IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 25, Issue 1 Ser. 3 (January. 2026), PP 71-76
www.iosrjournals.org

Relevance Of Periodontal Approach In The Management Of Palatogingival Groove: A Case Series

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Abstract
Background*: A developmental defect that is primarily observed on maxillary lateral incisors, the palatogingival groove (PGG), is frequently linked to localized periodontal destruction due to plaque accumulation and microbial ingress along the groove.*
Case series*: This case series highlights three different types of palatogingival grooves and its diagnosis and multidisciplinary management of palatogingival groove, the associated periodontal lesions using a combination of endodontic, periodontal, and surgical regenerative approaches.*
Conclusion*: Palatogingival groove represents a significant anatomical risk factor for localized periodontal destruction. A multidisciplinary approach involving accurate diagnosis and periodontal treatment, whenever necessary, are essential for successful management and predictable outcome.*
Keywords: *Palatogingival groove, periodontal pocket, odontoplasty, bone graft, regenerative therapy*

Date of Submission: 12-01-2026 Date of Acceptance: 22-01-2026

I. Introduction

Palatogingival groove, also called palato-radicular groove, is a developmental anomaly present on the palatal aspect of the maxillary anterior region [1]. The maxillary lateral incisor is most commonly involved because of the embryological hazard of having its tooth germ locked between those of the central incisor and canine. The groove begins in the cingulum region and extends apically from the cementoenamel junction along the root, with marked variability in its depth and extent [2-4]. The reported prevalence ranges from 2% to 8%, depending on the population and diagnostic criteria used [1].

Etiologically, palatogingival groove may arise due to an infolding of the enamel organ and Hertwig's epithelial root sheath during tooth development, resulting in a groove extending from the cingulum onto the root surface. It may also occur as a variant of dens invaginatus or secondary to alteration of a genetic mechanism or as an attempt to form another root [2].

A clinically relevant classification categorized palatogingival grooves depending on the extent and complexity of the groove into mild, moderate and severe. Mild grooves are gentle depressions in the coronal enamel that terminate at or immediately after crossing the CEJ. Moderate grooves extend some distance apically along the root surface in a form of a shallow or fissured defect. Complex grooves are deeply invaginated defects which involve the entire length of the root or those with separate accessory root from the main root trunk [2,4].

The anatomical complexity of the palatogingival groove favours plaque retention, making it a significant local etiologic factor for periodontal disease with or without pulpal pathology. Shallow grooves confined to the coronal portion are usually associated with mild gingival inflammation, whereas deeper grooves extending into the middle or apical third of the root may lead to isolated deep periodontal pockets, angular bone defects, and in advanced cases, secondary pulpal involvement [5,6]. Radiographically, these lesions often present as localized vertical bone loss along the root surface, sometimes mimicking primary endodontic pathology [7].

Management of palatogingival groove-associated lesions is challenging and frequently requires a multidisciplinary approach. Initial periodontal therapy consisting of scaling and root planing is essential for microbial load reduction; however, non-surgical therapy alone is often insufficient due to the inaccessibility of the groove [8]. Surgical intervention is therefore indicated in cases presenting with deep periodontal pockets or persistent inflammatory lesions. In cases where the groove extends deeply and communicates with the pulp,

endodontic therapy becomes an integral component of treatment. Endodontic intervention followed by periodontal regenerative surgery has been demonstrated to improve prognosis in such combined lesions [6,8].

Early recognition and an interdisciplinary approach are essential for a successful outcome. This case series presents different techniques of management of PGG and PGG-associated lesions involving periodontal therapy.

II. Case Series

Case 1

During the intraoral examination of a 45-year-old female patient, periodontal pocket depth of 6mm was noted on the disto-palatal aspect of left lateral incisor which was then noted to be associated with a moderate type of palatogingival groove beginning in the central fossa, crossing the cingulum and extending distally onto the root (Figs. 1,2). On radiographic examination, groove could be observed extending till the cervical third of the root onto the distal aspect (Fig. 3). Pulp vitality was evaluated using a cold test with ethylene oxide to aid in determining the appropriate treatment approach. Pulp vitality testing confirmed tooth vitality and endodontic treatment was deemed unnecessary.

Accordingly, a treatment plan was formulated consisting of surgical flap reflection to identify the extent of the groove, meticulous debridement, restoration of the groove, and regenerative periodontal therapy.

Following the administration of adequate local anesthesia, a full-thickness mucoperiosteal flap was raised, which revealed that the groove extended up to the cervical third of the root. Calculus was observed within the groove, supporting the concept that the groove serves as a pathway for bacterial ingress. Meticulous debridement of the groove and intrabony defect was carried out. Upon complete removal of granulation tissue and establishment of hemostasis, the groove was restored with light-cured glass ionomer cement (GIC) (Fig. 4).

Subsequent to groove restoration, the intrabony defect was grafted with demineralized freeze-dried bone allograft (DFDBA) in combination with Leucocyte-Platelet-Rich Fibrin (L-PRF), and an L-PRF membrane was placed to enhance periodontal regeneration (Fig. 5). The site was stabilized with a horizontal cross-mattress suture, followed by placement of a periodontal dressing (Fig. 6).

