Management of Palatoradicular Groove

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ABSTRACT:
Palatoradicular groove is a developmental anomaly which has been implicated as an initiating factor in localized gingivitis and periodontitis. These grooves when further complicated by pulp necrosis can present a diagnostic and treatment planning challenge to the operator. This article describes the management of bilateral maxillary lateral incisors with shallow and deep palatoradicular grooves.

Key words: Palatoradicular groove, Palatogingival groove, Radicular groove, Developmental anomalies, Endo-perio lesion.

INTRODUCTION
Developmental infoldings may result in defects that can provide a pathway for pulpal pathology. One such defect is palatoradicular groove which is seen in the central fossa of maxillary incisors that extends apically on to the root.1 It can be defined as “a developmental groove in a root that, when present, is usually found on the lingual aspect of maxillary incisor teeth”.2 These grooves are commonly seen on the palatal aspect of maxillary lateral incisors followed by maxillary central incisors and second molars. Many terms have been used to describe this defect: palatogingival groove,3,4 developmental radicular anomaly,5 disto-lingual groove,6 radicular lingual groove,7 radicular groove, and cingulo-radicular groove.

Lee et al. were the first to report an association between palatoradicular groove and localized periodontitis. They proposed that the palatal groove represents an infolding of the enamel organ and Hertwig's epithelial root sheath and parallels the pathogenesis of dens invaginatus. Unlike dens invaginatus, however, the infolding that occurs in the palatal groove is usually less extensive and creates an external defect that is...
situates adjacent to the gingival crevice. More recently, in a morphological analysis of these grooves, Ennes and Lara suggested that the palatal groove could be the result of an alteration of genetic mechanisms, rather than a dental germ folding. The prevalence rate of this defect has been reported to be 2.8% - 8.5%.

The significance of this defect lies in the fact that it has the potential to provide a pathway for bacteria to penetrate into the periodontal ligament area. It acts as a nidus for plaque accumulation and subsequent inflammation. Once a breach occurs in the periodontal attachment and the groove is involved, a self-sustaining localized periodontal pocket can develop along the length of the groove.

The groove might vary in depth along the root, and it might also communicate with the pulp cavity leading to pulpal necrosis, complicating the prognosis. But the main communication between the pulp and the periodontium in incisors with a radicular groove is probably the accessory canals, which might be anywhere along the groove. These grooves often present a diagnostic and treatment planning dilemma. While frequently associated with periodontal pockets and bone loss, pulpal necrosis of these teeth may precipitate a combined endodontic-periodontic lesion associated with localized periodontitis.

Suggested treatment modalities were curettage of the affected tissues, elimination of the groove by grinding and/ or by sealing with a variety of filling materials. If the groove extends beyond the middle third of the root apex, surgical procedures are required, which include, among others, the use of barriers and/ or intraosseous grafts to correct the defect. Although, the defect is of periodontal etiology, restorative treatment alone and/or endodontic treatment is often required because of secondary pulpal involvement. If periodontal breakdown continues, extraction of the affected tooth should be considered. This article presents a case report of bilateral palatoradicular groove in maxillary lateral incisors and their management.

CASE REPORT

A 21-year-old male patient with good general health presented to the department of Conservative dentistry & Endodontics with the chief complaint of proclined tooth with pus discharge in left upper anterior quadrant. The patient was unaware of any previous trauma to the maxillary anterior region and had no history of pain in that area. On clinical examination, bilateral, palatoradicular grooves were detected on the palatal aspect of maxillary lateral incisors (Figure 1). Dental caries and inflamed gingiva was seen on the palatal aspect of maxillary lateral incisors (Figure 2 and 7). A patent root canal was seen in both lateral incisors. Based on clinical examination and radiographic findings the case was diagnosed as localized periodontitis with palatoradicular groove in maxillary left lateral incisor (#22) and dental caries with palatoradicular groove in right lateral incisor (#12).

After prophylaxis and removal of localized calculus, local anesthesia (2% Lignox, Indoco remedies Ltd.) was administered and a surgical flap was raised from the palatal aspect in relation to both the lateral incisors and the palatoradicular grooves were seen extending onto cervical third of the root in #22 and onto cingulum in #12. After flap reflection, caries removal and saucerization of the enamel was done in #12 followed by restoration with light cure GIC (Figure 3,4 and 5), whereas thorough scaling and root planning was performed over the groove in #22 to remove the bacteria that might have colonized there. The diseased granulation tissue was curetted out (with Gracey curette number 1, 2 and
5,6; Hu-Friedy Manufacturing Co, Chicago, IL) to leave the soft tissue more conducive to regeneration. Later saucerisation was done with a round bur to remove the defect. A chemical conditioning of the groove was performed by using 10% polyacrylic acid, and light cured glass ionomer cement was placed into the defect (Figure 10,11,12). Then the localized bony defect was filled with bone graft (G-Graft) supported by using a bioabsorbable collagen membrane (Perio-col GTR membrane, Eucare) (Figure 13 and 14). Later the flap was approximated and supported with figure of eight sutures (Figure 15,16). Patient was instructed on postsurgery precautions and maintenance protocol, which included doxycycline 100mg, with instructions to take two capsules immediately, then one capsule every day for 14 days and rinsing with 0.12% solution of chlorhexidine twice a day for 5 weeks. Patient was recalled after 2 weeks. The healing of the periodontium was uneventful. Sutures were removed. At this time complete soft tissue closure in the defect-associated interdental area was still demonstrable. When chlorhexidine was discontinued, full mechanical interproximal cleaning in the surgically treated area was re instituted. The patient was recalled for professional tooth cleaning and reinforcement of self-performed oral hygiene measures at 1-month intervals for 6 months. No attempt at probing or deep scaling was made before the follow-up. A radiograph taken 6 months (Figure 17) after the surgery revealed bone fill of the previously existing osseous defect in #22 and the gingival health was satisfactory in #12. Clinical examination revealed no abnormal response to percussion, palpation and mobility was within normal limits. Later the patient was referred to the department of orthodontics for correction of the proclined left lateral incisor (#22).

