

PALATOGINGIVAL GROOVE: AN ENDODONTIC-PERIODONTAL HAZARD

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ABSTRACT

Introduction: The palatogingival groove (PGG) is a developmental anomaly that predisposes teeth to periodontal breakdown. It is known to promote adherence of plaque and bacteria to levels significant for the development of pathology because of their inconspicuous occurrence and variable extent on tooth root. Many times it gets complicated by pulp necrosis giving rise to a combined endodontic-periodontal lesion. This report presents management of two endodontic-periodontal lesion in lateral incisors that have PGG using a combined endodontic-periodontal approach.

Methodology:**Case no 1:**

A 30-year-old male patient reported with a chief complaint of pain and mobility in the maxillary left lateral incisor. Clinical examination revealed a deep 12mm periodontal pocket & presence of PGG with 22.

Radiograph: Bone loss upto apical third of the root and a radiolucency around the apex.

Diagnosis: Primary periodontal and secondary endodontic lesion was made.

Treatment: Root canal therapy later followed by apicoectomy, guided tissue regeneration surgery and restoration of the PGG.

Case no 2:

A 35-year-old male patient reported with a chief complaint of pain and mobility in the maxillary right lateral incisor. Clinical examination revealed a deep 5.5mm periodontal pocket & presence of PGG with 12.

Radiograph: Interdental bone loss mesially and distally.

Diagnosis: Primary periodontal and secondary endodontic lesion.

Treatment: Root canal therapy, periodontal flap surgery, saucerization of the groove and restoration of the PGG.

Results: In both cases, there was a significant reduction in probing depth and radiograph revealed resolution of periapical infection and slight gain in bone level after 1 year: Early and accurate diagnosis of such developmental anomalies can help the clinician to achieve long-term success.

KEYWORDS: Palatogingival groove, Endodontic-Periodontal Lesion, Maxillary Lateral Incisor, Periodontal Regeneration.

INTRODUCTION

Palatogingival groove (PGG) is a developmental anomaly that occurs as developmental infoldings of the inner enamel epithelium and Hertwig's epithelial root sheath (HERS).^[1] PGG is classified into: Type I; the groove is short but does not extend beyond the coronal third of the root, type II; the groove is long reaching

beyond the coronal third of the root but shallow, corresponding to a normal or simple root canal and type III; the groove is long, deep and extends beyond the coronal third of the root, corresponding to a complex root canal system.^[2] They primarily involve maxillary incisors. PGG is called as palato radicular groove, corono radicular groove, radiculo lingual groove and

disto lingual groove.

Several etiologies have laid claim for its development which include: (1) infolding of the enamel organ and Hertwig's epithelial root sheath simulating a mild form of dens invaginatus,^[3] (2) an aborted attempt towards formation of an additional root on the affected tooth^[4] and recently, (3) alteration of genetic mechanisms and racial link has been proposed.^[5] The evaluation of PGG dimensions is clinically important because long and deep grooves tend to plaque accumulation, culminating in the destruction of the sulcular epithelium, later evolving to severe and localized periodontitis. The wide range of PGG depths also has important endodontic implications because the groove may communicate with the root canal through accessory canals and foramina. In some cases, PGG may be seen on periapical radiographs as a thin radiolucent line that follows the pulp chamber and root canal.^[1]

Treatment of the PGG include curettage of the affected periodontal tissues^[6], saucerisation of the groove^[7], sealing the groove with a biocompatible material^[7], root canal treatment when a primary or secondary endodontic lesion is present^[8] and surgical procedures like guided tissue regeneration therapy (GTR) & intentional replantation^[9,10]



Figure 1



Figure 2



Figure 3

Based on history, clinical and radiographic examination, the lesion was provisionally diagnosed as primary periodontal lesion with secondary endodontic involvement according to Simon's classification^[11] in the left maxillary lateral incisor because of a palato-gingival groove. The patient was explained about the questionable long-term prognosis of the tooth #22 considering the palatogingival groove. Treatment offered to the patient included a combination of root canal therapy, sealing the groove, splinting the tooth and periodontal regenerative procedure. Patient wanted a conservative approach and hence agreed for this procedure. Informed consent was taken from the patient for the same.

Emergency access opening was performed (Figure 4) followed by non-surgical periodontal treatment. Evaluation was done after 7 days of the scaling and root planning on which pocket probing depth was found to be 11mm (Figure 5). Endodontic treatment was completed after giving calcium hydroxide dressing for a week. After

This paper reports two cases with PGG, both involving a primary periodontal lesion with secondary endodontic involvement in a maxillary lateral incisor. Since there is both, periodontal and periapical involvement, a multidisciplinary treatment approach was needed.

