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Management of a maxillary lateral incisor with a palatogingival groove and open apex – a case report

Key words endodontic-periodontal lesions, MTA, open apex, palatogingival groove

Introduction

Pulpal and periodontal problems are responsible for more than 50% of tooth loss. Treatment is further complicated if periodontal involvement is due to developmental anomalies. One such anatomical aberration is a radicular groove involving the crown and sometimes the root. The most commonly involved surfaces are the labial surface of maxillary central incisors and the palatal surface of maxillary lateral incisors. Several terms have been given to such anomalies, i.e. palatoradicular groove, radicular anomaly, palatogingival groove, distolingual groove, radicular lingual groove and syndesmo-corono radicular tooth. Regarding the aetiology of these grooves, different theories have been published. Currently it is assumed that these grooves may result from an infolding of the enamel organ and the epithelial sheath of Hertwig or from an attempt to form another root. The prevalence of palatogingival grooves in maxillary central incisors is 2.0%, of which 1.6% were on the buccal surface. They are most prevalent in maxillary lateral incisors with an incidence of 2.6%. Goon et al classified palatogingival grooves as mild grooves (gentle depressions of coronal enamel which terminate at the cementoenamel junction [CEJ]), moderate grooves (continue apically through the CEJ in the form of a shallow/fissured defect) and complex grooves (deeply invaginated defects that involve the entire root length as a separate accessory root from the main trunk). These grooves act as susceptible areas for plaque accumulation, which leads to destruction of the periodontium through...
the sulcular epithelium. These grooves may also lead to combined endodontic-periodontal lesions, since there might be a communication between the root canal system and the periodontium through accessory canals. The treatment and prognosis of such teeth depends upon the extent of the groove. Odontoplasty can be performed on shallow grooves but deeper grooves require complex periodontal therapy. The present case report describes the management of a maxillary lateral incisor with a palatogingival groove with severe periapical bone loss and a concomitant sinus tract.

**Case report**

A 20-year-old female patient with a non-contributory medical history reported the chief complaint of pus discharge and mobility in relation to tooth 12 for the past 6 months. She also described a dental trauma from 10 years ago. There was no history of pain associated with the tooth. Clinical examination revealed a draining sinus tract in the region of the labial mucosa adjacent to tooth 12 (Fig 1). A palatogingival groove was detected in relation to the same tooth (Fig 2). The tooth displayed grade III mobility and could be depressed into the socket. There was pus discharge through the palatal gingival sulcus, along with generalised probing depths of 6 to 7 mm. The probing depths in relation to tooth 12 were 6 mm at the labial aspect and 4 mm at the palatal aspect with a gingival recession of about 3 to 4 mm. The tooth did not show any carious lesion or coronal restoration and did not respond to thermal and electric pulp testing. An intraoral periapical radiograph revealed a periapical lesion, open apex and an advanced bony defect extending up to the apical third of the root (Fig 3). A gutta-percha cone inserted into the sinus tract revealed that the sinus was associated with the tooth 12 (Fig 4).
The contralateral tooth 22 was examined clinically and radiographically because of the possibility of bilateral occurrence of a palatogingival groove, but no abnormality was found. The diagnosis of generalised severe periodontitis with chronic suppurative apical periodontitis in relation to tooth 12 was made.

A wire composite splint was used to stabilise tooth 12 (Fig 5). It was decided to use the split rubber dam technique for isolation to facilitate placement of the dam material over the wire composite splint. Holes were punched for teeth 13 and 21 and a cut was made between them with the help of sharp scissors. Following placement, the rubber dam was then stabilised using impression material (Fig 6). The endodontic access cavity was prepared and the working length was determined radiographically. As the canal walls were thin, minimal instrumentation was done with Hedström files (MANI, Tochigi City, Japan) up to ISO size 80 followed by irrigation with 5.25% sodium hypochlorite. The root canal was dried with paper points and calcium hydroxide intracanal medicament was placed in the canal. At the next appointment 7 days later, the patient was asymptomatic and the sinus tract had healed. The intracanal dressing was removed using Hedström files and copious irrigation with sodium hypochlorite. MTA (ProRoot™ MTA; Dentsply Maillefer, Ballaiges, Switzerland) was then placed in the apical 3 to 4 mm of the root canal using a matrix of gelatine sponge (Ab Gel, Sri Gopal Krishna Labs, Mumbai, India) and hand pluggers. A moist cotton pellet was placed in the canal orifice and the access cavity sealed with a temporary restoration (Cavit-G, Premier Dental Co., Philadelphia, PA, USA). After 24 hours, the MTA was checked for total setting and then the rest of the root canal was obturated by cold lateral compaction of gutta-percha cones (Dentsply Maillefer, Ballaiges, Switzerland) and Sealapex sealer (SybronEndo, Orange, CA, USA). The access cavity was sealed with glass ionomer cement (Fuji II; GC Corporation, Tokyo, Japan). The postoperative radiograph revealed a homogenous root canal obturation (Fig 7).

