Case Report

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Dentistry Section

Endodontic-periodontal Management of Palato-gingival Groove: A Report of Two Cases

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ABSTRACT

The Palato-Gingival Groove (PGG) is a rare developmental anomaly most frequently affecting maxillary incisors, predisposing the tooth to plaque retention, localised periodontal destruction, and combined endodontic-periodontal lesions. Owing to its complex anatomy, the diagnosis and management of PGG remain a significant clinical challenge. This case report describes the management of a severe PGG in a 26-year-old male who presented with mobility and a deep periodontal pocket in the maxillary right lateral incisor. Clinical and radiographic examination, including Cone-Beam Computed Tomography (CBCT), confirmed the presence of a deep PGG associated with periapical radiolucency. Root canal therapy was performed, followed by a full-thickness flap surgery. The groove was saucerised and sealed with mineral trioxide aggregate to prevent microleakage and promote healing. Bone grafting was performed to facilitate periodontal regeneration, and the flap was repositioned and sutured. Follow-up evaluations at one, three, and five months demonstrated a significant reduction in probing depth, radiographic evidence of bone fill, and restoration of periodontal stability. The second case involved a 35-year-old male with a history of trauma to the maxillary left central incisor and previous root canal treatment, who reported recurrent pain and swelling. Clinical and CBCT examination revealed a palatal radicular groove associated with periapical pathology. Nonsurgical endodontic retreatment was performed, followed by flap surgery. The groove was sealed with light-cured Glass Ionomer Cement (GIC) to achieve a smooth surface, prevent microleakage, and enhance periodontal healing. Bone grafting and periodontal dressing were placed to promote regeneration. Follow-up evaluations at three and five months showed complete resolution of symptoms, bone fill, and satisfactory gingival healing. This report of two cases emphasises the importance of early recognition of the PGG as an etiological factor in persistent endo-perio lesions. A comprehensive approach involving endodontic, periodontal, and restorative procedures was essential in achieving favourable outcomes. The novelty of this report lies in highlighting the role of multidisciplinary management in preserving a tooth with an otherwise poor prognosis, thereby reinforcing the need for awareness and timely intervention in such rare anatomical anomalies.

Keywords: Case Report, Maxillary Incisor, Periodontal Defect, Regenerative Therapy

CASE REPORT

Case 1

A 26-year-old male patient reported to the department of conservative dentistry and endodontics with the chief complaint of mobility in the maxillary right lateral incisor for the past 1 month. There was no history of trauma, and the patient did not report any earlier episodes of severe pain or swelling related to the concerned tooth. The past medical, dental, and family history were non-significant.

During the clinical examination, the crown of right lateral incisor #12 was intact, without caries, and non-tender on percussion [Table/Fig-1].

The tooth did not respond to thermal or electric pulp testing. There were no draining sinus tracts associated with the tooth. Grade I mobility was present and pocket depth was measured to be 10 mm. Mild stains were present.

A Palato-Gingival Groove (PGG) extending apically was confirmed by a periapical radiograph and CBCT [Table/Fig-2a-c], accompanied by periapical radiolucency and bone loss, necessitating combined periodontal and endodontic management. Following rubber dam isolation and administration of local anaesthesia, an access cavity was prepared. Working length was established using an electronic apex locator and radiographic confirmation [Table/Fig-3a]. Biomechanical preparation was performed using the crown-down technique with the EdgeEndo Flex rotary file system (EdgeEndo, Albuquerque, New Mexico, USA), and the canal was enlarged up to size 30 with a 6% taper, under copious irrigation. The gutta-percha fit was confirmed with a master cone radiograph [Table/Fig-3b], and obturation was completed using the warm vertical compaction technique [Table/Fig-3c]. A full-thickness mucoperiosteal flap was then elevated, and thorough debridement of the defect was carried out [Table/Fig-4]. The PGG was clearly visualised, assessed for depth, and saucerised to eliminate plaque-retentive areas [Table/Fig-5]. The groove was sealed with Mineral Trioxide Aggregate (MTA), (ProRoot MTA, Dentsply Maillefer, Ballaigues, Switzerland) to prevent microleakage and enhance biocompatibility [Table/Fig-6]. Subsequently, a bone graft (Bio-Oss, Geistlich Pharma AG, Wolhusen, Switzerland) was placed within the osseous defect to promote periodontal regeneration [Table/Fig-7]. The flap was repositioned and sutured to achieve stability and optimal healing [Table/Fig-8]. Sutures were removed one week postoperatively [Table/Fig-9], showing satisfactory healing. Follow-up visits at 1, 3, and 5 months revealed progressive bone fill, reduction in probing depth, and stable periodontal health with no recurrence of pathology [Table/Fig-10a-c].

