

A novel approach in the management of palatogingival groove using MTA plus, PRF and GTR membrane**Abhilasha S Jain, Shekhar K¹, Bhuvan Shome Venigalla², Veerandar T Singh³, Harika D⁴**

Postgraduate Student, Department of Conservative Dentistry and Endodontics, Sri Sai College of Dental Surgery, Vikarabad, Telangana, India; ¹Professor, Department of Conservative Dentistry and Endodontics, Sri Sai College of Dental Surgery, Vikarabad, Telangana, India; ²Professor & HOD, Department of Conservative Dentistry and Endodontics, Sri Sai College of Dental Surgery, Vikarabad, Telangana, India; ³Senior Lecturer, Department of Conservative Dentistry and Endodontics, Sri Sai College of Dental Surgery, Vikarabad, Telangana, India; ⁴Senior Lecturer in Nanded Rural Dental College and Research Centre, Nanded, Maharashtra, India.

Address for Correspondence:

Dr. Abhilasha S Jain, Postgraduate Student, Department of Conservative Dentistry and Endodontics, Sri Sai College of Dental Surgery, Vikarabad, Telangana, India.

ABSTRACT:

Palatogingival groove is a rare developmental anomaly which results in combined periodontal and endodontic problem. This groove often presents challenge to clinicians as they remain unrevealed making diagnosis and treatment planning difficult. This case report describes the successful collaborative management of a maxillary lateral incisor with complex palatogingival groove showing an advanced periodontal destruction with necrotic pulp.

A combination of surgical endodontic therapy with MTA plus was used to seal the groove and PRF, bone graft and guided tissue regeneration therapy for periodontal tissue regeneration.

Keywords: Guided tissue regeneration, Maxillary lateral Incisor, Palatogingival groove, Platelet rich fibrin,

INTRODUCTION

Palatogingival groove (PGG) is usually seen as a breach in enamel that starts near the cingulum of the tooth and extends down the cemento-enamel junction apically, terminating at various depths along the length of the root.¹ This anomaly is mostly seen along the palatal surface of maxillary lateral incisor which is considered to be an area of embryological risk, and hence it is also termed as Distolingual groove.²

The radicular groove itself may represent a channel of communication between pulp and periodontium other than natural pathways.¹ Goon et al classified palatogingival groove into two types: simple and complex. The simple PGG does not communicate with pulp and represents a partial unfolding of Hertwig's epithelial root sheath (HERS), while complex PGG communicate directly with the pulp and groove that extend the length of the root.³

Even though, the aetiology of palatogingival groove is not clearly understood, few authors proposed that it is a mild form of dens invaginatus or an incomplete attempt of a tooth to form an other root.² More recently Ennes and Lara suggested that it could be a result of alteration in genetic mechanisms.⁴ The prevalence rate of palatogingival groove has been reported to be 2.8%–8.5%.⁵

Palatogingival groove is reported to be associated with localized periodontitis by Lee et al.⁶ In case the groove communicates with the pulp, endodontic treatment will be required in addition to periodontal therapy. This article presents a case report of non vital maxillary lateral incisor anatomically complicated by palatogingival groove which was successfully treated by endodontic followed by periodontal therapy using MTA Plus, bone graft, Plasma Rich Fibrin (PRF) and Guided Tissue Regeneration (GTR) membrane.

CASE HISTORY

A 21 year old female patient presented to the Department of Conservative Dentistry and Endodontics with complaint of dull and intermittent pain in the left upper anterior quadrant since 6 months. Patient did not give any history of trauma. During the clinical examination, the left maxillary lateral incisor(#22) had an intact crown with intraoral sinus tract on the labial alveolar mucosa(Figure1). Caries was noticed in palatal groove(Figure2) with negative response to vitality testing and positive to percussion with no mobility. On periodontal probing,12mm pocket was disclosed on the distopalatal aspect of the tooth associated with a palatal groove extending subgingivally (Figure3). Oral hygiene was otherwise satisfactory.



