

# Management of Maxillary Central Incisor with Deep Groove by Intentional Replantation and One Year Follow Up

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## ABSTRACT

The success of root canal treatment is dependent on the morphological knowledge of the involved tooth. Maxillary central incisor is assumed as the tooth with a single root with a single canal in it. In this case report, we describe the case management of maxillary central incisor with two roots, and with presence of labial and lingual grooves between the roots. The tooth was non-vital due to perio-endo pathology and it was managed with by intentional replantation after conventional root canal treatment.

**Keywords:** Groove; incisor; intentional replantation; microsurgery.

## INTRODUCTION

Maxillary central incisor is described as a tooth with a single root with a single canal.<sup>1</sup> Variation of maxillary central incisor with more than one root and developmental groove has been described in various literature.<sup>2</sup>

Grooves communicating with an oral cavity are an ideal pathway for oral bacteria to invade periodontal tissues and thus for the occurrence of periodontal damage, causing retrograde pulpitis and/or apical periodontitis.

Here, we present management of case of maxillary central incisor with two roots and lingual groove extending from cervical to the apical third of the root by conventional root canal and intentional replantation.

## CASE REPORT

A 23-year-old female visited the Department of Endodontics with the chief complaint of sinus on the labial vestibule in relation to the upper front right teeth.

On intraoral examination, the sinus tract was present on the labial vestibule between right maxillary

central and lateral incisors (Figure 1a). The labial fissure was present at the cervical third of the crown and extending inside the gingival sulcus (Figure 1b), no deepening of gingival sulcus was noticed in relation to the labial fissure. A similar lingual deep fissure was present that extended deep below the gingival sulcus; the gingival tissue above the fissure was inflamed (Figure 1c). The 10 mm deep periodontal pocket was observed during probing the lingual gingival sulcus (Figure 1c). The tooth showed mild tenderness on percussion, non-mobile and did not respond to any vitality test. The ISO #25 gutta-percha (GP, Dentsply, Maillefer) was inserted till the full depth through sinus opening and intra-oral periapical radiograph (IOPA) was taken, the GP followed the lesion tract and ended at the apex of right maxillary central incisor which confirms the area of origin of lesion and confirms the involved tooth, too (Figure 2, 3a). The cone-beam computed tomography (CBCT) was advised to identify the morphology of root and study the size (2x2 mm) of lesion inside the bone in relation to maxillary right central incisor (Figure 3b). The presence of radiolucency is seen extending throughout the root length starting from cemento-enamel junction (CEJ) till apex of the root (Figure 3c and 3d).



**Figure 1: Surgical steps performed during surgery.**



**Figure 2: Photographs taken on one week and one month follow-up.**



**Figure 3: Radiographs for treatment planning and after completion of conventional root canal treatments.**

The conventional root canal treatment followed by intentional replantation endodontic surgery was planned and discussed with the patient. The patient agreed the treatment plan and procedure was carried out. Local anaesthesia (Articaine HCl 4% with epinephrine 100,000, Septodont, USA) was given and after access preparations two canal orifices were seen on the pulp floor under an operating microscope. The working lengths of both canals were determined with an apex locator (Root ZX; Morita, Tokyo, Japan) and confirmed by IOPA radiograph. The mesial canal was 21 mm and distal canal was 19 mm length from incisal edge. Canals were shaped with ProTaper nickel-titanium rotary instruments (Dentsply, Maillefer) till file size F4. The irrigation was carried out with a copious amount of 1.0% sodium hypochlorite solution using 27 gauge side vented needle. Calcium hydroxide (Ivoclar, Vivadent) was placed in a canal after completion of chemomechanical preparations and patient was recalled after two weeks. After two weeks, canals were obturated by modified Schilder's principle with gutta-percha and AH Plus sealer (Dentsply, Maillefer) by thermo vertical compaction method. The access was restored with composite resin material (Z250; 3M) and postoperative radiographs were taken (Figure 3e). The patient was recalled after two weeks for microsurgery.

On the day of surgery, the sinus was still present (Figure 1a). The periodontal pocket on the lingual aspect followed the lingual groove (Figure 1c). The

tooth was extracted after local anaesthesia. The over-extension of GP from the apical foramen of the lingual root (Figure 1d), shallow labial groove and deep lingual fissures were observed (Figure 1d). About 3 mm of the root ends was resected, retro-prepared under continuous irrigation with a copious amount of Hank's balance salt solution (HBSS) through a syringe. The root end was restored with white mineral trioxide aggregate (MTA, Dentsply, Maillefer). The grooves were prepared with carbide fissure bur and restored with a flowable compomer resin material (BEAUTIFUL® Flow Plus, Shofu Dental, Fig. 1e-1k). The alveolar socket was curated and a tooth was replanted inside it and splinted with adjacent central and lateral incisor using flowable compomer resin material (BEAUTIFUL® Flow Plus, Shofu Dental). On one week recall, the sinus lesion had disappeared (Figure 2a), splint was removed and a lingual periodontal pocket was still present. One and half years follow-up showed well-functioning tooth, radiograph showed new bone formation in the area of previous radiolucency, labial and lingual gingival tissue texture and appearance within normal limits (Figure 4b) and the pocket depth was reduced to 5 mm (Figure 4c and 4d).

