

CASE REPORT

TWO UNUSUAL CASES OF PALATOGINGIVAL GROOVE

Authors:

Srilakshmi Vakada¹,
Vidhya Sampath²,
Ankur Sehgal³, Mohan B.⁴,
Lakshmi Narayanan⁵

¹Reader, Department of Conservative Dentistry and Endodontics, Vasanthadada Patil Dental College and Hospital, Sangli 444 602, Maharashtra, India.

²Reader, Department of Conservative Dentistry and Endodontics, SRM Dental College, Bharathi Salai, Ramapuram, Chennai 600 089, Tamil Nadu, India.

³Reader, Department of Conservative Dentistry and Endodontics, Surendera Dental College and Research Institute, Sri Ganga Nagar 335 001, Rajasthan, India.

⁴Professor, Department of Conservative Dentistry and Endodontics, SRM Kattankulathur Dental College, SRM University, Kattankulathur 603 203, Tamil Nadu, India.

⁵Professor and Head, Department of Conservative Dentistry and Endodontics, SRM Kattankulathur Dental College, SRM University, Kattankulathur 603 203, Tamil Nadu, India.

ABSTRACT

Endo-perio lesions are common in everyday practice. Palatogingival groove is one such developmental anomaly which contributes to the pathogenesis of endodontic-periodontal lesions. This case report presents two unusual cases of Palatogingival groove. The patient in case 1 presented with a palatogingival groove in relation to left maxillary central incisor which was diagnosed radiographically as extending up to the apical third of the root. A combined endodontic- periodontal management of the tooth was done. The defect was restored with Mineral Trioxide Aggregate and the tooth was endodontically treated. The patient in case 2 presented with a similar defect which was diagnosed using spiral CT and treated by root canal therapy and intentional replantation.

Keywords

Endo-perio lesion; Intentional replantation; Mineral Trioxide Aggregate; Palatogingival groove; Spiral CT

Address for correspondence:

Dr. Srilakshmi Vakada,
Reader, Department of Conservative Dentistry and Endodontics, Vasanthadada Patil Dental College and Hospital, Sangli 444 602, Maharashtra, India.
E mail: ymr357@yahoo.com.

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Introduction

Palatogingival groove is a developmental anomaly commonly associated with maxillary incisors, the clinical significance of which is related to the incidence of localized periodontitis with or without pulpal pathosis, depending on the depth, extent and complexity of the groove.¹ Prichard was the first to state that lingual grooves on maxillary incisor teeth are a pre-disposing factor to localized severe periodontal destruction.² These anomalies are difficult to diagnose and are usually spotted accidentally in routine clinical examination. In most cases, the periodontal symptoms are thought to be due to pulpal necrosis and an endodontic management alone is done. Such an incorrect diagnosis and treatment plan pave way for extraction of the tooth.^{3,4}

The treatment of palatogingival groove depends upon the correct diagnosis and knowledge of the exact length and depth of the defect. The complex nature of the defect and its anatomic superimposition with the pulp chamber space complicates its detection using conventional radiograph alone.⁴ This has led to the introduction of an alternative imaging modality, spiral Computed Tomography (CT) to facilitate diagnosis of palatogingival groove. This article illustrates two different management approaches to the same problem of palatogingival groove.

Case Report 1

A healthy 24 year old male reported with discomfort and pain in relation to his left maxillary central incisor for the past 15 years. Patient's history revealed a habit of using bobby pins to relieve food impaction from the tooth. Clinical examination of tooth 21 (Federation Dentaire Internationale- FDI system of nomenclature) revealed a pinkish hue and loss of translucency on the labial surface. A radicular defect suggestive of palatogingival groove was seen on the palatal surface of 21 extending upwards into the gingival margin (Fig. 1A). Periodontal examination revealed localized recession with no periodontal pocket in relation to 21. The tooth exhibited grade I mobility. The tooth responded negatively to electric pulp testing. Radiographic examination (Fig. 1B) revealed an accentuated appearance of root canal in 21 which extended up to the apical third of the root, giving an insight into the extent of the groove. Mild

widening of periodontal ligament space without any periapical pathosis was evident. A radiopaque object was seen in the root canal space suggesting the presence of a foreign body.