Figure 1: Preoperative clinical view showing intraoral sinus tract



Figure 2: Preoperative clinical palatal view showing caries involving the groove



Figure 3: Preoperative clinical palatal view showing intraoral probing depth more than 10mm

An occlusal radiograph revealed a large periapical lesion with a bony defect extending beyond the apical third of the root. A patent root canal was seen with another parapulpal radiolucent line, which is a typical radiographic representation of the palatogingival groove (Figure 4). Gutta-percha

tracing through the sinus tract revealed a communication with the periapical area (Figure 5). Based on above findings, the diagnosis was localized periodontitis with secondary suppurative periradicular periodontitis in relation to left maxillary lateral incisor. An informed consent was obtained after explaining the treatment plan and prognosis.

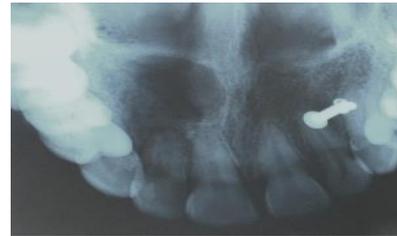


Figure 4: Preoperative occlusal view showing parapulpal radiolucent line

After oral prophylaxis and rubber dam isolation, endodontic access was performed followed by cleaning and shaping using stepback technique upto apical file size 60 in relation to left maxillary lateral incisor. Root canal was debrided with 3% sodium hypochlorite solution and calcium hydroxide was placed as an intracanal medicament at weekly interval between the three successive appointments. The access opening was sealed with intermediate restorative material. After three weeks, there was no labial sinus tract and the tooth was asymptomatic. The tooth was obturated with gutta-percha and AH plus sealer (Dentsply Maillefer, Ballaigues, Switzerland) by using lateral condensation technique. Postobturation IOPA(Figure6) revealed extrusion of sealer laterally into the defect suggestive of possible communication between pulp space and PGG.



Figure 5 & 6: Radiograph showing guttapercha tracing into sinus tract; Radiograph immediately after obturation of root canal

During the periodontal phase of therapy, after local anesthesia administration (xylocaine 2% with epinephrine 1:80,000), mucoperiosteal flap was raised from the palatal aspect (Figure 7) and the palatogingival groove was isolated to its most apical extent. Thorough root planing was performed to remove debris and microorganisms that might have colonized. Bone guttering was done using surgical bur in low speed micromotor straight handpiece under copious irrigation to remove thin cortical plate of bone to facilitate removal of granulation tissue there by making the defect conducive to healing and regeneration. PGG was saucerized (odontoplasty) with round bur to enable sealing of the defect (Figure 8).



Figure 7: Palatogingival groove exposed after elevating full thickness flap



Figure 8: Removal of granulation tissue and isolation of Palatogingival

A 10ml sample of whole blood was drawn intravenously from the patient's right antecubital vein and centrifuged under 3,000rpm for 10min to obtain PRF which was jelly-like inconsistency. PRF membrane was prepared and mixed with decalcified freeze dried bone graft in a sterile dappen dish and filled in to the bony defect (Figure 9). After obtaining the local hemostasis, MTA plus was manipulated as per manufacturer instructions and placed into the saucerized PGG (Figure

10) and allowed to set. A resorbable GTR membrane (chorion membrane) was placed over the defect (Figure 11) and the mucoperiosteal flap was sutured (Figure 12). Postsurgical radiograph revealed no sealer remnants in the defect (Figure 13). Patient was given postsurgical instructions and medication which included rinsing with 0.12% chlorhexidine twice a day for 4 weeks, amoxicillin 500mg, metronidazole 500mg, and ibuprofen paracetamol combination three times a day for 5 days.



