International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 18-06-2020; Accepted: 07-07-2020; Published: 15-07-2020
www.medicalsciencejournal.com
Volume 6; Issue 7; 2020; Page No. 78-82

Successful management of complex palatogingival groove by combined endodontic and surgical approach: A case report

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Abstract
Palatogingival groove is a developmental anomaly that often causes severe periodontal defects and often appear on maxillary lateral and central incisors. Various techniques have been adopted to eliminate the groove and regenerate lost periodontium. Careful endodontic and periodontal procedures may restore the form and function. This report presents a case of a maxillary lateral incisor with a deep palatogingival groove extending up to the root apex with severe periodontal destruction. In the present case; root canal therapy, and sealing of the groove with Biodentine was done followed by placement of platelet- rich fibrin (PRF) membrane.1 year follow up radiograph revealed reduction of radiolucency around 12 and the treatment outcome was gain in attachment, reduction in pocket depth, and deposition of bone in the osseous defect. A 12 month follow- up is included.

Keywords: biodentine; palatogingival groove (PGG); platelet- rich fibrin membrane

Introduction

Palatogingival groove is an anatomical malformation which starts near the cingulum of the tooth running down the cementoenamel junction in apical direction and terminates at various depths along the root. This developmental anomaly is seen predominantly in maxillary incisors, most commonly in lateral incisors along the palatal surface and hence it is also known as radicular lingual groove. It can occur on the distal or mesial surface and on the facial surfaces of the incisors known as the facial radicular groove. The anomaly might be bilateral or unilateral. Two grooves could be there on a single tooth, one on the palatal surface and the other on the facial surface [1].

Goon *et al*., categorised PGG (Palatogingival groove) into 2 types, simple and complex. The simple PGG represents a partial unfolding of Hertwig's epithelial root sheath (HERS) and doesn't communicate with the pulp, while complex PGG groove extends along the length of the root communicating directly with the pulp. In rare cases, the groove may lead to a minor accessory root which may also contain a root canal [2].Various etiologies have been claimed for this anatomical malformation: (i) consequence of an alteration in growth like infolding of the inner enamel epithelium and epithelial sheath of Hertwig, (ii) dens invaginatus variant, (iii) genetic mechanism alteration, and (iv) attempt to form another root [3]. Plaque accumulation is the most negative aspect of PGG. The groove may favour plaque growth by providing surface areas which are sheltered from cleaning efforts and from host defence mechanisms. Treatment modalities include curettage of the affected tissues, elimination of the groove by grinding (saucerization), or by sealing with a variety of filling materials [3]. In case where pulp has become necrotic, the tooth needs endodontic therapy along with periodontal treatment. Ability to treat the periodontal defect ultimately determines the prognosis of these teeth. Surgical procedures are required only if the groove goes beyond the middle- third of the root apex, which may include use of intraosseous graft and barriers to correct the defect [2].

This case report presents management of a complex PGG in a maxillary lateral incisor treated successfully with endodontic therapy followed by sealing the groove with biodentine, and placement of platelet- rich fibrin (PRF)

Case History

A 38- year- old female patient who had a complaint of dull and intermittent pain and a localised swelling at the palatal side of the right maxillary lateral incisor since two weeks came to Department of Endodontics. Her medical history was non-contributory.

During the clinical examination, the right maxillary lateral incisor had an intact crown without caries or fracture, with negative vitality testing and a positive response to percussion. The tooth was grade 1 mobile. A localized abscess was seen palatally in relation to 12. Periodontal probing disclosed a localised periodontal pocket (Fig 1b) (9 mm) at the mesiopalatal line angle of the tooth and concomitantly, a PGG which extended into the gingival sulcus. Oral hygiene was satisfactory with overall good periodontal health.

Radiograph revealed the presence of a periapical bone loss in relation to 12. Apical periodontal widening was also evident. A patent root canal was seen with another (Fig 1a) parapulpal radiolucent line, which is a typical radiographic representation of the palatogingival groove. A supernumerary root was also observed in the radiographs. Considering patient's history, clinical and radiographic examination, the lesion was provisionally diagnosed as localised periodontal abscess with pulpal necrosis secondary to the radicular groove.

Proper clinical and radiographic examination is important for accurate diagnosis and treatment planning in these cases.

As the radiograph can only provide two dimensional images, complex anatomy of root canal system in these anomalies are not clearly understood. So, CBCT (Fig 1c) could be of great advantage as to demonstrate the dimensions of groove, the site of bifurcation, its communicating nature,the volume of bone loss and, thus, the approximate amount of graft required for filling the defect [4].

CBCT Analysis

Palato gingival groove on the palatal aspect of 12 which extends from the level of cervical third of the crown to the level of apical third of the root (Fig 1d). This Groove bifurcates root into two at the level of apical third of the root. Groove is not communicating with root canal space.

Labial & palatal cortical plate is absent at the level of cervical & middle third of the root. Peri radicular bone loss can be appreciated.

