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Strategic management of periodontic and periodontic-endodontic lesion associated with palato-radicular groove – Report of three cases

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1. Introduction

Palato-radicular groove is a developmental anomaly, starts near the cingulum of the tooth and runs down the cemento-enamel junction in an apical direction, terminating at various depths along the root. It is suggested that the formation of palato-radicular groove is probably caused by infolding of the enamel organ and Hertwig's epithelial root sheath during odontogenesis[1] and has been speculated to be an aborted formation of an additional root.[2] It has also been suggested that the palatal groove could be the result of an alteration of genetic mechanism.[3]

Its prevalence ranges from 1.01% to 8.5%, independent of the sex[4] and a racial influence is suggested.[5] The maxillary lateral incisor is most commonly (93.8%) affected tooth.[6] Goon et al. have classified palato-radicular grooves into mild, moderate and complex types. Mild ones terminate at the cemento-enamel junction whereas moderate grooves continue apically along the root surface. The most complex forms are deeply invaginated defects that separate an accessory root from the main root trunk.[7]

The inherent difficulties in treating the palato-radicular groove make it a diagnostic complex for practitioners. Hence, early detection & treatment improves the prognosis and makes the treatment more predictable. The present case series shows 3 cases where, in the first 2 cases the palato-radicular groove was diagnosed early and treated before a complex lesion could occur, while the third case describes the treatment of a palato-radicular groove associated with a periodontic-endodontic lesion.

2. Clinical presentation & management

2.1. *Case report-1*

A 35 year old male reported with the chief complaint of bad breath and bleeding gums since 1 month. On examination, a 6 mm deep pocket was present on mid-palatal surface of tooth #22 (Fig. 1a). After phase I therapy, an open flap debridement was planned for the patient. After incision, a muco-periosteal

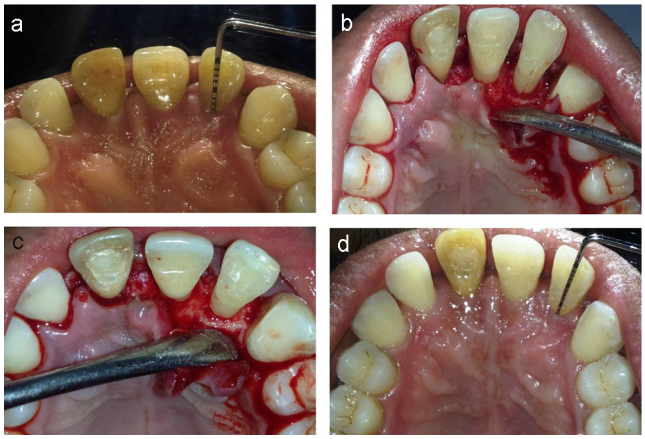


Fig. 1 – (a) Pre-operative view showing 6 mm deep pocket on mid-palatal surface of tooth #22. (b) Intra-operative view showing shallow Palato-radicular groove on the mid-palatal surface of tooth #22. (c) Palato-radicular groove saucerized with a round bur. (d) Post-operative view showing 2 mm sulcus at 1 year follow up.

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Fig. 2 – (a) Pre-operative view showing inflamed and edematous gingiva with 10 mm pocket on the mid-palatal aspect of tooth #22. (b) Pre-operative IOPA showing angular bone loss on mesial aspect of the root of tooth #22. (c) Intra-operative view showing debridement and radiculoplasty for PRG on tooth #22. (d) Regenerative materials placed in bony defect and a resorbable collagen membrane was placed & sutured. (e) Post-operative IOPA showing bone fill on mesial aspect of the root of tooth #22. (f) At 1 year Post-operatively, the probing depth had reduced to 3 mm.

flap was raised and thorough debridement was carried out (Fig. 1b). A shallow PRG was noted on the mid-palatal surface which was saucerized with a round bur (Fig. 1c). No associated osseous defect was present. The flap was repositioned with the help of 4-0 silk sutures. The healing was uneventful and the pocket depth reduced to 2 mm 1 year post-operatively (Fig. 1d).

