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The silent killer caught white handed: An interdisciplinary approach to manage a rare case of PGG associated Perio-endo lesion

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Abstract

Palatogingival grooves (PGG) are developmental anomalies quite hazardous for development of periodontal-endodontic lesion. An intact epithelial attachment across the groove ensures a healthy periodontium. However, if the attachment is breached, it acts as a suitable milieu for accumulation of plaque and subsequent pocket formation. It is noticed that localized deep pocket reaching up to or beyond the root apex often lead to combined primary perio secondary endo lesions. This paper reports a case of successful management of PGG associated perio endo lesion with interdisciplinary approach.

Keywords: Palatogingival grooves, periodontal-endodontic lesion, epithelial attachment

Introduction

Glossary of Endodontic terms defines palatogingival groove (PGG) as 'a developmental anomaly in a root that, when present, is usually found on the lingual surface of maxillary incisor teeth' [1]. Lee *et al.* coined the term long back in 1968 but literature has described other terms like radicular groove, syndesmocoronaradicular groove, disto lingual groove, radiculo lingual groove and corono radicular groove [2,3]. The innumerable array of variations concerning position, extent, degree of invagination complexes treatment planning and outcome [3].

The etiopathogenesis remains a mystery unsolved till date leading to conflicting speculations. Embryologically, some authors believe it to be an infolding of enamel organ as well as the Herwig's epithelial sheath that occurs before the calcification phase simulating a mild form of dens invaginatus [4]. Others proclaim it to be a failed attempt to form a supernumerary root [5]. Recently, Ennes and Lara proposed that a modification of the genetic mechanisms can be a plausible explanation for the occurrence of groove [6].

The common clinical presentation of PGG is a V-shaped indentation starting from the cingulum region extending to varying distances apically along the root surface.⁷ It is quite challenging to pinpoint the groove on radiographs due to overlapping over the pulp canal space; nevertheless, a radiolucent para pulp line can be appreciated by taking multiple radiographs with altered horizontal angulations [4].

The typical presence of PGG does not always result in pathological. An intact epithelial attachment across the groove ensures a healthy periodontium. However, if the attachment is breached, it acts as a suitable milieu for accumulation of plaque and calculus that remains concealed from the efforts of self-cleansing. Gradually, periodontal tissue destruction culminates consequent to pocket formation and it is noticed that localized deep pocket reaching up to or beyond the root apex often lead to combined primary perio secondary endo lesions.

It is said that pulpal involvement can communicate to this funnel shaped groove via the accessory foramina or exposed dentinal tubules. As a result, differentiating the primary cause (whether it is endodontic or periodontic in origin) is fairly difficult [8].

Various therapeutic options include complete curettage of the granulation tissue, exclusion of shallow grooves by saucerization with a round bur or sealing deep grooves with a variety of materials like Glass-ionomer cement, composite, or Biodentine [9,10]. Efficient elimination of the infection present in the accessory canal and sealing the depth of the groove ensures

successful therapy. Surgical intervention is mandated in those cases where the groove extends beyond the middle-third of the root however with the use of intraosseous bone replacement materials and barrier membranes one can aim to gain new attachment^[9, 11]. This paper reports a case of successful management of PGG associated perio endo lesion with interdisciplinary approach

Case Report

A 19-year-old female patient complaining of dull pain, swelling and loose upper left front tooth along with pus discharge for the past 4 to 5 weeks reported to Department of Periodontics, Dr. R Ahmed Dental College and Hospital, Kolkata. A detailed medical and dental history was elicited which was noncontributory as it revealed no incidence of prior trauma, pain or swelling with respect to the concerned tooth.

Clinically, the maxillary left lateral incisor was found to be devoid of any carious involvement yet there was mild swelling and a discharging draining sinus present on the labial gingiva distal to left lateral incisor. The marginal gingiva in the palatal aspect was edematous and appeared cyanotic. It concealed a notch that appeared to extend as a groove apically onto the root surface. The overall oral hygiene status of the patient was good however a periodontal pocket of 10 mm in depth was recorded in the midpalatal aspect of root. (Figure 1) The tooth was considered nonvital after it rendered a negative response to both thermal and electric pulp testing. In addition to it, intraoral peri-apical radiograph of the tooth showed a lateral and periapical radiolucency. (Figure 2) The findings were indicative of retrograde pulpitis secondary to periodontal lesion and hence a diagnosis of pulp necrosis with chronic apical periodontitis with draining sinus was established.