Correlating the clinical and radiographic findings, a provisional diagnosis of palatogingival groove in left maxillary central incisor associated with pulpal necrosis was made. Open curettage of the radicular defect, use of periodontal regenerative procedures and closure of the groove with Mineral Trioxide Aggregate (MTA), followed by root canal treatment of the tooth was planned.

Surgical flap elevation in relation to 21 showed the apical extent of the radicular groove and also its continuity with the root canal space (Fig. 1C). The foreign body (a piece of corroded and fracture bobby pin) was retrieved from the canal and root canal debridement was performed. The root surface was planed with curettes and the radicular groove was sealed with MTA (Pro Root, Dentsply/Tulsa Dental, Tulsa, Oklahoma, USA) (Fig. 1D). A wet cotton pellet was packed in the canal contacting the MTA before it was temporarily sealed. The bony defect was filled with a bone allograft (Puros cortical particulate allograft, Zimmer Dental Inc., Carlsbad, CA, USA). An absorbable collagen membrane (Biomend, Zimmer Dental Inc., Carlsbad, CA, USA) was placed over the graft and the flap was repositioned and sutured with 4-0 polyglactin 910 sutures (Vicryl, Ethicon, Inc., Piscataway, NJ). The patient was maintained on a 10-day doxycycline 100mg regimen along with prescription for Ibuprofen 600mg every 4 to 6 hours for 48 hours and chlorhexidine gluconate 0.12% rinse. Sutures were removed after a week and the post surgical healing was satisfactory. During this visit, root canal treatment of the tooth was completed (Fig. 1E). The patient was reviewed after 1 month and 6 months. The tooth was asymptomatic and no mobility was present. 2 year follow-up radiograph showed a satisfactory apical seal and no sign of osseous breakdown was present (Fig. 1F).

Case Report 2

A healthy 22 year old male reported with a complaint of discoloration and mobility in his left maxillary central incisor for the past 3 years. The patient had no history of trauma and complained of

mild discomfort due to mobility of the tooth. On clinical examination, a discolored, mesially and labially inclined tooth no.21 (FDI nomenclature) was evident. The tooth exhibited grade II mobility. Soft tissue examination revealed an inflamed gingiva with a gingival swelling on the palatal aspect of left maxillary central incisor. Deep infrabony pockets were present in association with 21, while adjacent teeth were found to be periodontally healthy. A radicular groove was seen on the palatal aspect of the tooth starting from the cingulum and proceeding upwards into the gingival margin (Fig. 2A).

Radiographic examination revealed an enormous amount of bone loss associated with the tooth, but the radicular groove was not evident on the radiograph (Fig. 2B). Then the patient was subjected to spiral CT (GE Light Speed 3D-VCT, Bharat Scans, Chennai, India). The three-dimensional (3D) reconstructed images revealed a 5-6mm deep palatogingival groove, non-continuous with the root canal space and extending from the cingulum area upto the apical third of the root (Fig. 2C, 2D). Considering the questionable prognosis of the tooth, a decision of intentional replantation following root canal treatment of 21 and closure of the radicular defect with MTA was planned.

The tooth was extracted under local anesthesia. Root canal treatment was performed on the tooth while holding the crown portion with gauze. The radicular groove was sealed with MTA (Pro Root, Dentsply/Tulsa Dental, Tulsa, OK). The socket was curetted for any granulation tissue and irrigated. A bone allograft (Puros cortical particulate allograft, Zimmer Dental Inc., Carlsbad, CA, USA) was placed in the socket. The tooth was replanted in the socket and splinted with adjacent teeth using orthodontic wire and composite resin. The whole procedure was completed in 30 minutes so as to maintain the integrity of periodontal cells. A post operative radiograph was taken (Fig. 2E) immediately after the procedure. The patient was advised to take Ibuprofen 600mg 4 to 6 hour for 2 days and use chlorhexidine gluconate 0.12% rinse every time after meals for 3 days. The patient was reviewed after three days. The patient was asymptomatic without any pain or swelling. The splint was removed after three weeks. The patient was reviewed after 1 month and 6 months. At 1 year follow-up, the patient