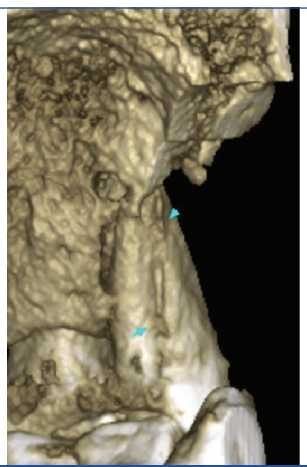
Case 2

A 35-year-old male patient presented with pain in the maxillary left central incisor for two months, with a history of trauma 15 years ago and root canal treatment done seven years prior. The patient reported recurrent swelling and pain, which subsided with medication. Clinical [Table/Fig-11] and radiographic evaluation, including CBCT [Table/Fig-12], confirmed a palatal radicular groove with periapical pathology. The previous Gutta-Percha (GP) was retrieved [Table/Fig-13a], working length was determined [Table/Fig-13b], and master cone selection was performed [Table/Fig-13c], followed by obturation [Table/Fig-13d]. A full-thickness mucoperiosteal flap

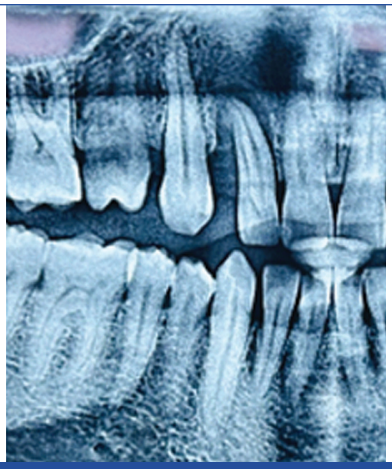
was elevated [Table/Fig-14], and the palatal groove was sealed with light-cured GIC [Table/Fig-15]. Light-cured GIC was selected for its strong adhesion to tooth structure, fluoride release, and excellent biocompatibility with periodontal tissues. Compared to conventional GIC, it provides superior strength, moisture resistance, and controlled setting during surgery. Unlike MTA, which lacks chemical adhesion and is difficult to finish smoothly in subgingival areas, light-cured GIC ensures a smooth surface, reduced plaque retention, and better marginal adaptation—making it ideal for sealing palatal grooves and promoting periodontal healing [1]. Bone grafting was performed using a xenograft material (Bio-Oss, Geistlich Pharma AG, Wolhusen, Switzerland) [Table/Fig-16], and sutures were placed [Table/Fig-17]. A coe-pack dressing was applied [Table/Fig-18], and post-operative radiographs [Table/Fig-19] were taken. Follow-up examinations at three and five months showed satisfactory healing and resolution of symptoms [Table/Fig-20, 21].

[Table/Fig-1]: Preoperative clinical photograph showing maxillary right lateral incisor (#12) with intact crown, Grade I mobility, and no caries.

[Table/Fig-2a]: Preoperative Radiovisiograph (RVG) showing periapical radiolucency associated with tooth #12.



[Table/Fig-2b]: CBCT scan confirming the presence of a deep palato-gingival groove with periapical bone loss.



Table/Fig-2c]: Orthopantomograph (OPG) view showing localised radiolucency in relation to the maxillary right lateral incisor.

[Table/Fig-3a]: Working length determination using an endodontic file placed in the canal.

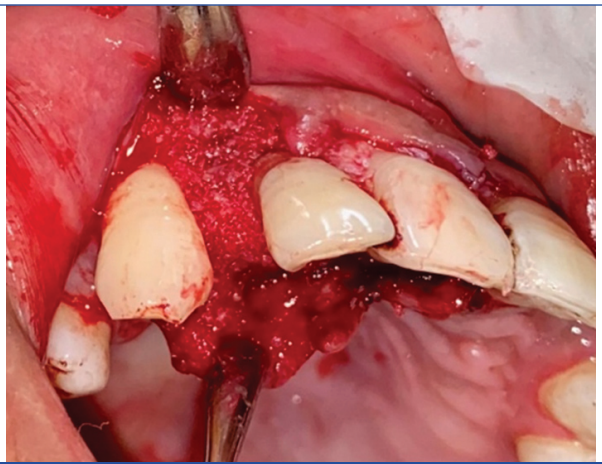
[Table/Fig-3b]: Master cone radiograph confirming gutta-percha adaptation.

[Table/Fig-3c]: Post-obturation radiograph showing complete root canal filling using warm vertical compaction.

[Table/Fig-4]: Full-thickness mucoperiosteal flap reflected with thorough debridement of the defect.

[Table/Fig-5]: Intraoperative view showing a distinct palato-gingival groove extending apically.

[Table/Fig-6]: Groove sealed with Mineral Trioxide Aggregate (MTA) to prevent microleakage.