For management of more complex cases, several methods have been recommended: removal of granulation tissue removal through a flap, defect elimination at the level of the crestal bone using rotatory instruments (saucerization) with or without the guided tissue regeneration technique, intentional reimplantation of a problematic tooth to achieve complete removal of the groove, orthodontic extrusion, and extraction [3].

Interdisciplinary treatment plan was formulated for the patient. The treatment plan suggested was to initiate endodontic therapy followed by surgical approach. Surgical management includes uncovering of the defect, curetting the diseased granulation tissue and sealing the groove with Biodentine and placement of PRF (Platelet rich fibrin).

On the next appointment, endodontic therapy was initiated. Endodontic access was performed and working length was determined by using electronic apex locator Root ZX (J. Morita Mfg. Corporation, Kyoto, Japan) and confirmed radiographically with 15 no. K- files(Fig 1e). The root canal was cleaned and shaped by by K files (MANI K FILES) using step back technique. The root canal was copiously irrigated with 2.5% sodium hypochlorite (Novo Dental Product, India). Access cavity was temporized with calcium hydroxide and TERM. Patient was recalled after 1 week; the tooth was asymptomatic. During the second appointment, root canal was irrigated again with normal saline and dried using paper points. The canal was obturated with selected master gutta- percha cone (Fig 1f) and AH- Plus sealer (Dentsply Maillefer Company, USA) using lateral compaction (Fig 1g). Vertical compaction was done using the heated pluggers at the canal orifices. Figure:1

Fig la: preoperative radiograph of tooth 12

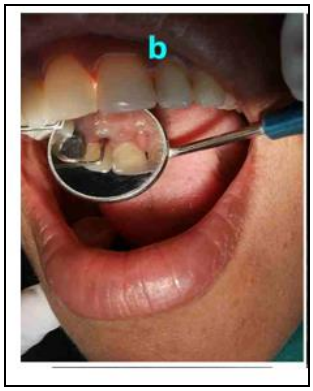

Fig lb: clinical evaluation of periodontal pocket

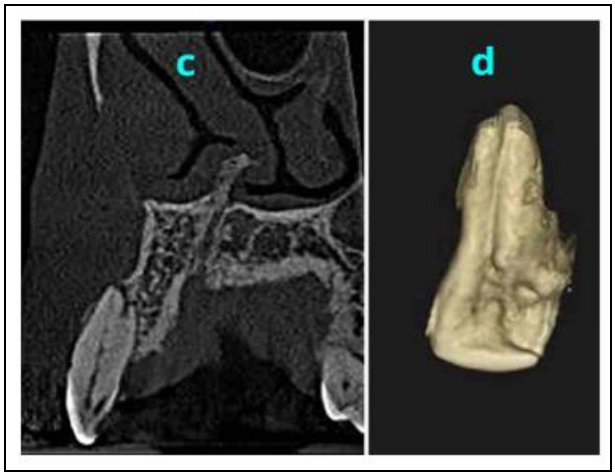

Fig lc & 1d: CBCT images of 12

Fig le: working length radiograph of 12

Fig lf: mastercone radiograph of 12

Fig lg: immediate post obturation radiograph of tooth 12

Fig lh: 1-year postoperative radiograph of 12

On the third appointment, during the periodontal phase of the therapy, complete extraoral and intraoral mouth disinfection was done with betadine and local anesthesia was administered (lidocaine 2% with epinephrine 1:80,000). A surgical flap was raised from the palatal aspect and the PGG was isolated to its most apical extent (Fig 2a). The diseased granulation tissue was curetted out. Minimal widening of PGG was done using a straight fissure bur at slow speed and was sealed with Biodentine™ (Septodont, St. Maur- des- Fosses, France) (Fig 2b). The area was kept isolated of blood and tissue fluids during the etting of the cement by using local hemostatic gelatin sponge (Pfizer Inc, New York, NY).

Preparation of PRF membrane: A 12 ml sample of whole blood was drawn intravenously from the patient's right antecubital vein and centrifuged (REMI Model R- 8c with 12 × 15 ml swing out head) under 3,000 rpm for 10 min to obtain the PRF which was jelly- like in consistency. PRF clot started to release its serum (PRF- clot exudates) (Fig 2c) and was ready for compression into the membrane. Without delay autologous PRF membrane was placed (Fig 2d& 2e) and the flaps were secured with 4- 0 polyglactin 910 sutures(Fig 2f & 2g) (Vicryl, Ethicon, Inc., Piscataway, NJ).