was still asymptomatic, but grade I mobility was observed in 21. A periapical radiograph was taken at that time which showed bone loss around 21 (Fig. 2F). During the 18- month recall of the patient, it was observed that mobility had progressed to grade III stage and hence extraction of 21 was suggested to the patient. With the patient's informed consent, the tooth was extracted under local anesthesia. A fixed prosthodontic replacement of the missing 21 was recommended to the patient after complete healing of the extraction site.

Discussion

Palatogingival groove / radicular groove is a dental anomaly occurring in regions of maxillary incisors.⁵ It is described in literature as distogingival groove or radiculolingual groove. Exact etiology is not fully understood. Some clinicians believe that the groove represents the mildest form of dens invaginatus which implies that there is a minimal folding of enamel organ and Hertwig's root sheath during odontogenesis,³ whereas the other investigators claim that this results from an attempt of the body to form another root on the affected tooth.⁴

Teeth with developmental malformations like palatogingival groove tend to fail to respond to treatment when they are associated with an invagination or vertical groove.⁶ Variability in shape and size of this anomaly coupled with bacterial invasion may affect both the periodontium and the pulp. Pulp involvement may result from the introduction of bacterial toxins via channels that exist between the root canal system and the groove.⁴ Dysplastic radicular dentin and numerous clefts are often encountered along the length of the defect, while in deeply invaginated cases there may be a groove with entrapped enamel within a blind cul de sac. For these anatomic reasons, the radicular groove is an ideal plaque trap for promoting periodontal breakdown and pulp necrosis.⁷

The basis of successful treatment outcome is an accurate diagnosis of the defect which presents a clinical challenge to the operator,⁸ as in most of the cases the symptoms mimic a vertical root fracture or periodontal abscess or a combined endo-perio lesion. If a condition is purely periodontal, it can be diagnosed by probing the depth of the pocket which is usually tubular in form and localized to this area.

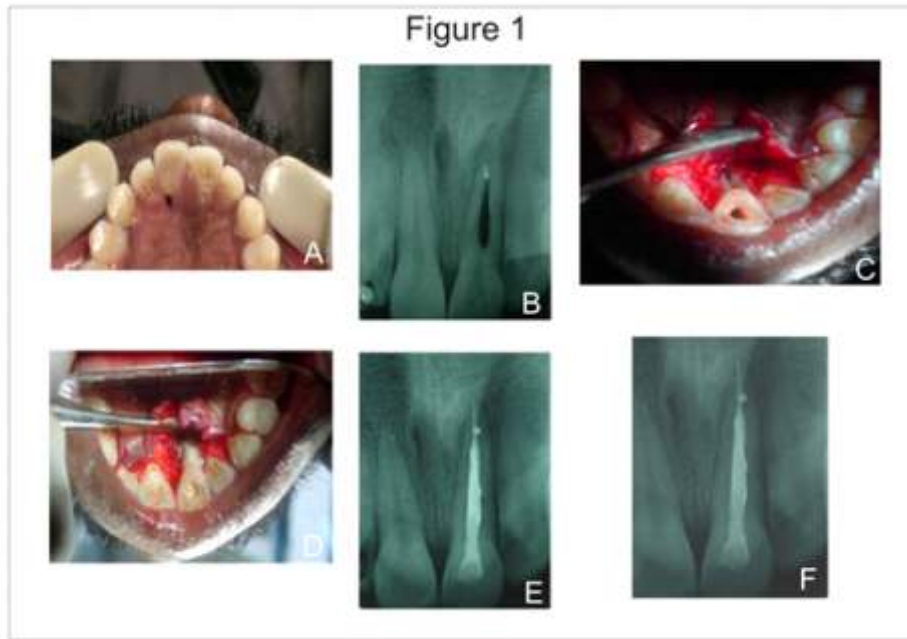


Figure 1-Images of case report1

Fig 1A- Pretreatment photograph showing radicular groove in the palatal surface of 21.