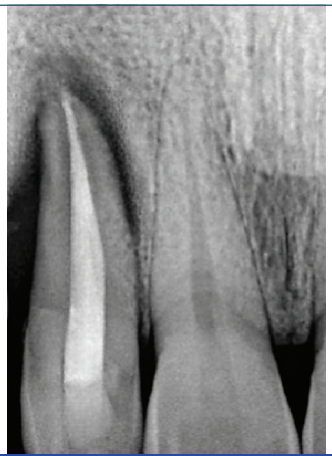


Table/Fig-7]: Placement of bone graft material in the osseous defect following groove management.

[Table/Fig-8]: Flap repositioned and secured with sutures to ensure stability and healing.

[Table/Fig-9]: Postoperative view at one week showing satisfactory healing following suture removal.

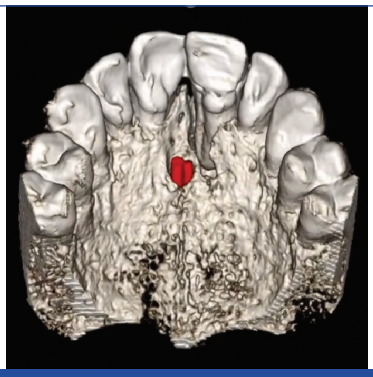
[Table/Fig-10a]: One-month follow-up showing satisfactory soft tissue healing and reduced probing depth.



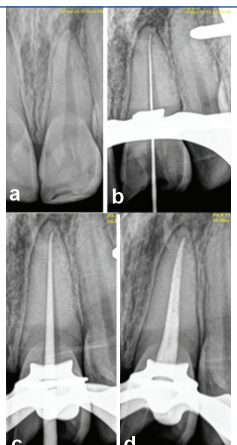
[Table/Fig-10b]: Three-month follow-up demonstrating progressive bone fill radiographically.

[Table/Fig-10c]: Six-month follow-up showing complete resolution of periapical radiolucency and periodontal stability.

[Table/Fig-11]: Preoperative clinical photograph showing maxillary left central incisor with mild gingival inflammation and discolouration, suggestive of a previously treated tooth with recurrent pathology.



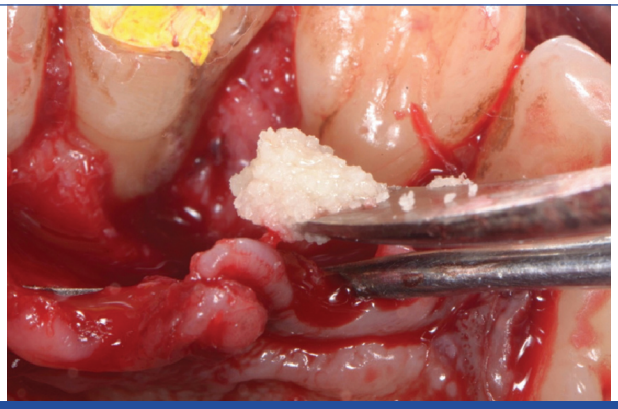
Table/Fig-12]: Preoperative radiograph and CBCT image revealing periapical radiolucency associated with the palatal aspect of the maxillary left central incisor, confirming the presence of a palatal radicular groove.



[Table/Fig-13]:(a) Retrieval of previous Gutta-Percha (GP) obturation material; (b) Working length determination using an electronic apex locator and radiograph; (c) Master cone selection confirming apical fit; (d) Post-obturation radiograph showing well-condensed root canal filling.

[Table/Fig-14]: Intraoperative image showing elevation of a full-thickness mucoperiosteal flap and exposure of the palatal groove for debridement and assessment of the defect.

[Table/Fig-15]: The palatal groove sealed with light-cured glass ionomer cement (GIC) to achieve a smooth surface, adequate marginal seal, and prevent microleakage.

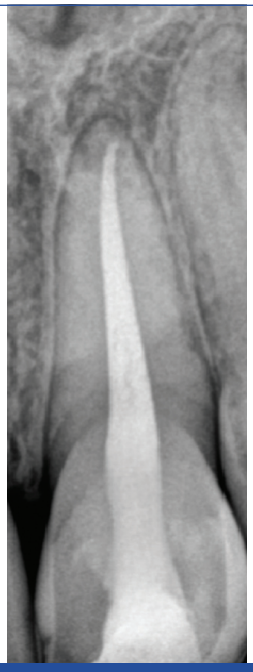


[Table/Fig-16]: Placement of bone graft material in the osseous defect to promote periodontal regeneration.

[Table/Fig-17]: Sutures placed to secure flap repositioning, ensuring optimal healing.

[Table/Fig-18]: Coe-pack periodontal dressing applied over the surgical site for protection.

[Table/Fig-19]: Postoperative radiograph showing successful obturation, groove sealing, and graft placement.



[Table/Fig-20]: Three-month follow-up showing satisfactory soft tissue healing and reduction in gingival inflammation.