2.2. *Case report-2*

A 34 year old male, reported with the chief complaint of bleeding gums since 3 months. His oral hygiene maintenance was fair.

On clinical examination, there was reddish-pink, inflamed and edematous gingiva with 10 mm pocket on the mid-palatal aspect of tooth #22 (Fig. 2a). Such deep pockets were not present on the buccal aspect as well in other areas of the dentition. The radiographic findings suggested bone loss extending upto apical one-third of the root of tooth #22 (Fig. 2b). On vitality testing, the tooth was vital.

One month after completion of phase I therapy, periodontal surgical treatment was planned. After incision, reflection & thorough debridement, a deep trench-like defect surrounding the palatal surface of the root of tooth #22 was seen. The radicular groove extended upto the base of the defect. Saucerization of the groove was done with a tapered-fissure diamond bur to smoothen the root surface and root planning was carried out (Fig. 2c). Alloplast (calcium phospho-silicate putty) and Platelet rich fibrin clot were used as regenerative materials for bony defect and a resorbable collagen membrane was placed over it to achieve regeneration.

2.3. *Platelet rich fibrin preparation protocol*

Before surgery, intravenous blood was collected in a 10-mL glass-coated plastic tube without any anticoagulant and centrifuged immediately using a table centrifuge for 10 min at 3000 rpm (400 g).[8]

The resultant product contained the following three layers:

- Topmost layer consisting of platelet poor plasma
- Platelet rich fibrin clot in the middle
- Red blood cells at the bottom

Platelet rich fibrin clots were removed from the test-tube using sterilized tweezers and the red blood cell layer attached to the clot was carefully removed using sterilized scissors (Fig. 3).

The flap was repositioned with 4-0 silk sutures (Fig. 2d). Antibiotics and analgesics were prescribed and the patient was recalled after 7 days. The healing was uneventful. Patient was kept on frequent recall. Post-operatively, the probing depth had reduced to 3 mm and radiograph showed sufficient bone fill in the defect (Fig. 2e and f).

2.4. *Case report-3*

A 36-year-old male reported with the chief complaint of pus discharge from upper front teeth region. Clinical examination depicted soft and edematous gingiva on palatal aspect with 13 mm periodontal pocket and grade I mobility. On radiographic examination, there was a radiolucency involving distal aspect

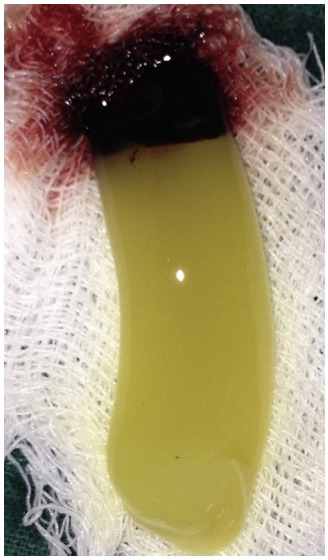


Fig. 3 – PRF prepared to use in osseous defect.

of tooth #12 extending till the apex (Fig. 4a). On vitality testing, tooth showed non-vital response. After completion of phase I therapy endodontic treatment was carried out (Fig. 4b). In follow up visit there was no improvement in pocket depth reduction (Fig. 4c). Therefore, surgical procedure was planned. Single flap reflection was opted on palatal aspect with crevicular incision raising an envelope flap. On surgical exposure palatoradicular groove was visible extending from cingulum to apical 3rd of root. Radiculoplasty was carried out to eliminate the groove. The regeneration of lost bone was done by placing platelet rich fibrin and Alloplast (calcium phospho-silicate putty) covered with resorbable collagen membrane. Sling suture was taken with 4-0 silk suture (Fig. 5a–e).

On 1 year follow up, the gingival inflammation completely subsided with 9 mm of attachment gain & reduction of pocket depth (Fig. 6a) and radiographic evidence of bone regeneration (Fig. 6b). No evidence of recession was seen on palatal or buccal aspect.