The patient was scheduled for periodontal flap surgery 1 week later. A full thickness mucoperiosteal flap was reflected on both labial and palatal aspects of tooth 12. An advanced circumferential bony defect surrounding the proximal and the palatal aspects was found. The bony defect was curetted and the granulomatous tissue was removed. Following root planing, odontoplasty of the palatogingival groove was performed using a round diamond bur (MANI).
Hydroxyapatite graft material (Ossifi, Metrociti Health Care, New Delhi, India) was mixed with saline and placed into the bony defect and then the flap was sutured back in place. The sutures were removed 1 week following surgery. Healing was uneventful.

The patient was recalled after 1, 3, 6 and 12 months postoperatively. After 1 month, there was no exudate or bleeding on probing. After 3 months, the probing depths had reduced markedly (Fig 8). After 12 months, the labial splint was removed and a permanent palatal composite wire splint was placed (Fig 9). Radiographic healing was evident after 12 and 18 months (Figs 10 and 11).

Discussion

The malformation of a palatogingival groove is a rare developmental defect, which predisposes the tooth to severe periodontal diseases and has many similarities with dens invaginatus. The alteration is an infolding of epithelium in the case of a palatogingival groove, whereas in dens invaginatus, the alteration is an invagination resulting in a circular opening. The palatogingival groove presumably represents an unsuccessful attempt to form an additional root. The occurrence of grooves extending from the cingulum to the apex appears to be extremely rare. However, the clinical implications are important, since such grooves may lead to combined endodontic-periodontal lesions.

The mere presence of a palatogingival groove does not indicate pathology. If the epithelial attachment is intact, the tooth and the periodontium remain healthy in most cases. Once there is loss of attachment, a periodontal pocket is formed along the groove leading to periapical pathosis. This breach in epithelium can be either due to endodontic involvement or gingival irritation. Inflammation can
progress from an apical lesion coronally along the groove, causing a primary endodontic/secondary periodontal lesion. Conversely, it can start from gingival irritation secondary to microbial plaque retention, creating a periodontal defect. Previously, many teeth were extracted because of these endodontic-periodontal lesions. For mild and simple grooves, conservative treatment like curettage and apically repositioned flaps are recommended, with the prognosis considered to be good. However, when grooves are deeper, treatment is almost always doomed to failure.

Various materials have been advocated to restore the palatogingival groove, such as composite resin, amalgam and glass ionomer cement. In the present case, the groove was shallow and extended to the apex (moderate type according to Goon et al). Saucerisation was performed to eliminate the groove without the need of any restorative material. Saucerisation involves elimination of the defect with rotary cutting and polishing instruments. This method has been reported to be a helpful method in eliminating shallower grooves. Dysplastic radicular dentine is often present along the groove, so the palatogingival groove acts as a plaque trap for promoting periodontal breakdown and pulpal necrosis due to the tracking of microorganisms to the root apex.

In the present case the patient suffered from a generalised severe marginal periodontitis, which probably was aggravated in relation to tooth 12 due to the presence of the palatogingival groove. In addition, the reported dental trauma may also have caused loss of pulp vitality, resulting in incomplete root formation with the wide-open apex (Fig 3). The pathology required both endodontic and periodontal management. Root canal treatment was performed along with generalised periodontal flap surgery, including curettage of granulation tissue and root planing. During root canal treatment, isolation of the tooth was difficult because of the presence of the wire composite splint in that region. So, a split rubber dam technique reinforced with impression material was used. The treatment was further complicated by the open apex of the tooth. An apical seal was obtained with MTA and the rest of the root canal was obturated with gutta-percha and sealer.

To treat the advanced periapical bone loss, a bone graft material (Ossifi) was placed to promote bone regeneration. Ossifi is a synthesised combination of hydroxyapatite and ß-tricalcium phosphate that creates new molecules. Moreover, it has a bio-ceramic matrix that is biocompatible and highly osteoconductive.

To stabilise the tooth, a composite wire splint was placed up to 12 months in the present case. After that period, since there was still severe horizontal bone loss, a permanent composite wire splint was placed on the palatal aspect and the labial splint was removed. Three months after the root canal treatment and periodontal surgical procedure, the probing depths decreased from 6 to 3 mm at the labial and from 4 to 2 mm at the palatal aspect of the tooth. Complete apical osseous healing was evident in the 18-month follow-up radiograph. A long-term follow-up will, however, be required.

**Conclusion**

Although rare, the clinical implications of a palatogingival groove are important, since such grooves may lead to combined endodontic periodontal lesions. Therefore, careful diagnosis and skilful management are important in its treatment.

**References**


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