reduction in the pocket depth was noted, so with the consent of the patient a full thickness flap was reflected, which revealed that the palato-radicular groove ended at the cemento-enamel junction (CEJ) (Figure 4).

Subgingival scaling and root planing was carried out. The groove was then sealed with a conventional glass ionomer restorative material (Figure 5), and the flap was closed with simple interrupted sutures.

The patient was given postsurgical instructions and was placed on antibiotic-analgesic coverage (amoxicillin 500 mg TID for five days and ibuprofen 400 mg for three days). A chlorhexidine gluconate mouthwash (0.12 percent) was prescribed to supplement her normal oral hygiene regimen. The patient was recalled again one week later for suture removal and reminded of the importance of plaque control. Examination after two months revealed a reduction in the pocket depth to 2.0 mm as shown with resolution of the inflammation in the palatal aspect (Figure 6).

Case 2

A 35-year-old male patient reported to the Department of Periodontics with a complaint of pain involving his maxillary left lateral incisor. Clinical examination revealed a deep periodontal pocket measuring 7 mm and the presence of a PRG in the tooth. A periapical radiograph revealed a large radiolucency in relation to the maxillary left lateral incisor (Figure 7). A heat vitality test using hot gutta percha was negative. Because this was an endo-periodontal defect, endodontic treatment was first performed on the affected tooth (Figure 8).

There was a significant reduction in the radiolucency after the endodontic therapy was completed. After two months a full thickness flap was reflected to reveal the full extent of the groove. It also was noted that the interdental area distal to the maxillary left lateral incisor contained a large amount of granulation tissue (Figure 9). On the palatal aspect the groove extended to the cemento-enamel junction (Figure 10).

Scaling and root planing were carried out to remove the subgingival calculus and granulation tissue using Gracey curettes numbers 1 and 2.



Figure 5. Mirror view of the groove, which was sealed with a glass ionomer cement.

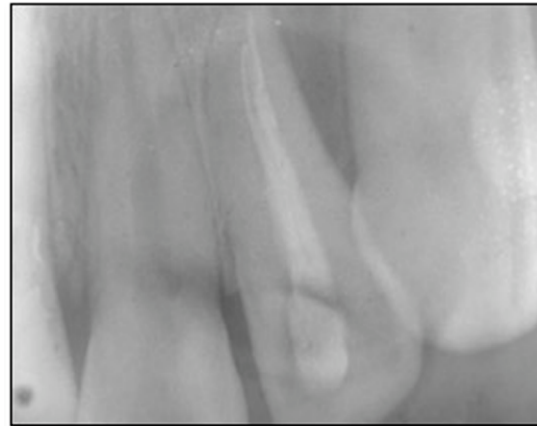


Figure 8. Radiograph of the maxillary left lateral incisor after root canal treatment.



Figure 6. Mirror view of the probing depth, which was reduced to 2.0 mm two months after the surgery.



Figure 9. Granulation tissue filled the defect around the maxillary left lateral incisor.



Figure 7. Case 2. Periapical radiograph showing a large radiolucent area distal to the maxillary left lateral incisor.

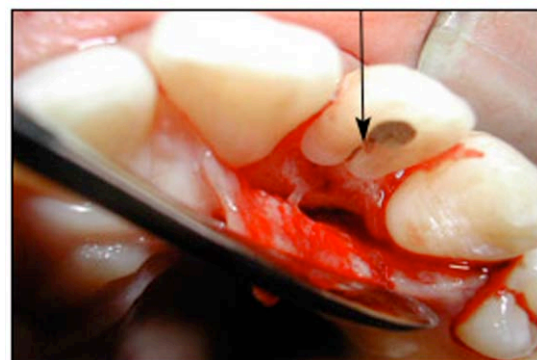


Figure 10. The palato-radicular groove extended to the CEJ.

Due to extensive loss of bone, additive osseous surgery involving placement of a bone graft was carried out. Because the groove was shallow, it was restored (actually filled) with glass ionomer restorative material to eliminate further plaque retention (Figure 11).

Sutures were placed and the patient was placed on antibiotic-analgesic coverage (amoxicillin 500 mg TID for five days and ibuprofen 400 mg for three days). The patient was advised to use chlorhexidine gluconate mouthwash (0.12 percent) to supplement his oral hygiene regimen. Sutures were removed after two weeks. Healing was satisfactory, and the patient was put on supportive periodontal therapy. The patient also was instructed in proper oral hygiene measures and motivated to maintain his oral hygiene at a higher level to prevent recurrence of the disease. He was recalled on a regular basis and at six months no recurrence of the pathology was noted. After six months, there was

complete elimination of the periodontal pocket with radiographic evidence of significant bone fill (Figure 12).