Figure 2:

Fig 2a: Uncovering of palatogingival groove defect till apex by flap elevation

Fig 2b: Sealing of the defect using biodentine

Fig 2c: Preparation of PRF

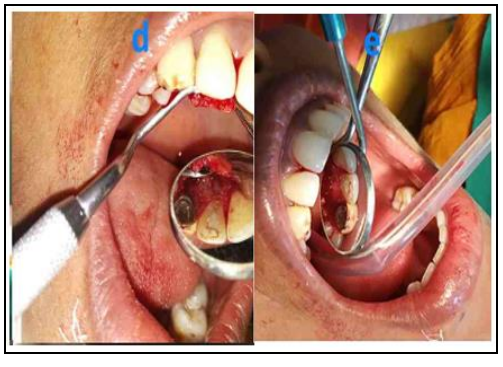

Fig 2d&2e: Placement of PRF into the defect

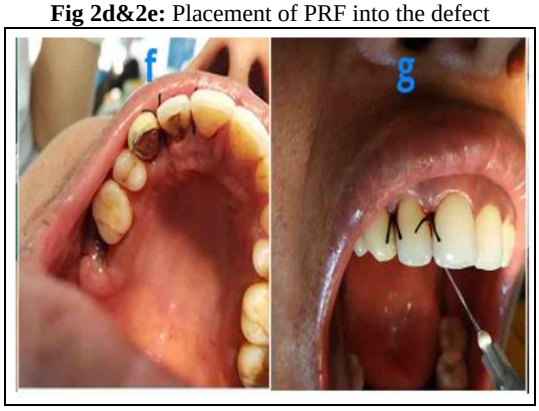

Fig 2f & 2g: sutures placed in relation to 12

Fig 2h: Post op photograph after 1 year

Following surgery, the patient was placed on systemic antibiotics for 5 days.In addition, a 0.12% chlorhexidine gluconate rinse was prescribed and ibuprofen was given for discomfort. The patient was asymptomatic postoperatively and sutures were removed after 7 days. The patient was recalled for 3 months, 6 months and 1 year. There was both a clinical and radiographic improvement (Fig 1h). Clinically, there was a reduction in the pocket depth of 5 mm in 6 months and patient is asymptomatic with a 3 mm non- bleeding sulcus at the end of 12 months (Fig 2h).

Discussion

The maxillary lateral incisor area is a region of embryologic hazard. Various anomalies can occur in this area like peg shaped laterals, dens in dente and congenitally missing lateral incisors. One such malformation is the PGG [4]. Withers *et al*. evaluated 2099 maxillary incisors and reported PGG in 2.33%, of which 94% were in the maxillary lateral incisors [5, 6].

These grooves which act as "plaque trap", is an initiating factor in localized gingivitis and periodontitis. Type III grooves may result in focal attachment loss which extend apically and results in a hopeless periodontal prognosis. Accurate diagnosis is the key factor in the management of these type of developmental anomalies. A CBCT image was taken in order to achieve a three-dimensional image of the tooth, to determine its accurate prognosis [7].

When there is no no visible communication existing between the groove and the pulp cavity, the groove can be treated as a separate entity preserving the vitality of the pulp [4]. In this case, endodontic treatment was done as the tooth had become nonvital due to the chronic long-standing involvement of the periodontium because of the presence of communicating channels between the groove and the pulp chamber, which facilitated bacterial penetration, causing the pulp tissue to undergo inflammation, degenerative changes, and eventual pulp necrosis.

Prognosis of teeth depends on the depth, and length of the groove (shallow/deep or long/short), location of the groove, the extent and accessibility of the periodontal defect.It is reported that 58% extend >5 mm apically from cementoenamel junction [5]

In this case, management of the defect was carried out in two phases: endodontic phase and periodontal phase. Since the pulp was necrotic, endodontic root canal therapy was performed followed by elevation of flap to expose the PGG. Widening of the groove was done to eliminate bacterial plaque and calculus and to prevent bacterial recolonization. The groove was sealed to enhance regeneration of periodontal attachment and bone and to eliminate the pocket. Materials like composite and amalgam have been used to fill the PGG. In our study, Biodentine was chosen as it requires only less setting time (a few minutes compared with several hours for MTA) and has better mechanical properties compared to other products [2]

The treatment for palatogingival groove is to eradicate inflammatory irritants by eliminating or sealing of the groove. Radiculoplasty was one of the procedures that have been advocated to eliminate the groove. Intentional replantation has been a treatment option for the management of palatogingival groove where the groove extended to the apex of the tooth [8]

PRF has also been shown to stimulate the growth of osteoblasts and periodontal ligament cells which helps in restoring periodontal defects. High- concentration GFs are released to the wound site by the PRF membrane, thereby stimulating new bone formation and healing, replacing lost tissue and restoring vascular integrity. The PRF membrane use requires only minimal cost as well as it negates the risk of disease transmission and graft rejection as it is a completely autologous product [2]

Khalid Al-Hezaimi *et al* presented a case of successful treatment of radicular groove associated with a maxillary lateral incisor. A combination of endodontics, intentional replantation, and Emdogain therapy was used. Emdogain was used to obtain periodontal regeneration to mimic the events that take place during the development of the dental root [9]. Intentional replantation using Emdogain may also prevent or delay ankylosis of replanted human teeth as reported by Flippi *et al*. [10]

Another case repoted by Ivan Garrido *et al* suggested a combined treatment approach, involving both endodontic therapy and intentional replantation after restoration with a self-etching flowable composite, resulted in periodontal healing and significant healing of the periradicular radiolucency at 12 months [11]

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