[Table/Fig-21]: Five-month follow-up demonstrating complete resolution of symptoms, healthy gingival contour, and radiographic evidence of bone fill and periapical healing.

DISCUSSION

The PGG is a morphological anomaly that commonly affects maxillary incisor teeth. Lateral incisors are more likely to have it (4.4–5.6%) than central incisors (0.28–3.4%) [2]. It is a structural abnormality that is clinically significant because it acts as a sheltered area for plaque accumulation, which in turn may lead to localised periodontal inflammation and even combined endodontic–periodontal involvement. It is observed that over 50% of the PGGs extend beyond the cemento-enamel junction, and about 43% continue apically along the root surface [3]. As described by Goon WWY et al. [4], the grooves are usually divided into simple and complex types, depending on how deep they are and whether they communicate with the pulp chamber. Deep or complex grooves that reach the root canal system are generally associated with a poor prognosis and often need a multidisciplinary approach for successful management.

The location, depth (shallow/deep), and length (long/short) of the groove, as well as the magnitude of the periodontal defect, and the ability to access it, and determine the tooth's prognosis. The chosen treatment plan was based on the following rationale: preventing plaque accumulation by saucerising the groove, sealing the defective area with biocompatible restorative materials, and facilitating flap re-adaptation and approximation to the root surface for enhancing the longevity of the tooth. Three strategies form the basis of the treatment option for teeth having a PGG: (i) total microbial eradication; (ii) thorough and permanent sealing of the root groove that connects the periodontium and the root canal; and (iii) periodontal regeneration and full healing of the periodontium [5-7].

Many reports in the literature have shown that combining endodontic and periodontal therapy can lead to favourable results. Lee KW et al., [3] and Schwartz SA et al., [5] reported successful bone healing after root canal treatment followed by sealing the groove with MTA. Suchetha A et al., [8] documented clinical and radiographic improvement after debridement and bone grafting. Sharma S et al., [9] also achieved good results when the groove was sealed with GIC after flap reflection. These cases underline how the choice of restorative material can directly influence the long-term outcome.

For more complex cases, various treatment options have been given, including eradication of granulation tissue via a flap, defect removal at the crestal bone level using rotatory instruments (saucerisation) with or without Guided Tissue Regeneration (GTR), purposeful extraction of the affected tooth to completely remove the groove followed by reimplantation (intentional replantation), orthodontic extrusion, and extraction. In cases where the groove extends extensively, some studies have reported fair outcomes with intentional replantation [7]. Dragoo MR [1] emphasised that any subgingival restorative material should be: (i) biocompatible, (ii) have dual-cure setting, (iii) adhesive, (iv) radiopaque, (v) compact, (vi) have surface hardness, (vii) resistant to dissolution in oral fluids, (viii) able to prevent microleakage, (ix) having a low coefficient of thermal expansion, and (x) having minimal curing shrinkage. Various materials, like amalgam, GIC, composite resin, and calcium silicate-based cement such as MTA, are used to fill the groove in PGG treatment. To date, no restorative material fully meets all the required criteria.

In the present case series, MTA was selected in the first case because the groove was deep and extended near the apex. In the second case, the groove was shallower and more accessible surgically, so light-cured GIC was used. This material bonds chemically to dentin, releases fluoride, and sets quickly when light-cured, which helps achieve a tight seal even in a moist surgical field. Although fast-set MTA or MTA putty is biocompatible, they do not adhere to tooth structure and is difficult to polish smooth beneath the gumline, increasing the chance of plaque retention. Light-cured GIC, on the other hand, allows easy placement, a smooth finish, and better marginal adaptation, making it ideal for shallow grooves and promoting periodontal healing [1]. If the groove expands deeply or reaches the root apex, surgical intervention is recommended. Various regenerative materials, such as bone grafts and platelet-rich plasma, have been utilised depending on the defect size. For decades, GTR has been employed to prevent epithelial downgrowth while promoting the regeneration of the periodontium, cementum, and bone. McClain PK et al., [10]. stated that the combined use of grafts and GTR enhances attachment levels. In this case, the combined approach yielded significantly better results than open flap debridement alone, reducing the initial pocket depth from 10 mm to 2 mm after treatment.

CONCLUSION

The PGG is a rare yet significant anatomical anomaly that can serve as a silent nidus for plaque accumulation, leading to periodontal destruction and potential tooth loss. Early recognition and accurate diagnosis are crucial for effective management. This twin case report highlights an innovative and multidisciplinary approach that combines saucerisation, biocompatible restorative materials, and regenerative techniques to achieve optimal clinical outcomes. The successful reduction in pocket depth and improved periodontal stability demonstrate the efficacy of this comprehensive treatment strategy. A tailored approach based on the extent of the groove and associated periodontal defect can significantly enhance tooth prognosis and long-term oral health.

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