Case 3

A 47-year-old man reported to the Department of Periodontics with a complaint of loose maxillary anterior teeth. On periodontal examination his oral hygiene was judged to be poor, and an 8 mm pocket was present on the distal aspect of both maxillary lateral incisors (Figures 13 and 14). On examination from the palatal aspect, PRGs were present on the distal aspect of both lateral incisors (Figure 15).

In addition, the left and right lateral incisors presented with grade III mobility and the central incisors had grade II mobility. The left lateral incisor also was supererupted. Periapical radiographs of the affected teeth revealed extensive bone loss (Figures 16 and 17). Based on these findings, the patient was advised to have



Figure 11. Glass ionomer cement was used to seal the groove.

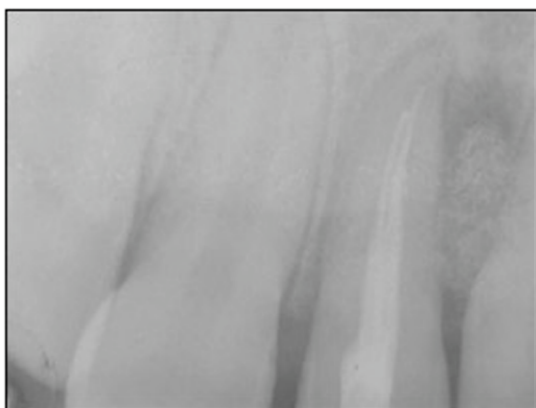


Figure 12. Periapical radiograph showing bone fill after six months.



Figure 13. Case 3. Mirror view showing an 8 mm pocket was found on the maxillary right lateral incisor.



Figure 14. Mirror view showing an 8 mm pocket at the disto-lingual line angle of the maxillary left lateral incisor



Figure 15. Mirror view with arrows pointing to a palato-radicular groove on the disto-palatal aspects of the maxillary right and left lateral incisors.

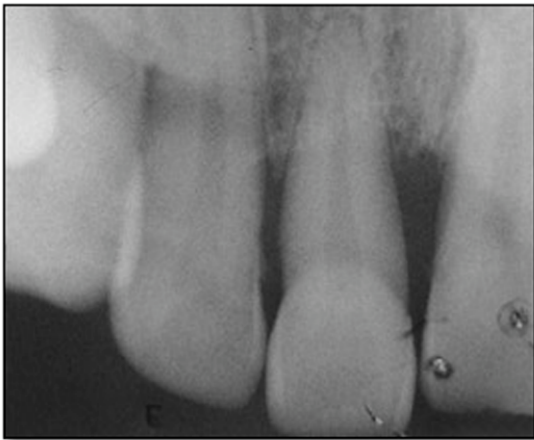


Figure 16. Periapical radiograph showing severe maxillary anterior bone loss.

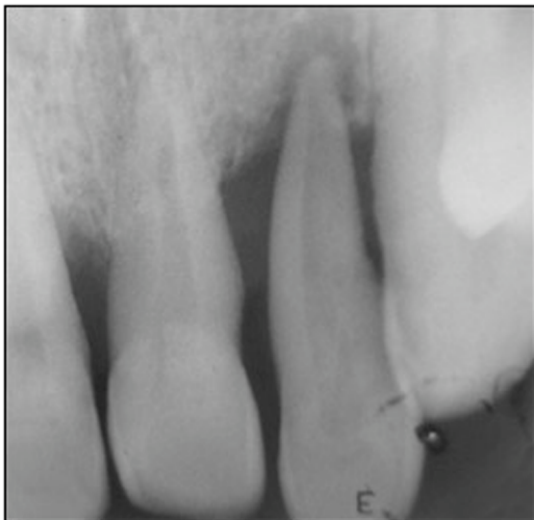


Figure 17. Periapical radiograph showing extensive bone loss around the maxillary right lateral incisor.

the affected lateral incisors extracted and then the missing teeth replaced.

Discussion

This report presents three cases of PRG demonstrating variations in the depth and extent of involvement of the pulp and attachment apparatus and treatment management. In the first case, the patient was a young lady with moderate periodontal pocket depth and minimal destruction of the attachment apparatus. The second case involved a middle-aged man with deep pocket depths and extensive bone loss with pulpal necrosis. The third case was that of a 47-year-old man with severe bone loss affecting the central and lateral incisors, where extraction of the affected teeth was recommended.