Fig 1B- Periapical radiograph of 21 showing an accentuated root canal and a radiopaque object suggestive of a foreign body.

Fig 1C- Surgical photograph showing the extent of the radicular groove upto the apical third of the root.

Fig 1D- Curettage of the radicular defect and sealing with MTA.

Fig 1E- Radiograph taken immediately after obturation of root canal in 21.

Fig 1F- 2 year follow-up radiograph showing an intact apical seal and a healthy periradicular area.

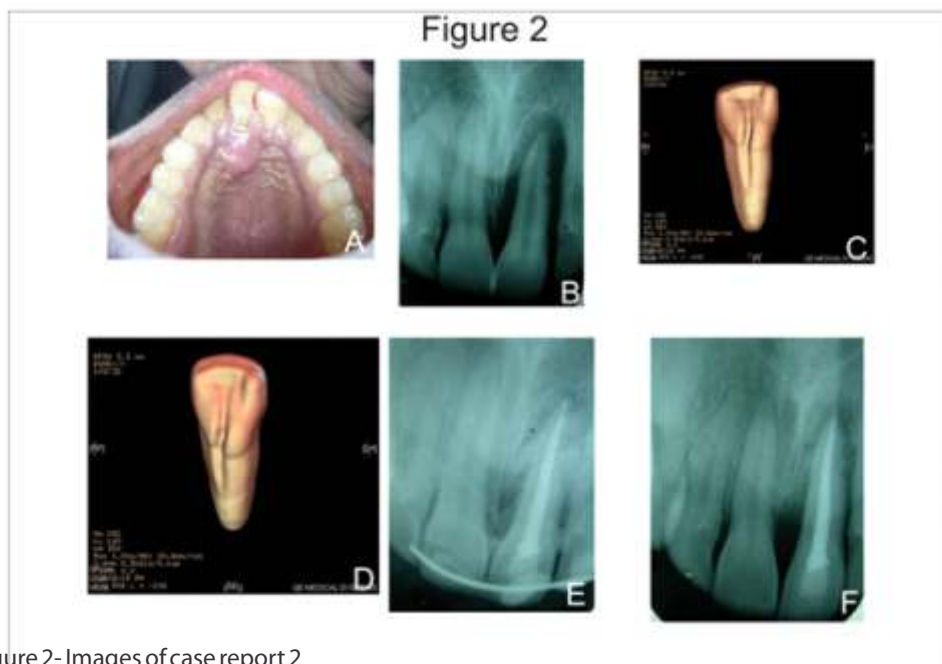


Figure 2- Images of case report 2

Fig 2A- Pretreatment image showing gingival swelling and radicular groove in the palatal aspect of 21.

Fig 2B- Pre-operative radiograph showing the osseous defect around 21. But the radicular groove is not visible.

Fig 2C- Spiral CT image of 21. Posterior view showing the extent of the radicular groove.

Fig 2D- Spiral CT image of 21. Lateral Oblique view.

Fig 2E- Radiograph taken immediately after replantation and splinting of 21.

Fig 2F- 1 year follow-up radiograph showing progressive bone loss around 21.

The tooth will respond to pulp testing procedure unless in severe cases when the pulp gets infected.⁶ On radiographic examination, a parapulpal line may be seen resembling vertical root fracture³ and in severe cases, tear drop shaped radiolucency is also seen.⁶ Radiographs taken at different angles may aid in diagnosis of this defect.¹

All these factors indicate that the conventional radiography is not the imaging modality of choice in the detection of palatogingival groove and there is a need for developing an alternative imaging modality for diagnosis of this defect. This led to the introduction of CT in diagnostic endodontology. The earlier CT systems took longer time to scan and required higher radiation dose to produce an image of appreciable clarity. But with the introduction of spiral CT, scan time and radiation exposure have been greatly reduced.

