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Case Report

Minimally Invasive Treatment of a Type II Palatogingival Groove detected at an early stage: A Case Report

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Abstract

The palatogingival groove (PGG) is a developmental anomaly that may cause localised periodontal destruction, encourage plaque accumulation and increase risk of dental caries and endodontic involvement. This case report describes early detection and minimally invasive management of a Type II PGG in a maxillary lateral incisor, highlighting the diagnostic value of cone-beam computed tomography (CBCT). A 19-year-old patient presented with gingival bleeding and sensitivity on the maxillary left lateral incisor. CBCT revealed a groove extending from the cingulum into the middle third of the root (depth 1.7 mm). Treatment included flap reflection, saucerisation of the groove, root-surface conditioning with 24% EDTA gel, and sealing with resin-modified glass-ionomer cement. At the 6-month follow-up, gingival inflammation resolved, bleeding ceased and tooth vitality remained intact.

Keywords
CBCT,endo-perio lesion,palatogingival groove,saucerization

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Introduction

Palatogingival groove (PGG) is a developmental anomaly that is usually found on the lingual surface of maxillary incisor teeth, crosses the cingulum, and proceeds apically to varying distances.[1] Its prevalence varies from 2.8%–8.5%.[2-4] PGGs vary in depth and extent, terminating just above the cementoenamel junction (CEJ) in some cases, or extending along the entire length of the root in others.[5] Gu YC. classified the palatogingival grooves based on the degree of severity of the groove into[6]

Type I: the groove is short (not beyond the coronal third of the root)
Type II: the groove is long (beyond the coronal third of the root) but shallow, corresponding to a normal or simple root canal
Type III: the groove is long (beyond the coronal third of the root) and deep, corresponding to a complex root canal system.

This developmental defect acts as a nidus for plaque and a route for the bacteria to enter the periodontal ligament and cause progressive periodontitis, as well as to enter pulp via the lateral canals, accessory canals or dentinal tubules, which may lead to pulpal necrosis in advanced or untreated cases.[7] Clinically, lesions

associated with PGG may present with a range of symptoms, including varying degrees of pain (dull, intermittent, or sharp), increased mobility, tenderness on percussion, localised gingival swelling, sinus tract formation, or purulent discharge. In some cases, however, patients may remain asymptomatic.[8] Prognosis depends on several factors such as the amount of periodontal involvement, location of the groove and accessibility, depth and extent of the groove.[9] Hence, early detection and timely management of a PGG is crucial to prevent the progression of complex endodontic-periodontal lesions.

This case report describes successful early-stage management of a palatogingival groove in a maxillary lateral incisor by saucerization and sealing of the groove.