3. Clinical outcome

Reevaluation after 12 months showed periodontal health in all three cases with reduction in probing pocket depth, clinical attachment gain and no gingival recession. Radiographic bone fill was also evident.

4. Discussion

Local anatomic factors play a very significant role in the initiation and progression of periodontal disease. These are the areas where there is no attachment and can act as a direct ''pathway to destruction''. Palato-radicular groove is one of the most common anatomic developmental aberrations found on the surface of maxillary lateral incisors.

It is also known as distolingual groove, radicular lingual groove, radicular groove, and syndesmocoronoradicular groove. The groove is a locus for plaque accumulation, which destroys the sulcular epithelium and later deeper parts of the periodontium, finally resulting in the formation of a severe localized periodontal defect. Maintenance of the defect is difficult, if not impossible for the patient[9]. Pulpal involvement and eventual necrosis can occur due to tracking of the bacteria

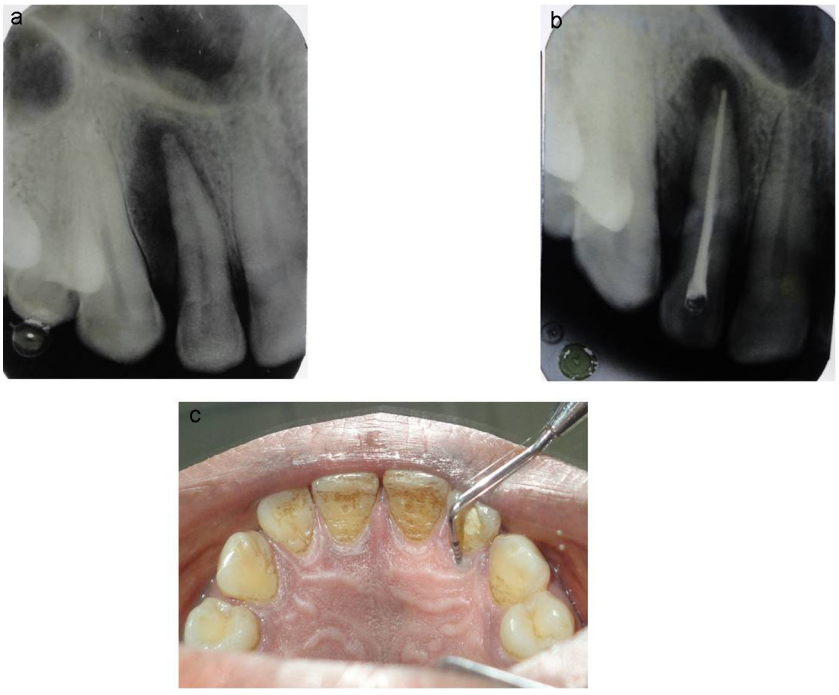


Fig. 4 – (a) Pre-operative IOPA showing periodontic-endodontic lesion with radiolucency involving distal aspect of tooth #12 extending beyond the apex. (b) After Phase I therapy, endodontic treatment done. (c) 12 mm deep pocket & exudation present even post-endodontic treatment of tooth #12.

