

## Palato Gingival Groove-A Review

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### Abstract

### Review Article

Palatogingival grooves are developmental anomalies quite notorious for causing endodontic - periodontal lesions. They promote adherence of plaque and bacteria because of their inconspicuous nature, funnel-shaped morphology and variable extent on the tooth root. Recognition of palatogingival groove is important because of its diagnostic complexity. Numerous techniques have been used to eliminate or seal the groove and regenerate endodontic and periodontal tissues. Careful diagnosis, prevention and management are highly recommended to save the tooth affected by this malformation.

**Key words:** endodontic lesion, palatogingival grooves, periodontal pocket, regenerative therapy, saucerisation.

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## INTRODUCTION

The maxillary incisor region is an area which can show various anatomic and morphological anomalies such as fusion, germination, cysts, Dens in dente, peg laterals, talon's cusp, supernumerary roots and palatogingival grooves. Palatogingival groove (PGG) is defined as 'a developmental anomaly in a root that, when present, is usually found on the lingual surface of maxillary incisor teeth' [1]. Maxillary lateral incisors are the most commonly affected due to the positioning of its tooth germ between central incisors and canine.

Identification and management of PGG is difficult and requires a combined endo-perio treatment strategy. The aim of this article is to review on literature on the diagnosis and management of PGG.

## HISTORY

PGG was first described as a radicular groove by Black in 1908[2]. In 1958, Oehlers first reported radicular invagination of a maxillary lateral incisor [3].

In 1968, Lee *et al.* proposed the term PGG. The anomaly has been termed the radicular anomaly, distolingual groove, radicular lingual groove, palatoradicular groove, radicular groove and cinguloradicular groove, interruption groove, corono

radicular groove, vertical developmental radicular groove, developmental radicular anomaly [4, 5-7].

## ETIOLOGY

Several etiologies have been claimed for this developmental anomaly: (i) consequence of infolding of the inner enamel epithelium and epithelial sheath of Hertwig during odontogenesis[4],(ii) Variant of dens invaginatus [4,8], (iii) alteration of a genetic mechanism [9], and (iv) ) and has been speculated to be an aborted formation of an additional root[5,10].

## PREVALENCE

The investigation by Everett *et al.* in 625 extracted maxillary lateral incisors was the first large survey of the prevalence of PGG. They reported a prevalence of less than 2% with 0.5% of PGG extending into the apical area in their survey [6]. Withers *et al* [4] reported that the prevalence of the PGGs in 531 individuals examined was 8.5%. Most of the PGGs were in maxillary lateral incisor teeth (93.8%) [8].

Storrer *et al.* reported a prevalence rate of 9.58% [11] and Al-Rasheed *et al.* reported 10.3% prevalence of the PGG [12]. In a clinical examination of 200 patients, Iqbal *et al.*[13] reported a prevalence rate of 10%, 6.75% as a coronal groove and 3.25% as an apical groove. They found bilateralism in 57.5% of

cases, 63% of coronal and 46.15% of apical grooves. Hou *et al.* reported a prevalence rate of 18.1% [14].

## CLASSIFICATION

- According to the Location of groove [7] 1) Distal 2) Mesial 3) Central (or midpalatal)
- Regarding extent and complexity of groove [15]
- Mild: the grooves are gentle depressions of the coronal enamel that terminate at or immediately after crossing the cemento-enamel junction
- Moderate: the grooves extend some distance apically along the surface of root in the form of a shallow or fissured defect
- Complex: the grooves are deeply invaginated defects that involve the entire length of the root or a separate accessory root from the main root trunk

### Degree of invagination of the groove towards the pulp cavity [7]

Shallow/flat (< 1 mm) 2), Deep (> 1 mm) and closed tube

### Degree of severity based on microcomputed tomography studies [16]

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



**Fig-1: Palatogingival groove**

## RADIOGRAPHIC FEATURES

Radiographically PGG can be misinterpreted as a vertical root fracture or as an additional canal [29]. In some cases, a radiolucent parapulpal line can be observed [6]. Gutta-percha tracing through the sulcus

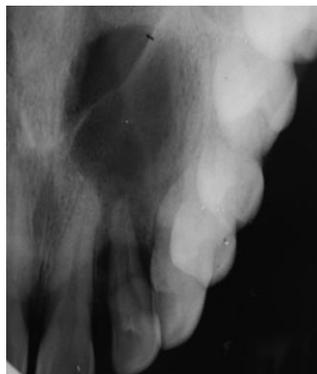
## CLINICAL FEATURES

Clinically, the tooth with PGG may present with either:

- A primary periodontal lesion
- A primary periodontal lesion with a secondary endodontic lesion
- A true combined lesion in long-standing cases.