## DISCUSSION

The presence of groove is normal anatomy on root surface but the overextended groove that communicates with the oral cavity often acts as



**Figures 4: Photographs taken on one and half year follow up.**

the pathway for bacteria from the oral cavity to root apex. The core treatment in such condition is elimination of the grooves and thorough infection control. In this case, intentional replantation was the chosen treatment modality. The maxillary central incisor is described as the tooth with a single root and single canal in it.<sup>1</sup> Recent case report describes the maxillary central incisors with more than one root and canal, but the case report has described the presence of grooves and tooth with irreversible necrotic pulpitis due to perio-endo lesion and its management by intentional re-implantation with one and half year follow-up.<sup>2</sup>

The possibility of inflammatory root resorption is associated with the tooth after replantation if the periodontal ligament is necrosed.<sup>3</sup> It is believed that the tooth with dead periodontal ligament first goes under replacement resorption and it is followed by inflammatory resorption.<sup>3</sup> The avulsed tooth can be prevented from this consequence by not allowing

the periodontal ligament membrane to get dry.<sup>3</sup> Thus, during the whole procedure, the root surface was continuously irrigated with HBSS, because, the HBSS is one of the most bio-compatible storage medium for avulsed tooth and maintains the vitality of periodontal ligament membrane cells.<sup>4</sup> The most important point to note is that extracted tooth needs to be replanted within 30 minutes to avoid the consequences arising due to periodontal ligament death.<sup>5</sup> Here, till the day of follow-up, no clinical and radiographic signs of alveolar ankylosis or resorption were observed and tooth resonated similar as of adjacent left maxillary central incisor on percussion. Which shows that careful extraction of the tooth and maintaining the vitality of the periodontal ligament membrane is a crucial factor for the success of replantation surgical procedure.

Every case going for the endodontic treatment must be probed circumferentially with periodontal probes during a diagnostic procedure to detect the radicular

groove, which could be a hint for the presence of extra root.<sup>6</sup> The deep groove can be a pathway for bacteria to lead to bone loss and periodontal pocket formation. In these cases, preparation of groove and filling it with flowable compomer resin so that bacteria microenvironment in groove gets removed and body immune system can have easy access to the new environment so that healing can take place.

Probing around circumference of CEJ and observing pulp chamber floor through dental operating microscope can maximize success of endodontic treatment.<sup>7</sup> Careful study of origin of lesion and planning for treatment will ensure the success of treatment.<sup>7</sup> CBCT is one of the best diagnostic tool to study the morphology of tooth before surgical intervention.<sup>7</sup> CBCT produces the 3D image of the tooth with surrounding structures and eliminates the overlapping of anatomic structures as in 2D radiographs.<sup>7</sup> CBCT analysis prior to endodontic treatment or endodontic microsurgery is helpful to identify the size and extent of the lesion, missed canals, variations in anatomy and adjacent vital structures and plan the treatment procedure accordingly.<sup>8,9</sup>

The bacteria inside root canal is cause for periapical lesion. But in present case, it was present on the root surface and was associated with deep lingual and labial groove. Bacteria present in the deep groove is protected from the mechanical cleaning

and after the biofilm gets established inside the groove it becomes difficult to be removed by body immune system, thus they need to be removed by surgical intervention. Here, after the fissure was mechanically prepared and restored with flowable resin compomer the lesion healed and did not appear in a one-year follow-up. The resin compomer we used for fissure sealing is a biocompatible resin material and it can binds with the cementum and dentine chemically that minimizes the possibility of microleakage from gingival sulcus and does not allow the lesion to re-establish.<sup>10</sup> With all these benefits, resin compomer can be the best choice for sealing the defects on the root surface with microsurgical intervention and similar beneficial use of resin compomer material for sealing of defect on root surface as we have presented in our case report.<sup>10</sup>

The lack of understanding variations in the anatomy of the tooth and lack of use of different diagnostic procedures can leave the irritant in developmental anomalies of a tooth which ultimately leads to the failure of the treatment procedure. This case report emphasizes the management of deep groove by replantation.

**Conflict of Interest:** None.

JNDA

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