In contrast to conventional CT systems, spiral CT offers the following advantages

1. Slice thickness of 0.625 mm, much lesser than the conventional system;
2. 73 % more area coverage/second (0.175 mm/second) thus reducing the scan time significantly;
3. A very high resolution (0.35 mm microvoxels).

With this high resolution even microcracks can be visualized on tooth surfaces. The other variants of CT available are: tuned aperture computed tomography (TACT), cone beam CT (CBCT), local CT, flat panel volume detector CT (FDVCT) and micro-CT.^{9,10} From the day of its inception, radiation dose has remained the primary concern for limiting the usage of conventional CT to selected cases. With recent advancements in the field of radiology, spiral CT offers significantly less radiation exposure when compared to conventional CT. This is primarily due to the use of multiple X-ray sources and increased number of detectors/sensors which has led to a significant reduction in scan time.^{10,11} Use of spiral CT for detection of vertical root fracture has been reported in literature.^{12,13} However, its use in detection of palatogingival groove has not been reported frequently.

In the current case reports, the patient in Case 2 was

subjected to spiral CT and 2D axial slices obtained were reconstructed three dimensionally with a volume rendering software as provided by the manufacturer. The CT images revealed a deep groove extending from the cingulum to the apical third of the root. There was no direct communication between the groove and the pulp.

Over the years, various treatment modalities have been tried and the prognosis depends upon the severity of periodontal problem, accessibility of the defect and the type of groove (shallow/deep, short/long).¹⁴ In relatively shallow grooves the following treatment modalities have been proposed:

1. Placing an amalgam restoration in the groove^{3,4}
2. Gingivectomy or apically repositioned flap³
3. Radiculoplasty along with sealing the groove with glass ionomer cement^{8,15}
4. Surgical exposure and flattening of groove by grinding with high-speed diamond drill or fine stone with or without application of guided tissue regeneration¹⁴

Deep grooves present complex endo-perio problems. Combined treatment modality involving root canal therapy, elimination of groove, emdogain application and intentional replantation has been tried.¹⁶ Intentional replantation has also been tried for periodontally compromised hopeless teeth.^{17,18} A severe periodontal defect may be secondary to endodontic involvement as bacteria emanating from the infected root canal system may extend into the apical base of the fissure and progress coronally.⁴ However, such a hypothesis cannot be applied to the cases presented here as the patients neither gave a history of trauma nor had the teeth been subjected to restoration.

MTA was chosen to seal the radicular groove in both the cases considering the well documented biocompatible nature of MTA that may induce cementum formation and its ability to regenerate periradicular tissue.¹⁹ Also, its excellent sealing ability under²⁰ moist conditions was an essential requirement for the successful healing in these cases.

Intentional replantation of teeth is defined as the removal of a tooth and its almost immediate replace-

ment in its socket, after obturating the canal apically while the tooth is out of its socket.²¹ This procedure, however, should not be routine in dental practice and should only be considered as a last resort to save the tooth as there is a high probability for the occurrence of root ankylosis after replantation, with subsequent resorption of the tooth.²²

On evaluation of the clinical symptoms, radiographic features and vitality tests, it was concluded that in case 1, the patient had a deep radicular groove communicating with the root canal space and in case 2, the groove was non-continuous with the root canal but presented with extensive bone loss and was considered periodontally compromised. Hence for case 1, open curettage, closure of the defect and combined endodontic - periodontal management were performed. For case 2, intentional replantation following root canal therapy and filling of the osseous defect with bone allograft were done. After 2 years of completion of treatment, Case 1 has responded well and is asymptomatic. But the progressive bone loss in case 2 resulted in failure of treatment inspite of an attempt to save the tooth.

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