Case Report

Management of Type II Palatogingival Groove with Combined and Independent Endodontic and Periodontal Origin; A Case Report with Two Years Follow-up

A Lavanya [1], Rajendra kumar Tewari [2], Sharique Alam [3]

[1] Junior Resident, Department of Conservative Dentistry and Endodontics, Dr Ziauddin Ahmad dental college, AMU, Aligarh
[2] Professor, Department of Conservative Dentistry and Endodontics, Dr Ziauddin Ahmad dental college, AMU, Aligarh
[3] Assistant Professor, Department of Conservative Dentistry and Endodontics, Dr Ziauddin Ahmad dental college, AMU, Aligarh

Abstract

Background and Aim: The purpose of the case report was to describe missed diagnosis of a deep palatogingival groove (PGG) associated with an endodontic-periodontal lesion which was subsequently managed using a regenerative surgical procedure.

Case Presentation: The PGG often predisposes the teeth to severe periodontal defects and pulp necrosis which complicates the diagnosis. This case illustrated a persistently sensitive tooth that was initially diagnosed as a combined endodontic-periodontal lesion, with an associated PGG identified at a later stage. The collaborative management of combined endodontic-periodontal lesion with endodontic therapy, ultrasonic debridement of groove, sealing with MTA and composite resin, and guided tissue regeneration resulted in substantial healing of the periradicular radiolucency at 24 months.

Conclusion: It is imperative to exercise caution during the biomechanical preparation of the root canal, when there is a reduced amount of dentin between the PGG and the root canal wall to prevent potential complications and ensure the integrity of the remaining tooth structure.

Key Words: Palatogingival groove, Maxillary incisors, Endodontic-periodontic lesion, CBCT, Periodontal pocket

Corresponding author:
A Lavanya, No F2, Zakaria apartment,new sir Syed nagar, Aligarh

lavanyaashok96@gmail.com

Received: 2 March 2023
Accepted: 9 June 2023

➢ **Cite this article as:** Lavanya A, Rajendra kumar Tewari, Sharique Alam. Management of Type II Palatogingival Groove with Combined and Independent Endodontic and Periodontal Origin; A Case Report with Two Years Follow-up. J Iran Dent Assoc. 2023; 35(1-2):15-20.

Introduction

The palatogingival groove (PGG) is an anatomical anomaly of developmental origin. It frequently occurs in maxillary incisors, with a prevalence ranging from 2.8% to 8.5%. Although the etiology remains hypothetical, it is believed to result from infoldings of Hertwig's epithelial root sheath, a variant of dens invaginatus, or a genetic mechanism alteration occurring during the formation of an additional root (1-4). A groove develops at the vicinity of the tooth's cingulum, extending to the root at various points along its surface and at varying depths. PGGs are small, difficult-to-instrument, plaque-retentive regions that act as microbial channels. They provide a site for bacterial growth and a pathway to the apical portion, leading to gradual inflammation along the

groove (5). The PGGs are quite narrow, making instrumentation difficult and resulting in continual plaque buildup. PGGs act as pathways for microbial infiltration (6). Further periodontal breakdown results in bony defect, pulp necrosis, combined endodontic periodontic lesion leading to poor prognosis. Therefore, diagnosing and managing the defect earlier is required for long term survival of affected teeth. A recent cohort study determined that the prevalence of PGGs in the maxillary incisors of the Indian population is 2.88% (7). The aim of this case report was to document the diagnostic and treatment challenges associated with effective management of a PGG.