Case No 1:

A 30-year-old systemically healthy male patient came to the Department of Periodontics, Bharati Vidyapeeth Dental College & Hospital, Navi Mumbai, India with a chief complaint of pain and mobility in the maxillary left lateral incisor. There was no history of any previous trauma or pain in the area before this. Miller's Grade II mobility was seen with upper left lateral incisor tooth (#22) with presence of a Palatogingival groove (Figure 1) and a draining sinus tract opening buccally (Figure 2). Refrigerant spray and Electric pulp testing resulted negative. Periodontal probing depth was 12-mm pocket in mid palatal region using UNC-15 Periodontal probe and the buccal gingival sulcus was within normal limits. Maxillary right lateral incisor was also examined for similar condition where it responded normally to the pulp testing. A shallow groove was evident and the probing depth was within normal limits. Intra oral periapical radiograph (Figure 3) revealed a periradicular radiolucency involving the apical one-third of the root.

one-week, the buccal sinus tract and pus drainage from palatal sulcus had stopped but the palatal sulcus adjacent to the PGG still probed to be 11 mm deep. To have a favourable periodontal regenerative outcome, splinting was done with respect to #21, #22, #23 on the buccal aspect (Figure 6) and regenerative surgery was planned, 2 months post completion of endodontic treatment.



Figure 4.



Figure 5.



Figure 6.

Periodontal regenerative treatment involved reflecting a full thickness flap under local anaesthesia, which revealed a wide bony defect exposing the root almost completely except the mesial part of the coronal portion of the root (Figure 7, 8). Curettage was carried out to remove the diseased granulation tissue which filled the bony defect as to provide a conducive environment for regeneration. As the root apex was exposed, apicoectomy (Figure 9) was done followed by placement of MTA (Figure 10). Odontoplasty was initially planned on the palatal aspect of the root to eliminate the PGG, but on reflection since the groove was very deep, restoration with resin modified glass ionomer cement- RMGIC was

done. The restoration was done in a well isolated area till the glass ionomer cement set (Figure 11). Then, Guided Tissue Regeneration (GTR) was carried out by means of PerioGlas® bioactive synthetic bone graft (NovaBone Products, LLC) (Figure 12) and placement of HEALIGUIDE® collagen membrane (Advanced Biotech Products Private Limited, Tamil Nadu India) was done around the tooth (Figure 13, 14, 15). The flap was approximated and sling and simple interrupted sutures were placed with nonresorbable 4-0 Prolene™ (Ethicon) suture material (Figure 16, 17). A periodontal pack was placed after suturing (Figure 18, 19).



Figure 7



Figure 8



Figure 9



Figure 10



Figure 11



Figure 12



Figure 13



Figure 14



Figure 15



Figure 16



Figure 17



Figure 18



Figure 19

Verbal and written post-surgical instructions were given to the patient and patient was asked to rinse with 0.12% solution of chlorhexidine twice a day. Patient was prescribed capsule Almox (Amoxicillin 500mg) thrice a day and tablet Zerodol P (Aceclofenac 100mg, Paracetamol 325mg) twice a day which were to be taken for 5 days post-surgery. Post-surgical healing was uneventful. Suture removal was done 14 days after the surgery, however no probing was attempted. A

radiograph was taken 2 months after the surgery (Figure 20) and it revealed partial disappearance of the radiolucency around the left lateral incisor due to bone fill after regenerative periodontal treatment. Also, palatal probing depth was 2.5mm after 1 year (Figure 21). So overall 9.5 mm gain of clinical attachment was achieved on the palatal aspect where originally the pocket measured 12 mm.



Figure 20



Figure 21

Case No 2

A 35-year-old male patient who was systemically healthy presented to Department of Periodontics, Bharati Vidyapeeth Dental College & Hospital, Navi Mumbai, India with a chief complaint of pain in the maxillary right lateral incisor. There was no history of any previous trauma or pain in the area before this. Maxillary right later incisor tooth (#12) had a Palatogingival groove. (Figure 22) The tooth gave no response to refrigerant spray suggestive of necrotic pulp. Periodontal examination revealed a 5.5mm pocket in the disto-palatal region using UNC-15 Periodontal probe. (Figure 23) The buccal probing depth of the lateral incisor was within normal limits. Maxillary left lateral incisor on examination showed normal probing depth even though a

shallow groove was present. Intra oral periapical radiograph (Figure 24) revealed periodontal space widening, discontinuous lamina dura, interdental bone loss mesially and distally and also the PGG was seen as a para pulpal radiolucent line.



Figure 22



Figure 23



Figure 24

Based on history, clinical and radiographic examination, the lesion was diagnosed as primary periodontal lesion with secondary endodontic involvement according to Simon's classification^[11] in the right maxillary lateral incisor because of a palatogingival groove. Treatment offered to the patient included management using a combination of endodontic therapy of root canal therapy, followed by periodontal flap surgery for saucerization and sealing of the groove. Patient agreed for this procedure and informed consent was gained.