Figure 9: Placement of bone graft and PRF



Figure 10: Sealing of PGG with MTA plus



Figure 11: GTR membrane covering the defect



Figure 12: Flap sutured

At 1 week recall visit, the patient was asymptomatic and sutures were removed. The

patient was recalled at 3 months, 6 months and 1 year intervals. Radiographic examination at 6 months (Figure 14) interval showed good healing with partial filling of the osseous defect. At one year followup, radiograph showed healing of almost entire lesion (Figure

15). Clinically, there was no recession (Figure 16) of the defect-associated interdental papilla or of the palatal gingival margin as well as reduction in the pocket depth was observed which did not exceed 2mm after 1 year



Figure 13, 14, 15: Immediate postsurgical radiograph; Postsurgical radiograph after 6 months followup; Radiograph after one year followup



Figure 16: Postoperative clinical palatal view after one year

DISCUSSION

The prognosis of teeth affected by Palatogingival groove depends on nature and extent of periodontal destruction which depends on virulence of microbiota, duration of disease, host defence mechanism and probably the depth and extent of groove onto the root surface.⁷

The selected treatment approach is based on complete eradication of microorganisms by saucerization and sealing of PGG; regeneration of bone and periodontal attachment thereby regaining the complete health of the periodontium.

Many materials have been used to seal palatogingival groove such as Glass ionomer cement, Mineral trioxide aggregate etc. Though MTA has excellent biocompatibility and sealing ability compared to GIC, it might get washed off due to its longer setting time in

the transgingival defect.⁸ Therefore, modified version of MTA that is MTA plus (Prevest Denpro Limited) is used in the present case. It is a calcium silicate based material that has composition similar to that of MTA which includes Tricalcium silicate, Dicalcium silicate, Bismuth oxide, Calcium silicate and Silica.⁹ MTA plus is known to have finer particle size which improves its handling and placement characteristics. MTA plus kit is available with an optional gel to confer washout resistance. Further, studies have shown that MTA does not exhibit cytotoxicity and increases attachment and proliferation of human periodontal ligament fibroblasts.¹⁰ However, in the present case, a barrier was placed along the root surface and MTA plus to prevent growth of epithelium.

Decalcified freeze dried bone graft was chosen to fill the osseous defect because of its osteoconductive nature. Bone graft was mixed with Platelet rich fibrin (PRF) which is a second-generation platelet concentrate enriched with platelets and growth factors known to promote periapical tissue regeneration and healing. PRF serves as a dense fibrin scaffold, with a specific slow release of growth factors [Transforming growth factor type beta 1 (TGF- β 1), platelet-

derived growth factor (PDGF), vascular endothelium growth factor (VEGF) and glycoproteins such as thrombospondin-1 for at least 7 days.¹¹ Recently, PRF has also been shown to stimulate the growth of osteoblasts and periodontal ligament cells, thereby promoting regeneration of periodontium.¹²

Years of extensive research on guided tissue regeneration(GTR) and other mechanical barriers reported a halt in epithelium down-growth along the root surface, as well as allowing periodontal ligament, cementum and bone to regenerate.¹³ McLain and Schallhorn showed that attachment levels are maintained more predictably in sites treated with a combined graft/GTR therapy.¹⁴ Similarly, we found that initial pocket depth of 12mm was gradually reduced to 2mm at 1 year followup. A collaborative management using MTA Plus, PRF mixed with an allograft along with membrane barrier to treat maxillary lateral incisor showing complex palatogingival groove and advanced periodontal destruction resulted in good healing both clinically and radiographically at 1 year followup. Clinically, there was no sign of mobility, recession or pocket and radiographically, it showed reduced periapical radiolucency with widened periodontal space which can be classified as incomplete healing according to Rud's radiographic criteria.^{15,16} However, literature suggests complete resolution of periapical radiolucency requires 4 years in ideal circumstances.¹⁷

In the present case, the alternative treatment option was to extract the tooth and replace it with appliance. However, saving the tooth was preferred as it is the most conservative treatment plan than complex implant procedure.

CONCLUSION

An interdisciplinary treatment approach extracting the benefits of regenerative endodontics succeeds in saving a tooth suspected with extremely poor prognosis. Clinical success of this treatment modality was

assessed by gain in attachment level, significant reduction in pocket depth and radiographic improvement in the periapical and periodontal defect around the involved tooth.

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