Case Presentation

A 25-year-old female patient was referred with the chief complaint of discomfort in her maxillary incisor tooth (tooth #10). The patient reported that she had a past history of mechanical injury to the left front part of her upper jaw three years ago for which she received dental treatment. The patient had a non-contributory medical history. On clinical examination, the tooth #10 revealed a resin composite restoration and multiple fracture lines (Fig 1A). The patient reported sensitivity to percussion. The tooth did not respond to cold pulp testing using Endo-Ice (Roeko Endofrost, Colten Whale dent, Germany) spray nor electric pulp testing using an electrical pulp test device (Vitality Scanner, Sybron Endo, Boston), although nearby teeth responded normally. Apart from a 7-mm narrow periodontal pocket on the palatal surface of the tooth, periodontal probings were within normal limits along the gingival sulcus (Fig 1B). The radiographic examination revealed a peri-radicular radiolucency extending along the distal aspect of the tooth (Fig 1C). The provisional diagnosis was pulp necrosis with localised chronic periodontitis representing endodontic-periodontal lesion. Root canal treatment was planned; the canal was instrumented up to size #35 hand files (Dentsply Maillefer, York, PA), irrigated with 5.25 % sodium hypochlorite. Calcium hydroxide paste was placed as intracanal medicament. During interappoint ment period within 1 week, the patient reported persisting sensitivity in the same tooth. Accordingly, vertical root fracture was suspected considering history of trauma. To elucidate the diagnosis, cone-beam computed tomographic (CBCT) imaging was performed. A PGG as well as apparent independence of the lesions of endodontic and periodontal origins were confirmed by CBCT. According to axial sections, the pulp space and the PGG were not connected (Fig 1D-F). The defect was located on the distopalatal side, classified as moderate, extending to the middle third of the root, and was quite deep. The definitive diagnosis of Type II PGG, according to Gu's classification associated with non-communicating combined endodontic-periodontal lesion (8). The PGG and the periodontal defect were both intended for surgical management. To access the groove, intrasulcular incisions were done to reflect the palatal flap. The entire groove depth of 7mm and width 1.5 mm was curetted and thoroughly debrided with ultrasonic agitation (Piezon Master 200, Geneva, Switzerland) upon direct visualisation (Fig 2A). Odontoplasty was difficult as in this case as the defect was into middle third region with depth of 1.5mm, the groove area below cemento enamel junction was sealed using MTA (Angelus ®, Brazil) and the coronal portion was sealed using composite resin (Fig 2B-C). The GTR membrane was placed and sutured (Fig D). Obturation was done using lateral compaction technique and coronal restoration done with adhesive composite resin (Prevest denpro, India) (Fig 2E). The patient was recalled periodically at 1,6,12and 24 month. Upon clinical examination, the patient had no symptoms and the periodontal pocket depths had returned to a normal range of 3 mm. During the 24-month recall period, radiographic analysis revealed a significant reduction in size of the periapical lesion (Fig 2F-G).

Discussion

Differential diagnosis of a PGG from a true periodontal, endodontic, or combined lesion is usually a clinical challenge. The presence of the notch in the palatal aspect of crown, a localized periodontal deep pocket, a para-pulpal line