A multidisciplinary approach with combination of endodontic and periodontal treatment was planned for this tooth. The preliminary endodontic phase included opening of the access cavity, establishment of working length, biomechanical preparation in a step back manner followed by application Calcium hydroxide intracanal medicament (RC Cal, Prime Dental Products, India) into the canal. After one week, groove became more evident as the swelling reduced in size. The canal was again copiously irrigated using 5.2% NaClO followed by placement of intracanal medicament for another week. On subsequent visit, obturation was completed with gutta percha (Dentsply- Maillefer, Switzerland) and Calcium hydroxide sealer Apexit plus, Ivoclar vivadent, Switzerland). The patient was asymptomatic on 6 weeks post endodontic therapy.

Extension of the groove beyond two third of the root along with the presence of probing pocket depth of 10 mm mandated a surgical intervention as second phase of therapy. On the day of surgery, a presurgical rinse with 0.12% chlorhexidine mouthwash preceded the administration of local anesthesia (2% lignocaine with 1:80,000 adrenaline). A triangular flap was raised on the labial surface of lateral incisor. Vertical releasing incision was given on the distal line angle of canine keeping esthetics as prime concern. The sinus tract was excised. On the palatal aspect, a full thickness mucoperiosteal flap was raised to expose the bony defect and PGG extending beyond two thirds of the root as shown in Figure 3 and 4. Gracey curettes number 1/2 (Hu-Friedy Manufacturing Co., Chicago, IL) were used for thorough debridement of granulation tissue which exposed a complete through and through bucco lingual bone defect. Next a No 2 round bur was used to eliminate the groove by saucerization.

Synthetic osteoconductive bone graft substitute consisting of Beta-Tricalcium phosphate (B-OstIN TP Granules, Particle size 0.355 to 500 μ m, Basic Healthcare, India) was used to fill the bone defect. (Figure 3) Finally simple interrupted sutures were placed using Silk 4-0 and periodontal dressing (CoePak) was given. The patient was briefed about necessary post-surgical instructions. Postoperative antibiotics (Amoxicillin trihydrate 500mg and metronidazole 400mg to be taken thrice daily) along with analgesic (Ibuprofen 400mg thrice daily) and antacid (Omeprazole 20mg once a day) were prescribed for 5 days. Patient was advised not to brush on the surgical site for 6 weeks. Professional oral prophylaxis was done every 15 days. Suture removal was done after 10 days and the patient was put on maintenance therapy for 6 months. Figure 4 shows the clinical picture after 3 months revealing healthy gingival architecture with reduced probing depth of 4 mm. Radiographic bone fill was evident after 6 months (Figure 4).



Fig 1: Clinical picture showing deep pockets(10mm) in tooth #22 and radiograph revealing tear drop shaped defect



Fig 2: Surgical exposure of defect and palatogingival groove



Fig 3: Elimination of groove by saucerization followed by packing of bone graft into defect



Fig 4: Successful Clinical and radiographic healing after 3 months

Discussion

PGG is a rare morphological aberrancy that usually begins at or near the tooth gingulum region extending apically from the cemento-enamel junction (CEJ) along the root surface. Interestingly, the evidence of PGG dates back to prehistoric and medieval eras between 2500 and 1000 BC. In the beginning of 19th century, Black first described a radicular groove^[12]. Half a century later, a case of radicular invagination encountered in one of the maxillary lateral incisors in a Chinese female was reported by Oehlers^[13].

However it was Lee *et al.* in 1968 who termed ‘a groove detected in the palatal aspect of incisor’ as PGG and pioneered in demonstrating its association with localized periodontitis [2].

Occurrence rates for PGG vary from study to study. In general rate of affliction was seen to be higher in lateral incisors (4.4-5.6%) in comparison to central incisors (0.28-3.4%) [3, 14]. As pioneer workers, Everett and Kramer in 1972 surveyed 625 extracted maxillary lateral incisors and demonstrated a prevalence of less than 2% [4]. In the year of 1986, Kogon *et al.* examined 3,168 extracted maxillary incisors by staining method and established a prevalence rate of 4.6%. However in contradiction to the previous mentioned studies, they noted central incisors (5.6 %) to be more affected than lateral incisors (3.4%) [3]. Few other studies by reported prevalence rates as high as 10% [15, 16]. The phenomenon of bilateralism was accounted by Iqbal *et al.* in 57.5% of cases which would advocate a genetic liaison [16]. This discrepancy in prevalence rates may perhaps be due to different diagnostic criteria or examination techniques (e.g., clinical examination vs. survey of extracted teeth) or owing to ethnic/racial disparities, [17]. Studies with larger samples representing the entire population are required to obtain more precise prevalence rates.

Table 1 gives the list of classification proposed by various authors.