The first and the second cases were treated with periodontal flap surgery with and without bone grafting, respectively. The rationale for using antibiotics with the first two patients was to support their individual host defenses in overcoming periodontal infections by eliminating subgingival pathogens that remain after periodontal instrumentation¹¹ and to prevent the systemic complications that may arise from a transient bacteremia following the surgical procedure. The grooves were sealed with glass ionomer cement. This restorative material is known to have many advantages, such as the ability to bond chemically to enamel and dentin, biocompatibility, good cavity seal, as well as ease of use and low cost.^{12,13} Apart from these advantages, glass ionomers have a unique antibacterial property.¹⁴

Palatal grooves occur frequently on the maxillary lateral incisors, but less frequently on central incisors.¹⁰ The groove is more likely to form on the lateral surfaces (60 percent) than in the mid-palatal region (40 percent).¹⁶ However, Kogon¹⁰ found the groove to be more frequently found on the mid-palatal regions. Hou¹⁵ and Bacic et al.¹⁶ postulated the distal and mesial locations of the groove to be more harmful than a mid-palatal groove. This was because far more plaque accumulates in these regions, where it is difficult to remove. What can follow is a deep localized periodontal lesion as in the third case, where the PRG was present on the distal aspect of the lateral incisors, in contrast to the second case report, where the

groove was present in the mid-palatal region of the lateral incisor with severe, localized periodontal destruction.

The diagnosis of the PRG may sometimes present a diagnostic dilemma because the patient usually presents with myriad signs and symptoms related to a true periodontal lesion or a true endodontic problem or sometimes a combination of both i.e., endo-periodontal lesion. Use of a disclosing agent may prove valuable because it can fill up the depressed groove area and visually differentiate the groove from sound tooth structure.

Various treatment modalities have been suggested that depend on the severity of the periodontal defect and type of groove (deep or shallow). Ramirez,¹⁸ Holm,¹⁹ and Everett and Kramer⁶ suggested a curettage procedure with or without a flap and odontoplasty for shallow grooves. Lee et al.²⁰ recommended doing an apically repositioned flap and placing amalgam in the groove. Rankow and Krasner²¹ advocated surgical exposure of the defect and flattening of the groove by grinding with a high-speed diamond bur or fine stone, with or without application of the guided tissue regeneration (GTR) technique. Everett and Kramer⁶ advised that if the groove is very deep, the prognosis is usually hopeless.

On the other hand, if the groove is not deep with only a shallow periodontal pocket, closed curettage is usually recommended to prevent attachment loss. If an open flap curettage is used to treat this condition, then expect a loss of periodontal attachment rather than a gain. When dealing with pockets of moderate depth, a flap surgery is advised along with sealing of the groove with a restorative material such as glass ionomer cement, dental amalgam, or a light-activated, resin-based composite. The principal disadvantage of these procedures may be the formation of a long junctional epithelium instead of a true regeneration of the lost attachment apparatus. This is because it also has been shown that when restorative materials are used to seal the groove, the result typically is a reduced epithelial attachment in that region.²² However, the advantages of using a sealant like glass ionomer cement are this material's ability to provide a tight seal and its antibacterial property. When a sealant of some type is used, it prevents the formation of a dead space between the gingival flap and the depressed groove.

Perhaps the best technique or treatment option can be the use of GTR or enamel matrix derivatives, which usually show true regeneration of the lost attachment apparatus. In spite of all these treatment procedures, if periodontal maintenance at regular intervals is not carried out following any or all of these treatments, there is a greater likelihood of failure.

Summary

An association between palatal groove and periodontal complications is relatively rare. Yet when a PRG is present, diagnosing a pulpal or localized periodontal lesion can sometimes pose a dilemma for the general dentist because these radicular grooves act as "funnels" aiding microbial plaque accumulation, leading to gingivitis, localized periodontitis, and even pulpal necrosis. However, when a PRG does occur and a timely diagnosis is made, there are recognized ways to manage the situation and, in many cases, the involved tooth or teeth can be saved.

Clinical Significance

Thorough examination of the morphological anomalies associated with the lateral and central incisors, in particular, aided by appropriate diagnostic aids can lead to accurate diagnosis and management of a tooth or teeth with a palato-radicular groove.

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