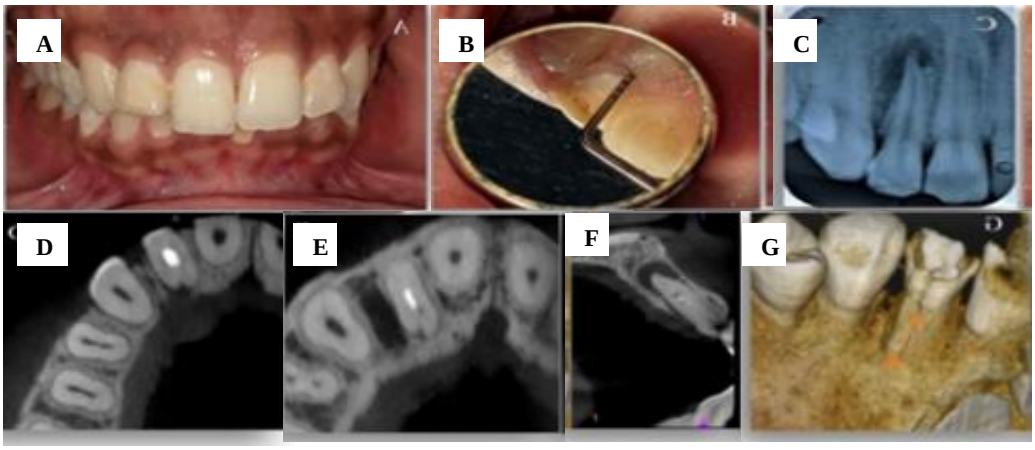

Figure 1. (A) Clinical photograph of tooth#10 showing multiple fracture lines and discolouration (B)Palatal view showing localised probing pocket depth of 7mm (C)The periapical radiograph of #10 showing periapical radioluency and bone defect (D-F) CBCT axial cross sections showing that the palatogingival groove is concomitant with the periodontal lesion, but it is not connected to the pulp space. The endodontic and periodontal lesions are independent (G) 3D-CBCT showing depth and extent of palatogingival groove.

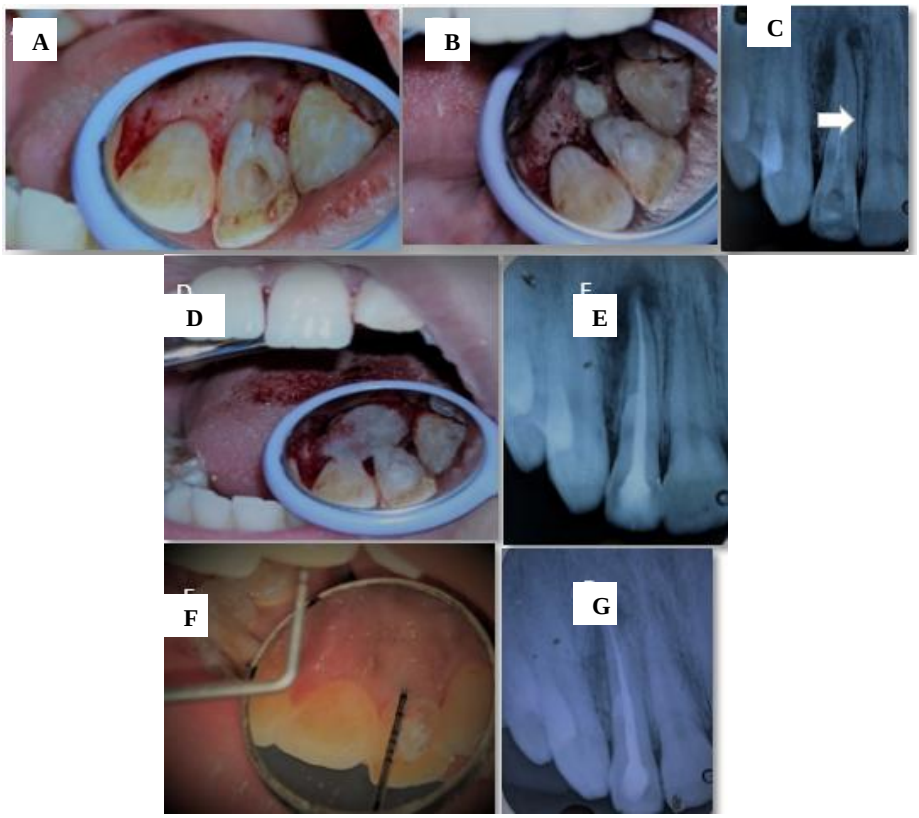

Figure 2. (A, B) The debridement of the groove followed by sealing with MTA (C) The radiograph after placement of MTA, note the sealing of the groove area (D, E) After placing GTR membrane and obturation (F, G) Over 12-month recall period probing revealed no pockets beyond 3mm and radiograph showing excellent periapical healing.

evident on periapical radiographs overlapping or seen parallel to root canal are good indicators of a PGG (9).