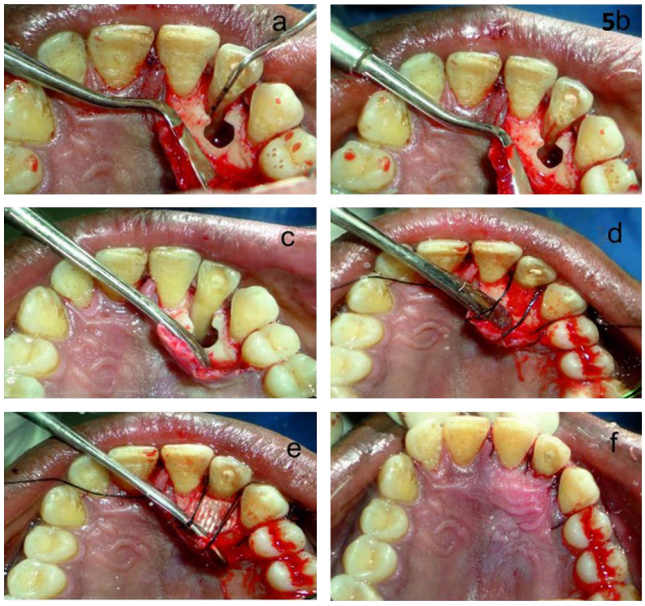


Fig. 5 – (a) Clinical view of 12 mm deep periodontal osseous defect along palatal rrot of tooth #12. (b) Midpalatal root of tooth #12 showing palate-radicular groove extending to apex. (c) Radiculoplasty was carried out to eliminate PRG. (d) Alloplast (calcium phospho-silicate putty) and PRF were used as regenerative materials for periodontal bony defect. (e) A resorbable collagen membrane was placed to secure graft. (f) Flap sutured with sling sutures (a–e).

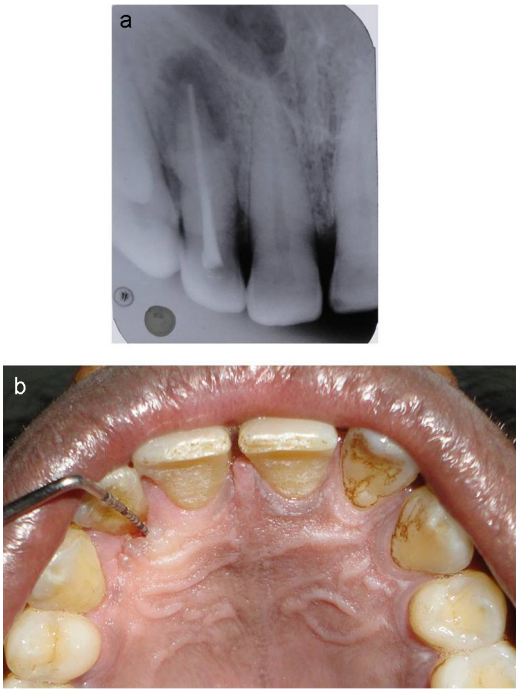


Fig. 6 – (a) On IOPA post-operative view showing radiographic evidence of bone fill on tooth #12. (b) Post-operative view at 1 year follow up showing 4 mm sulcus without bleeding on probing.

apically along the groove to the apex and through the accessory foramina.

Various treatment modalities have been suggested that depend on the severity of the periodontal defect and type of groove (deep or shallow). Treatment management for the PRG include curettage of the affected tissues,[10] saucerisation with a round bur,[11] sealing of the groove with a biocompatible material,[11] root canal therapy if primary or secondary endodontic lesion is involved[12] and surgical procedures, i.e., guided tissue regeneration therapy, intentional replantation.[9,13] If periodontal breakdown continues, extraction of the affected tooth should be considered.

Among three cases presented, in the first case, only debridement and saucerizarion were sufficient. In the second case, successful results were achieved with the use of periodontal regenerative therapy for the treatment of osseous defect. In the third case, successful results were obtained despite the presence of a combined periodontic-endodontic lesion by an inter-disciplinary approach consisting of endodontic treatment followed by periodontal regenerative therapy. Platelet rich fibrin was used along with bone graft in both the cases as the regenerative material. There are very few cases in the literature which report the use of platelet concentrates in treatment of such defects.[14] We were able to achieve successful results with platelet rich fibrin and further studies are needed to prove the beneficial effects of the same.

5. Conclusion

From the presented cases it can be summarized that successful management of palato radicular groove with different severity depend on early & accurate diagnosis and elimination of inflammatory irritants and contributory factors. PRG can also act as a gateway to the development of periodontic-endodontic lesions and complicate the diagnosis and treatment if kept undiagnosed. For the treatment of such lesions an inter-disciplinary approach should be implemented. Thus, appropriate diagnosis and timely most suited treatment is of paramount importance in successful management of such cases.

Conflict of interest

The authors have none to declare.

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