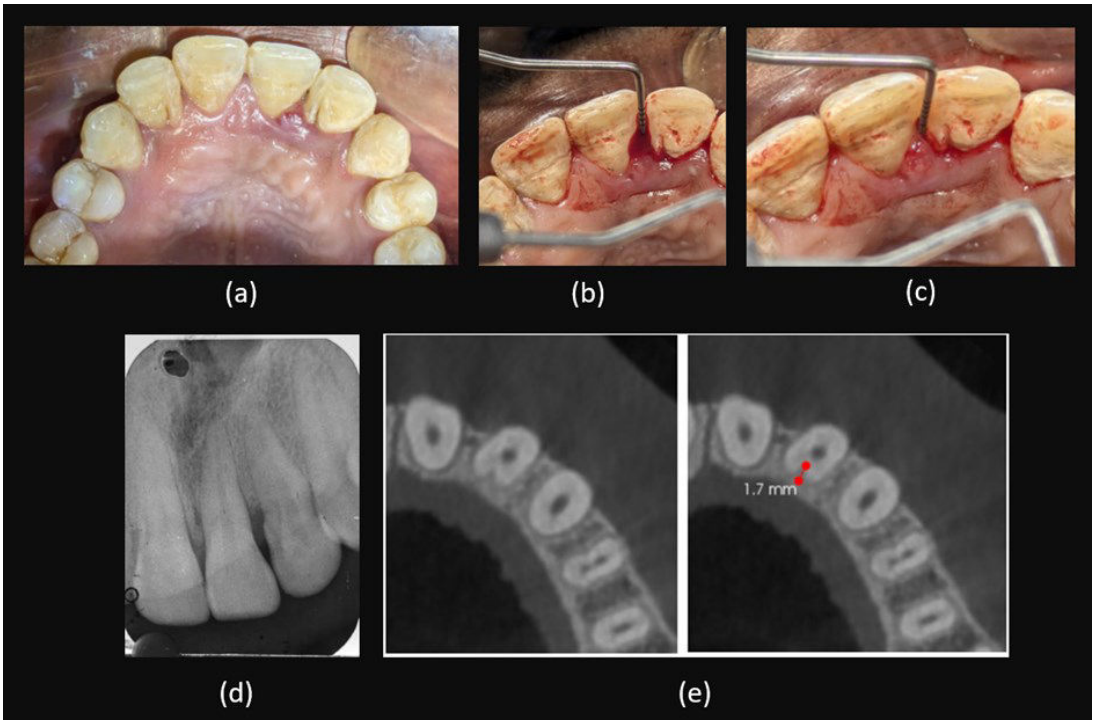
Case History

A 19-year-old male patient presented with sensitivity, spontaneous gingival bleeding and swelling localised in the upper-front tooth region. His medical and dental history were unremarkable, with no report of trauma, extensive restorations or systemic conditions contributing to the symptoms. On clinical examination, the maxillary left lateral incisor (FDI #22) exhibited localised erythema and oedema of the mesiopalatal marginal gingiva.[Fig 1a]

Spontaneous bleeding on probing was noted, with a Bleeding Time Index score of 4, despite probing depths being within normal limits and no tenderness on percussion. [Fig 1b] These findings suggested a marginal gingival inflammatory lesion rather than advanced periodontal pocketing or periapical pathology.

On the lingual surface of the tooth, a visible developmental groove was observed, originating at the cingulum and extending apically.[Fig 1c] The tooth responded normally to vitality sensibility tests, indicating preserved pulpal health at that time. A periapical radiograph revealed a thin radiolucent line paralleling the root canal in the coronal and middle thirds of the root an indirect radiographic sign consistent with a radicular groove.[Fig 1d] To more precisely assess the morphology of the groove, an axial section of Cone-Beam Computed Tomography (CBCT) was obtained; it confirmed the presence of a moderate palatogingival groove located mesially and extending to the middle third of the root, with a maximum measured depth of 1.7 mm at a point 2 mm apical to the cementoenamel junction (CEJ).[Fig 1e]

Based on the combination of clinical, radiographic and CBCT findings, the diagnosis was established as a "gingival abscess secondary to a palatogingival groove" associated with tooth #22. The treatment plan entailed a minimally invasive surgical approach: one week after initial



a) Preoperative occlusal view showing palatogingival groove in association to #22 and erythematous and edematous mesiopalatal marginal gingiva
b) Image showing spontaneous bleeding after probing
c) Image showing normal periodontal probing depth
d) Preoperative radiograph showing a radiolucent line running parallel to the canal, indicative of the presence of a groove
e) Axial sections of CBCT showing Type II, moderate, mesial palatogingival groove with a maximum depth of 1.7 mm measured 2 mm apical to the CEJ