CBCT imaging is an integral part of the diagnostic process because it provided crucial information necessary for treatment planning, specifically that the pulp space is not commonly involved in the superficial PGGs (10,11). Even after treating pulpal and periodontal lesions, PGGs are associated with a poor prognosis (12,13). Hence, the morphological characteristics of PGGs are critical in determining the risk of infection, such as bacterial plaque deposition, pulpal and periodontal conditions. In this case, a PGG existed as a separate cause for periodontal defect and pulp necrosis was related to earlier trauma to the tooth which was evident with tooth discoloration. Treatment strategies for teeth with PGG focus on complete microbial eradication, thorough and permanent sealing of the root groove that connects the periodontium and root canal(s), and complete healing and regeneration of the periodontium (14,15,16). Numerous regenerative materials are available to seal the defect (17). Saucerization of the groove is also used as a treatment option for type I defects (18). In this case, irritants along the groove caused periodontal tissue breakdown, including alveolar bone resorption. After thorough debridement, the groove area was sealed with MTA. MTA Angelus was used for sealing due to its faster setting time, excellent handling, biocompatibility, hydrophilicity, its ability to stimulate differentiation of osteo/cementoblastic cells. Recent evidence shows that this material, as other calcium silicate cements, is widely used for its outstanding biological properties and regenerative capacity (18,19,20,21). The ultrasonic agitation was used for enhanced debridement capability as well as improved adaption of the material on the groove area (22,23). For regeneration of the periodontal defect, a resorbable guided tissue regeneration (GTR) membrane was used. The placement of the GTR membrane ensured the regeneration of the lost attachment, preventing epithelial growth and promoting true regeneration instead of mere repair. Bone grafts were not placed as bone regeneration was expected in this case of 3- walled defect.

Clinicians should exercise caution during biomechanical preparation, since as excessive root canal preparation can reduce the remaining root dentin thickness along the PGG wall, thereby increasing the vulnerability of an incisor tooth to further breakdown (9). In this case, the distance between the PGG and root canal wall was adequate to prevent external communications or perforations. The distance was analysed and confirmed with the aid of CBCT. Intentional replantation (16) can be another treatment modality if the PGG involves the pulp space which was not needful in our present case. Conditions with similar findings of the present case are dens invaginates, persistent endodontic disease secondary to untreated extra root/canal, and vertical root fracture (17). All of these were ruled out using CBCT and during surgical intervention. The use of specially designed ultrasonic tips along with agitation of ultrasonic waves ensured elimination of inflammatory irritants and sealing with biocompatible material resulted in substantial healing. More studies on literature are required in depicting other aspects of this variation such as methods to seal off the PGG with the pulpal space, as well as management of the resultant alveolar bone destruction.

Conclusion

Use of CBCT is crucial in accurate diagnosis of PGGs. Treatment planning of PGGs should be based upon complete debridement of the lesion, management of the pulpal condition as well as appropriate approaching toward treatment of alveolar bone destruction. In case of inadequacy of dentin thickness between the PGG and the root canal wall, care should be taken while biomechanically preparing the root canal space.

Informed consent

The patient was duly informed of the diagnosis and the various treatment modalities available. Informed consent was obtained from the patient for the disclosure of images and clinical information to the respective journal. The

patient comprehended that her name and personal details would not be published, and additional measures would be taken to ensure confidentiality.

Patient perspective

The patient was relieved of discomfort and symptoms during the 1-month recall period.

Conflict of interest

The authors of the manuscript declare that they have no conflicts of interest related to this case report.