As stated earlier, the clinical significance of this structural variation is that it serves as an ideal niche for plaque and microorganisms initiating focal periodontitis. It doesn't imply all grooved teeth will present with loss of clinical attachment, but its presence constitutes a risk factor of which the dentist should be mindful. An isolated endodontic or periodontal disease or combined lesion can develop resulting in diverse symptoms like acute or dull intermittent pain, mobile teeth, purulent discharge, and/or gingival swelling. Sometimes, patients can be asymptomatic even with advanced lesions.¹⁷ Clinically, one can find a funnel shaped notch or depression often obscured by accumulation of plaque and calculus, along with deep pocket, clinical attachment loss, bleeding on probing. Pulp vitality might be jeopardized due to possible communication between the pulp and groove via the accessory canals or dentinal tubules [8].

Superimposition over the pulp space can obscure the visibility

of groove in radiographs, however if seen, it can be interpreted as a parapulpal radiolucent line [4]. The bone destruction is usually seen as teardrop shaped radiolucency. One can seek the help of other imaging techniques like cone beam computed tomography to acquire more accurate diagnostic images yet it ought to be used conservatively to limit the exposure to radiation [19].

A tooth with PGG may present itself with symptoms of focal periodontitis or as a true pulpal lesion, or as a combined lesion. Though parapulpal radiolucent lines might assist in diagnosing, the key to final diagnosis is to detect a notch at or near the cingulum of the crown [20]. The list of differential diagnosis includes developmental defects like dens invaginatus, Tomes' root and other phenomenon like minute crack, vertical root fracture, etc. [17, 20].

In accordance to the classification given by Gu YC, the presented case was diagnosed as a Type II variant of palatogingival groove in the distopalatal surface of left maxillary lateral incisor. Kerezoudis *et al.* has listed out the various treatment options available in cases of relatively shallow PGG [21]. Amongst them, saucerization/odontoplasty that involves grinding the groove to the level of the crestal bone is best known to treat simple/shallow grooves [17]. A 10 mm deep isolated periodontal pocket associated with the nonvital tooth strongly suggested a combined primary periodontal and secondary endodontic pathology. Hence root canal therapy was completed prior to any periodontal intervention.

Nevertheless, overall treatment will be completed only after correction of the anatomical defect. Surgical exposure was required for additional access as groove extended upto the root apex. Many authors have demonstrated significant gain in clinical attachment by using bone replacement graft materials and membrane as compared to open flap debridement [17, 22, 23]. An alternative option of intentional replantation is available for deeper defects, wherein the tooth is extracted as atraumatically as possible, endodontically treated outside and then reimplanted again in its own site. Though literature reports a success rate ranging from 52-95% it is essential to preserve the viable periodontal ligament (PDL) cells as well as the intact cementum to avoid the risk of replacement resorption after reimplantation [24, 25].

Table 1: Classification of PGG according to various authors

| S. No | Criteria | Author & year | Classification |
|-------|--|-------------------------------|--|
| 1. | Location of groove [3] | Kogon SL 1986 | Distal Mesial Midpalatal |
| 2. | Degree of invagination towards the pulp cavity [3] | Kogon SL 1986 | Shallow/flat (< 1 mm) Deep (> 1 mm) Closed tube |
| 3. | Extent of groove [18] | Goon WW <i>et al.</i> 1991 | Mild: Gentle depressions of the coronal enamel that terminate at or immediately after crossing the CEJ Moderate: the grooves extend some distance apically along the root surface in the form of a shallow or fissured defect Complex: Deeply invaginated defects that involve the entire length of the root or that separate an accessory root from the main root trunk |
| 4 | Complexity of groove [18] | Goon WW <i>et al.</i> 1991 | Simple grooves - do not communicate with the pulp and represent only a minor infolding of the Hertwig's epithelial root sheath. Complicated grooves communicate with the pulp cavity either laterally or apically owing to their severe depth and extent on the root. |
| 5 | Degree of severity based on microcomputed tomography studies [5] | Gu YC 2011 | Type I: the groove is short (not beyond the coronal third of the root) Type II: the groove is long (beyond the coronal third of the root) but shallow, corresponding to a normal or simple root canal Type III: the groove is long (beyond the coronal third of the root) and deep, corresponding to a complex root canal system |

Conclusion

A diagnostic dilemma always exists due to the varied clinical presentation. Screening every patient for the presence of PGG is necessary and if in case it is present the patient must be periodically recalled for review. As a rule of thumb, shallow grooves carry a favorable prognosis as compared to deeper complex grooves. Many a times, misdiagnosis or delayed treatment has led to undesired extraction of the tooth yet with recent treatment modalities survival of a tooth with questionable prognosis can be successfully prolonged. Multidisciplinary approach with advanced periodontal regeneration treatment modalities can lead to complete resolution of the lesion.

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