Accessory foramina or dentinal tubules along the grooves have been regarded as the possible pathway between the pulp canal and the groove [15, 16].

Patients with a pathology related to PGG often complain of dull intermittent [17, 18], or acute pain [19, 20], mobility of the affected teeth [21], tenderness on percussion [17], pus discharge [20, 22, 23], sinus tract formation [21], and gingival swelling [19]. Cases have been reported with no symptoms [21]. In most cases, the patient had no history of dental caries, trauma, or discoloration of the teeth. Pulp vitality was retained or lost dependent upon pulpal nerve involvement. Cases with advanced lesions along complex grooves frequently show no response to pulp vitality testing [19, 21-27]. Accumulation of plaque and calculus in the grooves, loss of epithelial attachment, pocket formation, and bleeding on probing are some of the clinical features. In one study, bilateralism was found in 57.5% of total cases in the study [28]. This condition can also be misdiagnosed as a periodontal abscess clinically.



**Fig-2: Radiographic appearance**

along the groove could delineate the course of the groove [25]. Use of CBCT technique helps in an accurate diagnosis and the treatment decision can be taken accordingly [30].

Differential diagnosis involves dental anomalies that resemble PGG such as dens invaginatus, Tomes' root, and extra root variation.

### MANAGEMENT OF PGG

Prognosis of this defect depends on location, depth and extension of groove and destruction of periodontal attachment [31, 32]. The purpose of the

treatment is to completely remove the inflammatory tissue, eliminate the groove and to attain periodontal health.

Suggested treatment modalities were curettage of the affected tissues, elimination of the groove by grinding (saucerisation), or by sealing the defect with a variety of filling materials.



**Fig-3: Saucerisation of groove**

In the mild type of PGG with shallow grooves, odontoplasty in conjunction with periodontal treatment, like gingivectomy or subgingival root planing, is recommended. 'Saucerisation' is one method for treating the mild form of PGG that involves grinding the groove to the level of the crestal bone with a rotary cutting and polishing instrument [33].

If the groove extends beyond the middle-third of the root apex, surgical procedures are required, including placement of barriers and intraosseous graft to correct the defect [34]. For more complex conditions, intentional reimplantation [20] and orthodontic extrusion are considered.

Several materials are used to seal the palatogingival groove like Glass ionomer cement, Amalgam [5], MTA, Composite, Biodentin etc.

#### Amalgam

Amalgam has antibacterial activity related to the presence of mercury, copper, and zinc. Along with its biocompatibility, ease of manipulation, and better hardness to moist conditions than other materials, it has led amalgam to be widely used to fill PGG [5]. The disadvantage of using amalgam is it can cause tooth discolorations.

#### Glass ionomer cements

GIC shows good sealing ability and fluoride release. Epithelial and connective tissue attachment occurred on the cement surface when GIC was used for sealing the groove [35].

#### Biodentin

Calcium silicate-based cement with excellent biocompatibility like MTA has been used in many cases. But the handling difficulties and solubility in fluids have made biodentin as the preferred sealing material for PGG. Some authors have reported a successful treatment outcome for PGG with Biodentine, describing advantages such as easy handling, a relatively short setting time of 9 to 12 minutes, improved mechanical properties, good biocompatibility, and regenerative potential [34].

#### Various regenerative materials used to fill intrabony defects

The platelet rich fibrin membrane acts by releasing high-concentration growth factors to the wound site, thereby stimulating healing and new bone formation. The risk of disease transmission and graft rejection is negated.

Anderegg *et al.* also reported 10 cases of successful treatment after 6 month follow-up using a polytetrafluoroethylene membrane [36]. Attam *et al.* reported that a combined technique of bone graft and membrane significantly reduced the pocket depth compared with cases treated by open flap debridement [37]. Use of bone graft [23, 38, 39] enamel matrix derivative [40] are also been used and found out to be successful.



**Fig-4: Placement of bone graft material**

## CONCLUSION

PGG, a rare aberration on the maxillary anterior teeth, occasionally results in combined endodontic-periodontal disease with extensive periodontal destruction of the tooth, which is associated with poor prognosis. In the past, a tooth with PGG showing a complex lesion was regarded as hopeless and immediate extraction was recommended. However, with the development of new materials, diagnostic tools, and understanding of the characteristics and treatment principles, many recent cases have shown successful treatment outcomes on teeth with PGG. Clinicians should recognize the existence of PGG and manage it properly based on the understanding in order to ensure survival of the tooth.

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