Patient was then followed up for 10 days (Fig. 7), 1month and 6 months. The 6-month follow up showed a complete resolution of the pocket, with reduction in probing depth from 6mm to 2mm (Fig. 8) Radiographic examination showed adequate bone fill at 6 months follow up.

Fig. 1: Case 1 - pre-operative clinical view of palatogingival groove

Fig. 2: Case 1 - periodontal pocket

Fig. 3: Case 1 - radiographic view (pre-operative)

Fig. 4: Case 1 - flap reflection and debridement

Fig. 5: Case 1 - placement of bone graft and L-PRF membrane

Fig. 6: Case 1 - flap sutured

Fig. 7: Case 1 - 10-days follow-up

Fig. 8: Case 1 - 6-months follow-up

Case 2

Clinical examination of a 46-year-old male patient revealed mild type palatogingival grooves bilaterally on distopalatal aspect of maxillary lateral incisors not extending beyond cemento-enamel junction along with presence of 6 mm to 8 mm deep periodontal pockets (Figs. 9,10).

After a period of 8 weeks of Phase I periodontal therapy, surgical intervention was undertaken. Under local anesthesia, full-thickness mucoperiosteal flaps were raised in relation to both maxillary lateral incisors, and

meticulous debridement was carried out. The shallower groove was treated by odontoplasty using a fine-grit bur, whereas the deeper groove was restored with a flowable composite resin (Figs. 11, 12). The surgically treated sites were then sutured. Patient was followed up for 1 week (Fig. 13), 1 month, 3 months, 6 months and 18 months.

The 3 months follow up showed a complete resolution of periodontal pockets from 7-8mm to 2-3mm and was maintained at 18 months follow up (Figs. 14,15).

Fig. 9: Case 2- pre-operative clinical view of palatogingival groove (right lateral incisor)

Fig. 10: Case 2- pre-operative clinical view of palatogingival groove (left lateral incisor)

Fig. 11: Case 2- debridement and restoration (right lateral incisor)

Fig. 12: Case 2- debridement and restoration (left lateral incisor)

Fig.13: Case 2- follow-up at 1 week (both lateral incisors)

Fig. 14: Case 2- 18-months follow-up (right lateral incisor)

Fig. 15: Case 2- 18-months follow-up (left lateral incisor)

III. Discussion

The cases presented in this series reinforce the understanding that periodontal lesions associated with palatogingival grooves require meticulous diagnosis and individualized treatment planning.

In the first case, the presence of an isolated deep periodontal pocket on the palatal aspect of a maxillary lateral incisor, in the absence of generalized periodontal involvement, raised clinical suspicion of an underlying developmental anomaly. Surgical exploration confirmed the presence of palatogingival grooves of varying depths and extensions, findings that are in accordance with previously published reports [1,5].

Bilateral occurrence of palatogingival grooves have been reported in the literature [2,9]. In the second case, palatogingival grooves present bilaterally on the maxillary lateral incisors were shallow and were therefore treated with odontoplasty in combination with restorative intervention.

The favorable treatment outcomes observed in this case series are consistent with existing literature emphasizing elimination of the groove as the primary etiologic factor for disease resolution [4,8]. Odontoplasty, when combined with sealing of the groove using biocompatible restorative materials, effectively reduced plaque retention and prevented bacterial ingress along the root surface [2.5].

Glass ionomer cement is commonly employed for PGG restoration because of its biocompatibility with periodontal tissues, chemical bonding to tooth structure, resistance to water degradation, and antibacterial properties. Fluoride release from GIC reduces bacterial adhesion and inhibits bacterial growth, and epithelial and connective tissue attachment to the cement surface has also been documented [2]. Previous long-term studies have reported a progressive increase in gingival inflammation adjacent to composite resin restorations, with a significantly higher prevalence than that observed with alternative materials [10]. In contrast, no increase in gingival inflammation was noted at the 18-month follow-up in the second case. Furthermore, the incorporation of periodontal regenerative techniques resulted in significant reduction in probing pocket depth and gain in clinical attachment levels, supporting earlier reports that regenerative therapy enhances prognosis in deep osseous defects associated with palatogingival grooves [2,7].

The findings of this series also underscore the importance of an interdisciplinary approach, more important particularly in cases presenting with pulpal involvement. Combined restorative or endodontic and periodontal management facilitated favourable healing and long-term stability. Follow-up examinations revealed maintenance of periodontal health with no evidence of disease recurrence, highlighting the predictability and effectiveness of a combined periodontal–restorative strategy in the management of palatogingival groove-associated lesions.

IV. Conclusion

Palatogingival groove represents a significant anatomical risk factor for localized periodontal destruction. Accurate diagnosis, elimination of the groove, and regeneration of lost periodontal tissues are essential for successful management. A multidisciplinary approach offers predictable outcomes and long-term tooth preservation.

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