Non-surgical periodontal treatment was performed. Evaluation was done after 7 days of the scaling and root

planning. Next root canal therapy was completed (Figure 25) which included giving calcium hydroxide dressing for 1 week before eventually doing the root canal filling. The periodontal approach included raising full thickness flap reflection (Figure 26), debridement (Figure 27) followed by saucerization of the groove using a round bur. (Figure 28) After this negotiation of the groove was done using an endodontic file and a radiograph was taken. (Figure 29, 30) Later, the groove was filled with RMGIC. (Figure 31) Thereafter, the flap was approximated with sling and simple interrupted sutures using nonresorbable 4-0 Prolene™ (Ethicon) suture material (Figure 32).



Figure 25



Figure 26



Figure 27



Figure 28



Figure 29

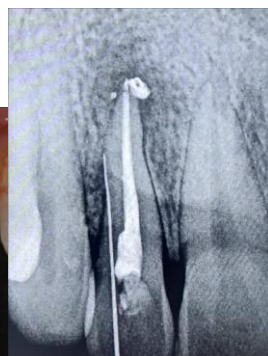


Figure 30

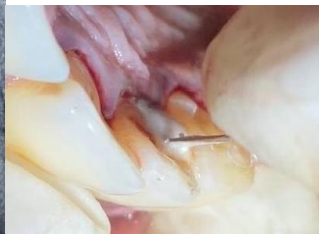


Figure 31



Figure 32

Verbal and written post-surgical instructions were given to the patient and patient was asked to rinse with 0.12% solution of chlorhexidine twice a day. Patient was prescribed capsule Almox (Amoxicillin 500mg) thrice a day and tablet Zerodol P (Aceclofenac 100mg, Paracetamol 325mg) twice a day which were to be taken

for 5 days post-surgery. Post-surgical healing was uneventful. Suture removal was done 7 days after the surgery however no probing was attempted. A radiograph was taken 6 months after the surgery revealed bone fill in the mesial and distal aspect (Figure 33) and also the palatal probing depth was 2 mm.



Figure 33

DISCUSSION

Palatogingival groove is a morphological aberration known to frequently affect maxillary incisor teeth with a rate of affliction seen to be higher in lateral incisors (4.4-5.6%) compared to central incisors (0.28-3.4%)^[4-5]. They act as a “plaque trap” and initiating factor in localized gingivitis and periodontitis.^[4] Its formation presumably represents an aborted attempt to represent an additional root. If deep periodontal pockets associated with PGG are let untreated, it can secondarily affect pulp vitality thus becoming an endodontic-periodontal lesion.^[4] In both the cases presented here, the lesions were diagnosed as primary periodontal lesion with secondary endodontic involvement according to Simon’s classification.^[11] (Figure 3). The location, depth and extension of the groove, severity of the periodontal problem, accessibility of the defect and the type of groove play importance in determining the prognosis of the affected tooth.^[12] The PGG prevalence rate in the population has been reported to be between 2.8% and 8.5%. The incidence has been found to be 6% in central incisors as compared to 93% in lateral incisors.^[5] When there is periodontal as well as endodontic involvement, both treatment in combination are required. Shallow grooves not exceeding the CEJ can be treated by odontoplasty and curettage and deeper grooves having periodontal & periapical lesion, need surgical intervention to not only eradicate inflammatory irritants but to also completely eliminate the groove.^[13]

Various materials are used to fill PGG such as composite resin, amalgam and mineral trioxide aggregate. In both the cases presented here, resin modified glass ionomer cement (RMGIC) was chosen because it has advantages like antibacterial effect, chemical adhesion to the tooth structure, adequate sealing ability and promoting epithelial and connective tissue attachment.^[14] Clinical and histological studies have revealed that epithelial and connective tissue can adhere to the glass ionomer cement during the healing process.^[15] In the first case, a synthetic

alloplast graft material [PerioGlas® bioactive synthetic bone graft (NovaBone Products, LLC)] was chosen to fill the osseous defect pertaining to its osteoconductive and osteopromotive abilities.^[16] Several studies show that bone fill is enhanced by the addition of a graft material to GTR procedures. Also, a collagenous membrane [HEALIGUIDE® collagen membrane (Advanced Biotech Products Private Limited, Tamil Nadu India)] was placed over the defect to provide epithelial exclusion allowing periodontal ligament, cementum and bone to regenerate.^[17]

CONCLUSION

Therefore, an interdisciplinary approach combining periodontal and endodontic treatment is needed for the management of such complex cases. Successful endodontic treatment with periodontal flap and regenerative surgery while eliminating the palatogingival groove can result in excellent healing both clinically and radiographically.

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