Case Report

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Treatment of Cinguloradicular Groove Accentuated Periapical Abscess with Platelet Rich Fibrin and Bovine Bone

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ABSTRACT

Background: Cinguloradicular groove is a developmental anomaly which is a predisposing factor for periodontal and endodontic problems. Most of the times these grooves go undiagnosed and need an interdisciplinary approach of treatment. This case report describes a successful collaborative management of maxillary lateral incisor with a cinguloradicular groove using a combination of surgical endodontic and periodontal therapy.

Keywords: Cinguloradicular groove, Apicectomy, Platelet rich fibrin.

INTRODUCTION

Morphological defects in dental structure can be predisposing factors for the onset of inflammatory process in the periodontal / pulpal tissues. These defects predominantly affect the maxillary incisors. One among them is cinguloradicular groove[1].Other synonyms for such tooth anomaly are palatogingival groove[2], distolingual groove[3] and radiculolingual groove[4]. Kovacs called tooth with palatoradicular groove as syndesmocorono-radicular tooth. He brought attention to a significant feature associated with the groove; the alteration of the level of the cementoenamel junction where the groove passes from the crown to the root[5]. Palatogingival groove is a rare developmental anomaly of maxillary central and lateral incisors and is associated with periodontal pockets and bone loss, which may lead to pulpal necrosis. Its prevalence is 2.8%–8.5%[6, 7]. The etiopathogenesis of palatogingival groove has not beenfully elucidated. The palatal groove is thought to represent an infolding of the enamel organ and Hertwig's root sheath, leading to an external defect adjacent to the gingivalcrevice[8]. However, more recently, the etiopathogenesis has been related to the recent concept of alteration of genetic mechanisms[9]. The groove provides the site or pathway for bacteria to penetrate into the periodontal ligament area, resulting in a periodontal pocket along the length of the groove[10]. Necrosis of the adjacent pulp tissue can develop because of the presence of irritants in an area that is separated from pulp tissue by only a thin layer of enamel and dentin or cementum[11].

MATERIALS AND METHODS

A 19 year old female patient reported to the department of periodontics, Meghna Institute of dental sciences, Nizamabad, Telangana state with a complaint of pain in the upper right front tooth region since 3months. Periodontal examination revealed 6mm pocket associated with a deep cinguloradicular groove in relation to the maxillary right lateral incisor on its palatal surface (figure 1).

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Fig 1: 6mm periodontal pocket in relation to 12.

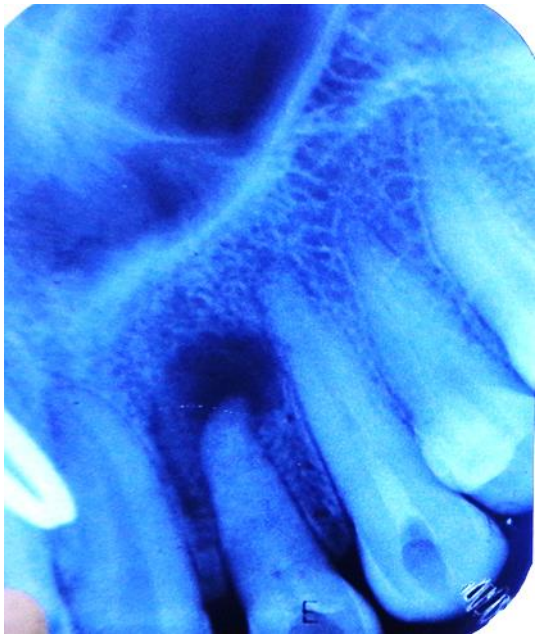

Fig 2: Pre operative radiograph.

Fig 3: After elevation of full thickness flap.

Fig 4: Saucerisation of the groove.

Fig 5: Sealing of the groove with flowable composite.

Fig 6: During composite cureing.

Fig 7: After sealing with flowable composite.

Fig 8: Bony defect.

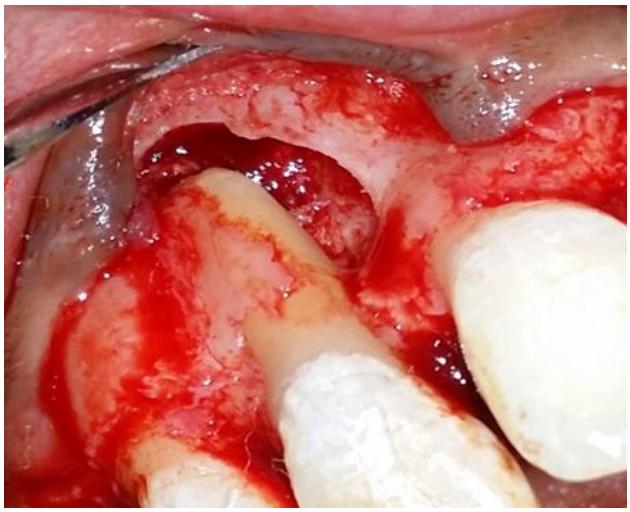

Fig 9: After thorough debridement.