**DISCUSSION**

The palatoradicular groove is a developmental anomaly which usually begins in the central fossa, crosses the cingulum, and extends varying distances and directions apically.2 Withers et al.4 in a study of military recruits, found palatal grooves in 8.5% of individuals, 0.28% of maxillary central incisors and 4.4% of maxillary lateral incisors. After an examination of 3168 extracted incisors, Kogon9 reported the prevalence to be 3.4% in central incisors and 5.6% in lateral incisors. About half of these grooves (54%) extended onto the root surface; of those, 43% extended less than 5 mm, 47% 6 to 10 mm, and 10% more than 10mm apically from the cementoenamel junction. Fifty-four percent of the palatal grooves in this study were described as a shallow depression, 42% as a deep depression, and 4% as a closed tube.

The treatment of a palatal groove presents a clinical challenge to the operator and involves a multidisciplinary approach. The prognosis of teeth affected by this anomaly depends on the location, depth, and extent of the groove and the extent of periodontal destruction.1 The rationale behind the selected treatment plan was the following:

1) Removal or saucerization of the radicular portion of the groove to eliminate bacterial plaque and calculus and to prevent bacterial recolonization; (2) Regeneration of periodontal attachment and bone and consequently improvement of the clinical conditions (reduction in pocket depth); (3) Cleaning and sealing of the coronal portion of the groove to prevent bacterial recolonization.

Complicated by the palatal occurrence and patient’s inability to keep the area clean, periodontal breakdown is inevitable. It acts like a trap, facilitating the development of a combined endodontic-periodontal lesion as there might be a communication between the pulp canal system and the periodontium through the accessory canals. Sometimes, it is misdiagnosed as a primary endodontic lesion. The diagnosis might further be complicated because the clinical picture might point toward a periodontal abscess, and radiographically the palatogingival groove might appear like a vertical root fracture or an extra root canal.14

Materials such as composite and amalgam have been used to fill the palatoradicular groove.15,16 Although mineral trioxide aggregate sets in the presence of moisture, it might get washed off from the transgingival defect. Instead, light cure glass ionomer cement was chosen because it does not have this limitation. It also has the added advantages of...
having an antibacterial effect, chemical adhesion to the tooth structure, adequate sealing ability, and promoting epithelial and connective tissue attachment.

Several techniques have been reported in the past for the treatment of teeth with developmental abnormalities such as radicular groove. Despite its being a periodontal hazard, and Metzler have reported clinical success at 6 months for 10 cases treated with nonresorbable barrier.

According to recent studies, GTR membrane acts as mechanical barrier halts the epithelium down growth along the root surface, allowing periodontal ligament, cementum, and bone to regenerate. The combined technique of using graft material with GTR membrane helps to reduce the pocket depth thereby improving the prognosis of the tooth. McLain and Schallhorn also showed that attachment levels are maintained more predictably in sites treated with a combined graft/GTR therapy. In the present cases clinical success might be attributable to elimination of the local factor for supragingival and subgingival plaque accumulation by smoothing the radicular defect and filling it with restorative material.

CONCLUSION:

Deep radicular grooves can predispose to pulp necrosis and the establishment of combined endodontic-periodontal lesions. Evaluation of clinical signs and appropriate diagnostic tests are of paramount importance in order to prevent incorrect diagnosis and treatment. If the clinicians are aware of the forms in which the condition may occur, with the various treatment modalities available, a number of teeth with palatoradicular grooves may be saved.

References

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Fig 1: Bilateral Palatoradicular Grooves

Fig 2: Pre-operative Radiograph I.R.T #12

Fig 3: Flap Reflected I.R.T 12

Fig 4: Saucerization I.R.T. 12

Fig 5: After Sealing With Light Cure GIC

Fig 6: Pre-operative View - Proclination Of #22

Fig 7: Pre-operative Radiograph I.R.T. 22

Fig 8: Probing Done I.R.T. 22

Fig 9: Radiograph Showing The Probing Depth Done I.R.T. 22

Fig 10: Flap Reflected I.r.t. 22

Fig 11: Caries Removal And Saucerisation Done I.R.T. 22

Fig 12: After Sealing With Light Cure Gic I.R.T. 22

Fig 13: Graft Placement I.R.T. 22

Fig 14: Collagen Membrane Placement I.R.T. 22

Fig 15: After Suturing - Labial View

Fig 16: After Suturing - palatal View

Fig 17: Follow Up Radiograph - After 6 Months