periodontal hygiene therapy, a palatal flap was reflected under local anaesthesia (2% lignocaine with 1:80,000 epinephrine via nasopalatine nerve block + local infiltration). The groove was explored to the level of the crestal bone using a sharp explorer.[Fig 2a] Saucerisation was then carried out by grinding the groove with a fine-grit flame-shaped diamond point until the groove was eliminated down to the crestal bone level.[Fig 2b] The exposed root-surface was curetted, then conditioned with 24% EDTA gel (PrefGel, Straumann, Basel, Switzerland) for two minutes, rinsed with saline for two minutes, and sealed with a resin-modified glass-ionomer cement (light-cured universal restorative material, GC, Japan).[Fig 2c] The flap was repositioned and sutured, and postoperative instructions were provided.[Fig 2d] Immediate post op radiograph was taken.[Fig 3a] Sutures were removed at one week, [Fig 3b] and follow-up clinical assessments were carried out at 1 month, 3 months,[Fig 3c] 6 months and 12 months [Fig 3d,3e,3f], demonstrating resolution of gingival inflammation, cessation of bleeding and maintenance of pulpal vitality.

Discussion

Palatogingival groove (PGG) represents a developmental anomaly of the palatal/lingual root surface most commonly of the maxillary lateral incisor characterised by a groove originating from the cingulum or central fossa and extending apically along the root. This groove acts as a plaque-retentive zone, facilitating bacterial colonisation, calculus deposition and ingress of inflammatory mediators. Such conditions predispose the adjacent periodontium to destruction and may provide a pathway for communication between periodontium and pulp via accessory canals, dentinal tubules or directly through the groove itself thus commonly leading to a primary periodontal lesion with secondary pulpal involvement.[10,11]

Early recognition of PGG is critically important: shallow or moderate grooves without deep pocketing or pulpal necrosis may be amenable to conservative, minimally invasive interventions. Detecting the lesion before extensive bone loss or combined endodontic–periodontal pathology allows treatment planning that preserves the tooth, reduces morbidity and improves prognosis. In the present case, although probing depths were within normal limits, spontaneous bleeding and marginal gingival inflammation pointed to a sub-clinical groove lesion a scenario where early surgical correction (saucerisation+sealing) was justified and likely contributed to the favorable outcome.

Imaging plays a decisive role in the diagnosis and management of PGG. The American Association of Endodontists (AAE) and American Academy of Oral and Maxillofacial Radiology (AAOMR) joint position statement endorses the use of limited field of view cone-beam computed tomography (CBCT) in cases of suspected complex root canal morphology or anatomical anomalies.[12] In PGG, CBCT not only confirms the groove's presence and three dimensional trajectory, but allows accurate measure-

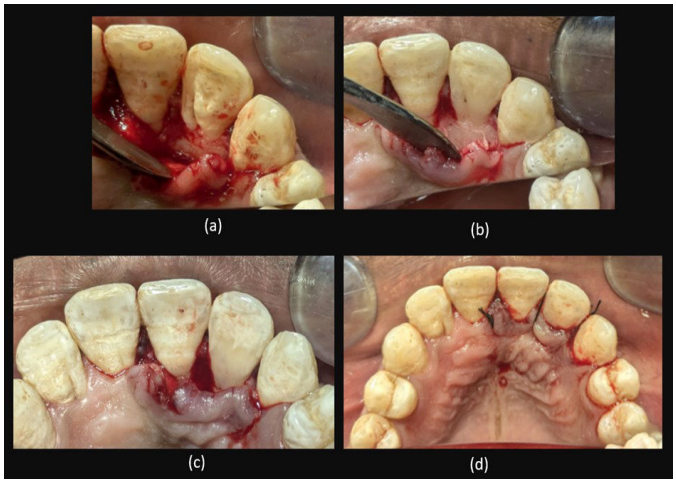


Fig. 2: a) Palatal flap reflection, b) After the saucerization of groove upto the crestal bone level, c) After sealing the groove with light-cure RMGIC, d) Flap repositioned with sutures