Fig 10: After apicectomy.

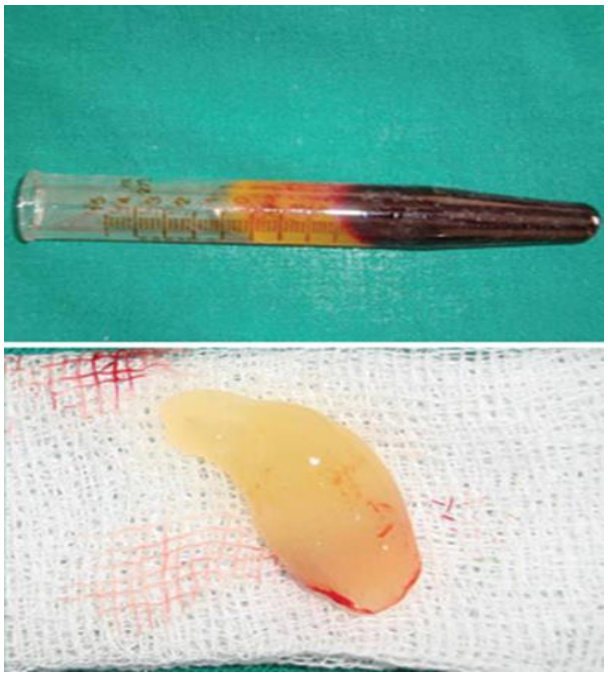

Fig 11: Preparation of platelet rich fibrin.

Fig 12: A mixture of bone graft and PRF.

Fig 13: Placement of graft and PRF into the defect site.

Fig 14: After placement of graft and PRF into the defect site.

Fig 15: After suture placement.

Fig 16: After periodontal dressing placement.

Fig 17: Post operative healing after 1 month.

Fig 18: Post operative radiograph after 1 month.

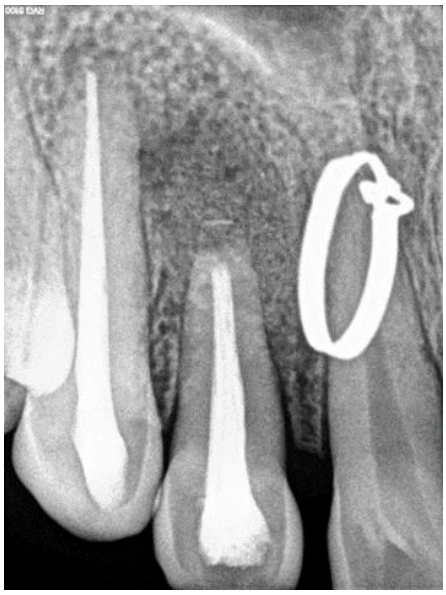

Fig 19: Post operative radiograph after 3months.

Fig 20: Post operative radiograph after 6months.

Fig 21: Periodontal probing depth after 1 month.

Fig 22: Periodontal probing depth after 3months.

Fig 23: Periodontal probing depth after 6 months.

There was neither caries nor any history of trauma in relation to the concerned tooth. Pulp of the tooth revealed a negative response to an electronic pulp tester. An intraoral periapical radiograph revealed a diffused periapical radioluscency involving the apical one third of the root in relation to 12 and also extending to involve 13 (figure 2). Since bilateral occurrence of the palatoradicular groove is possible, tooth 22 was also examined, but no evidence of a palatoradicular groove was found after sulcular probing. The resulting condition was diagnosed as chronic periapical abscess associated with localised periodontitis resulting from cinguloradicular

groove. The case was conducted in accordance with the Declaration of Helsinki (1964). An informed consent was taken from the patient before performing the treatment.

Table 1: Prevalence of cinguloradicular groove according to different studies.

Study	No. of individuals	No. of sites with groove / No. of teeth	Prevalence
Everett and Kramer	_	18/625 (LI)	2.8%
Withers et al	531	49/2099	8.5% 2.3%
Kogon et al	_	47/1382 (CI) 100/1786 (LI)	3.4%(CI) 5.6%(LI)
Bacic et al	1081 681	11/1081 5/635	1.01% 0.79%
Pecora et al	_	10/500 (CI) 11/421(LI)	2.0%(CI) 2.6%(LI)