References

1. American Association of Endodontics. Glossary of Endodontic Terms, 8th ed. Chicago, IL, 2012.
2. Everett FG, Kramer GM. The disto-lingual groove in the maxillary lateral incisor; a periodontal hazard. J Periodontol 1972; 43: 352–61.
3. Lee KW, Lee C, Poon KY. Palato-gingival grooves in maxillary incisors. A possible predisposing factor to localised periodontal disease. Br Dent J 1968; 124: 14–8.
4. Ennes JP, Lara VS. Comparative morphological analysis of the root developmental groove with the palato-gingival groove. Oral Dis 2004; 10:378–82.
5. Mittal M, Vashisth P, Arora R, et al. Combined endodontic therapy and periapical surgery with mta and bone graft in treating palatogingival groove. BMJ Case Rep 2013 Apr 18.
6. Gao ZR, Shi JN, Wang Y, et al. Scanning electron microscopic investigation of maxillary lateral incisors with a radicular lingual groove. Oral Surg Oral Med Oral Pathol 1989; 68:462–6.
7. Lekshmi MS, Sharma S, Gupta SR, Sharma S, Kumar V, Chawla A, et al. Prevalence and radiological characteristics of palatogingival groove: A retrospective cone-beam computed tomography study in an Indian cohort. J Conserv Dent 2021; 24: 359-63.
8. Gu YC. A micro-computed tomographic analysis of maxillary lateral incisors withradicular grooves. J Endod (2011); 37:789–92.
9. Pinheiro, T. N. et al. Palatogingival groove and root canal instrumentation. Int Endod J 2020; 53, 660–670.
10. Patel S, Kanagasingam S, Mannocci F. Cone beam computed tomography (CBCT) in endodontics. Dent Update 2010; 37:373–9.
11. Durack C, Patel S. The use of cone beam computed tomography in the management of dens invaginatus affecting a strategic tooth in a patient affected by hypodontia: a case report. Int Endod J 2011; 44:474–83.
12. Peikoff MD, Trott JR. An endodontic failure caused by an unusual anatomical anomaly. J Endod 1977; 3:356–9.
13. Simon JH, Glick DH, Frank AL. Predictable endodontic and periodontic failures as a result of radicular anomalies. Oral Surg Oral Med Oral Pathol 1971; 31:823–6.
14. Cho, Y. D. et al. Collaborative Management of Combined Periodontal-endodontic Lesions with a Palatogingival Groove: A Case Series. J Endod 2017; 43, 332–337.
15. Castelo-Baz, P. et al. Combined endodontic-periodontal treatment of a palatogingival groove. J Endod 2015; 41, 1918–1922.
16. Garrido, I., Abella, F., Ordinola-Zapata, R., Duran-Sindreu, F. & Roig, M. Combined Endodontic Therapy and Intentional Replantation for the Treatment of Palatogingival Groove. J Endod 2016; 42, 324–328.
17. Kim, H.-J., Choi, Y., Yu, M.-K., Lee, K.-W. & Min, K.-S. Recognition, and management of palatogingival groove for tooth survival: a literature review. Restor Dent Endod 2017;42, 77.
18. Pushpalatha, C. et al. Modified Mineral Trioxide Aggregate—A Versatile Dental Material: An Insight on Applications and Newer Advancements. Frontiers in Bioengineering and Biotechnology vol. 2022;10.
19. Tabari, K., Rahbar, M., Safyari, L. & Safarvand, H. Comparison of compressive strength and setting time of four experimental nanohybrid mineral trioxide aggregates and angelus mineral trioxide aggregate. World Journal of Dentistry 2017;8, 386–392.
20. Ajas, A., Anulekh, B., Nasil, S., Thaha, K. A. & Mary, V. J. Comparative Evaluation of Sealing Ability of Biodentine and White MTA-Angelus as Furcation Repair Materials: A Dye Extraction Study. International Journal of Oral Care & Research. 2018; 6, 54–57.
21. Salehimehr, G., Nobahar, S., Hosseini-Zijoud, S. M. & Yari, S. Comparison of physical & chemical

properties of Angelus MTA and new endodontic restorative material. J Appl Pharm Sci. 2014; 4, 105–109.

22. Aguiar BA, Frota LMA, Taguatinga DT, Vivan RR, Camilleri J, Duarte MAH, de Vasconcelos BC. Influence of ultrasonic agitation on bond strength, marginal adaptation, and tooth discoloration provided by three coronary barrier endodontic materials. Clin Oral Investig. 2019 Nov; 23(11):4113-4122.

23. Drukteinis, S., Bilvinaite, G., Shemesh, H., Tusas, P. & Peciuliene, V. The effect of ultrasonic agitation on the porosity distribution in apically perforated root canals filled with different bioceramic materials and techniques: A micro-ct assessment. J Clin Med. 2021; 10.