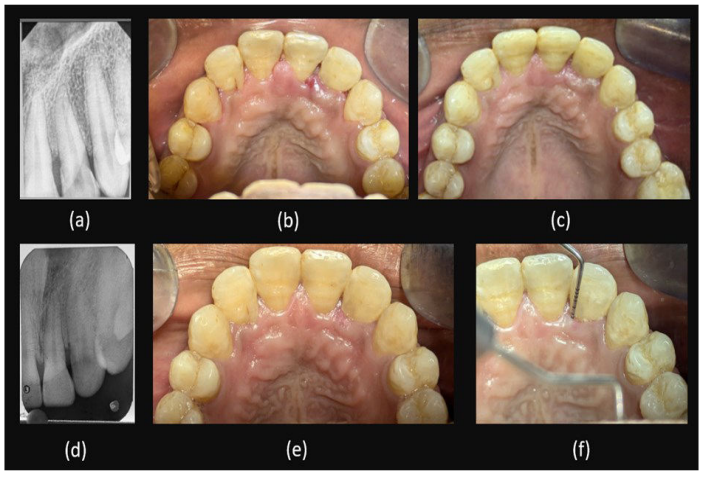


Fig. 3: a) Post operative radiograph, b) Suture removal after 1 week of the surgery, c) Follow-up photograph after 3 months ,d) Follow-up radiograph after 1 year, e) Follow-up photograph after 1 year, f) Normal pocket probing depth after 1 year

-ement of its depth, length, relation to bone, potential pulpal communication and classification (for example, Gu's Type I–III). In our case, axial CBCT sections revealed a 1.7 mm-deep groove extending to the middle third of the root (Gu's Type II) a finding that guided our minimally invasive surgical access and root surface management.

Treatment options for PGG vary depending on groove severity, extension, and associated periodontal and/or endodontic involvement. These range from gingivectomy, scaling/root planing and sealing of shallow grooves to more invasive approaches open-flap debridement, saucerisation, root surface conditioning, defect grafting and guided tissue regeneration (GTR), intentional replantation or extraction in severe Type III cases.[10,14-16] In the present moderate-depth case with no pulpal necrosis or deep bone defect, we adopted a conservative surgical approach: flap reflection, saucerisation to crestal bone level, root surface-conditioning with 24% EDTA gel and sealing with a resin-modified glass-ionomer. The rationale was to eliminate the anatomical niche (groove), remove irritants, improve root surface biocompatibility, and restore structural integrity thereby halting disease progression while preserving tooth vitality.

Root surface conditioning (e.g., EDTA) is documented to remove the smear-layer, expose collagen and dentinal tubules, and facilitate fibroblast/periodontal ligament cell attachment a key element in periodontal re-attachment adjacent to groove-treated root surfaces.[10,16] While clinical long-term data in PGG-specific cases remain limited, this biologically guided approach aligns with regenerative principles. Additionally, sealing the groove is paramount to prevent re-colonisation of bacteria and contaminants thus enhancing healing and long-term stability of the periodontium and pulp interface.[12]

The favourable clinical outcome resolution of marginal gingival bleeding/oedema, maintained tooth vitality and absence of re-infection at the 6 and 12 month reviews reflects the success of early, guided, conservative intervention. Nevertheless, as literature indicates (e.g., prevalence studies showing higher risk of bone loss and pulpal involvement in Type II/III grooves) continued monitoring is critical, given the potential for progression.[13]

In terms of future directions, larger cohort studies are needed to define prevalence in different populations, the comparative effectiveness of various groove management protocols (e.g., different sealing materials or regenerative adjuncts), and longer-term outcomes (2–5 years) in shallow/moderate vs deep-type grooves. Additionally, the integration of digital intra-oral scanning for soft-tissue follow-up, patient-reported outcome measures and minimally invasive biomaterials may further advance treatment of PGG.

Conclusion

This case underscores the critical importance of early detection and precise imaging (such as CBCT) in identifying a Palatogingival Groove before extensive periodontal or pulpal damage occurs. By employing a minimally invasive surgical approach saucerisation, root-surface conditioning and sealing the periodontal insult was arrested, gingival health restored and the tooth's vitality preserved. With appropriate diagnosis, timely intervention and tailored technique, even anatomically complex grooves can be managed predictably, safeguarding long-term tooth survival and function.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Conflicts of interest: None declared

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