Treatment plan comprised of thorough scaling, root planning and root canal therapy followed by periodontal surgery for the treatment of pocket elimination, groove repair and apicectomy. Access opening was done under rubber dam isolation. After extirpation of pulp, the working length was determined. Biomechanical preparation was done using K files of ISO size 50. Calcium hydroxide was placed as intracanal medicament and access cavity was temporarily sealed with cavit (zinc oxide eugenol). The patient was recalled after 7 days and obturation was done with gutta purcha cones using lateral condensation technique. The access cavity was sealed with glass ionomer cement (Fuji II, GC corporation). One week after root canal therapy, the periodontal flap surgery was done. Following local anesthesia full thickness mucoperiosteal flap was reflected on labial and palatal aspect of 13, 12, 11 and 21(figure 3). On the palatal aspect of 12 a shallow cinguloradicular groove was detected which was extending into the radicular area and a horizontal bony defect was noted. Prior to restoration of groove, it was widened by using a round bur (figure 4). This process is called Saucerisation. Acid etching was done and was restored with flowable composite (figure 5, 6, 7). On the labial aspect, flap was extended beyond mucogingival junction to view the bony defect created by abscess (figure 8). A wide defect was noted surrounding the root apex of 12. Thorough debridement was done in the defect area (figure 9). Apicectomy was done to remove 3mm of root apex and retrograde filling was done with GIC (figure 10). The wide bony defect is filled with PRF (Platelet Rich Fibrin) and bovine bone (G-Graft) (figure 11, 12, 13, 14). Flap was approximated and sutured with non resorbable suture (figure 15). Periodontal dressing was placed (figure 16). Post operative instructions were given and patient was adviced to use 0.12% chlorhexidine mouth wash for 4 weeks. The patient was recalled after 10 days for suture removal.

RESULTS

Post-operative examination revealed satisfactory healing (figure 17). Post operative healing radiographs were taken after 1month, 3months and 6months (figure 18, 19, 20). Periodontal probing depth was decreased to 3mm after 1month and 3months (figure 21, 22), 2mm after 6months (figure 23). As we have used a radiolucent retrograde filling material i.e. GIC, it was not visible in the post operative radiograph.

DISCUSSION

Several studies have been conducted in order to determine the prevalence of cinguloradicular groove (Table 1). Its prevalence is approximately 2.8%–8.5%[6, 7]. A study by JP Ennes[10] compared the morphological analysis of the root developmental groove with the palato-gingival groove and found many similarities between the two, such as the increased cementum thickness, decreased dentin thickness, pulp compartment surface alteration, irregularity of the dentin–cementum junction and of the cementum surface.

Kogon et al[12] observed extracted teeth of 1786 maxillary lateral incisors after staining with mythelene blue under microscope. He found 100 of them exhibiting palatogingival groove. Out of these 100 grooves 77 originated in cingulum, 15 in lateral fossa, 7 at cemento-enamel junction and 1 on root proceeding apically. Out of 100 grooves 13 were located on the mesial side, 25 were located on the distal side and 62 on the mid palatal surface. In the present case, the groove was located on the mid palatal surface.

In this case saucerisation was done because saucerisation involves elimination of the defect to the crestal bone level with rotary cutting instruments. It has been a helpful method in eliminating shallower grooves.[13]For sealing of cinguloradicular groove several materials are used, like Amalgam, GIC, Composite and MTA (Mineral Trioxide Aggregate). In this case flowable composite was used to restore the cingulo radicular groove.

In this case patient has given a history of pain.Pulp vitality test was done and revealed a negative response to electric pulp tester. Prior to surgical therapy, endodontic therapy was done. At the time of surgery apicectomy was done by removing 3mm of root apex because of presence of ramifications & lateral canals and retrograde filling was done to seal the apex.

PRF is a matrix of autologous fibrin, in which are embedded a large quantity of platelet and leukocyte cytokines. The intrinsic incorporation of cytokines within the fibrin mesh allows for their progressive release over time (7-10 days), as the network of fibrin disintegrates[14]. Stimulated secretion of osteoprotegrin and indirect inhibition of RANKL RANK system may be responsible for osteoblastogenesis[15]. There is a slow sustained release of growth factors over time[16]. The properties of this natural fibrin biomaterial thus ensure accelerated healing of osseous defects. It has been clearly demonstrated that fibrin matrix leads directly to angiogenesis[17]. Fibrin constitutes a natural support to immunity and reduces inflammatory process[18]. The collection of PRF is technique sensitive as success of this method depends on speed of collection. Since no anticoagulant is added to the collected blood, tendency to coagulate upon touching the walls of test tube during centrifugation are high. PRF clot (approximately 40-60% of the product) forms in the middle of the test tube between the lighter clear platelet poor plasma and the packed red blood cells[14].

Cinguloradicular groove causes not only the periodontal problems but also the endodontic problem. Most of the times it goes undiagnosed, but with careful observation and proper treatment we can solve both problems. More longitudinal studies are required to evaluate the results.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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