

## Case Report

## Successful Conservative Endodontic Treatment of Fused Maxillary Incisors: A Case Report

Mesgarani A.<sup>a</sup>, Shahrami F.<sup>b</sup>, Ehsani M.<sup>a</sup>, Poorsattar Bejeh Mir A.<sup>c</sup>

<sup>a</sup> Dept. of Endodontics, School of Dentistry, Babol University of Medical Sciences, Babol, IRAN

<sup>b</sup> Dept. of Endodontics, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, IRAN

<sup>c</sup> Dentistry Student Research Committee (DSRC), Dental Materials Research Center, Babol University of Medical Sciences, Babol, IRAN

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### ABSTRACT

Fusion is a rare developmental dental anomaly and its definitive diagnosis is of great importance for successful endodontic treatment.

A twenty-five-year old female attended the Endodontic Department with the chief complaint about dysmorphic right front tooth and a history of vague pain since the previous 11 months, which had ceased during last one month. Oral cavity examination was performed, endodontic oriented sensitivity tests including cold, hot, and electric pulp tests were conducted, and periapical radiography was also ordered.

Oral cavity examination revealed an enlarged permanent right maxillary incisor with deep caries on the lingual surface. All vitality tests were negative. Examinations were normal except for one missing tooth in the total count in the upper right quadrant. Periapical radiography clarified a fused maxillary central and adjacent lateral incisor with large coronal radiolucency involving the pulp and a periapical radiolucent area suggestive of a chronic apical periodontitis. The final diagnosis was established as fused maxillary incisors with necrosis and chronic apical periodontitis. A conservative non-surgical root canal therapy was planned and careful negotiation and obturation were performed after obtaining the informed consent, followed by the esthetic reconstruction. A six month follow-up revealed that periapical radiolucency had almost disappeared, the teeth were in function, and the patient reported no complaint.

\* **Corresponding author.** Poorsattar Bejeh Mir A., Address: Babol, Ganj Afrooz Ave, School of Dentistry, Babol University of Medical Sciences, Mazandaran, IRAN Tel: 0098-0111-2294718 E-mail: arashpoorsattar@yahoo.com

### Introduction

Fusion is a rare developmental size anomaly resulting from the fusion of separate dental germs [1]. It can occur at the level of dentin and enamel or enamel alone, depending on the odontogenesis which might be partial or complete [2]. Clinically, this anomaly possesses an unaesthetic shape with excessive mesio-distal width and irregular morphology although the influenced tooth or teeth may exhibit normal shape. The fused teeth may demonstrate a single crown, incorporating the crown features of both of the teeth,

or an apparent bifid crown with a separating vertical line on the vestibular aspect of the teeth. The resultant enlarged teeth can have separate root canals with just one pulp chamber or an individual pulp chamber for each [1]. Fusion may have been addressed as double teeth, double formation, dental twinning, joined teeth or fused teeth in the literature [1]. The main reason for seeking dental care is the aesthetic concerns. However, the groove at the fusion line may be subjected to periodontal destruction [2] or caries, leading to pulp necrosis, especially when it

continues subgingivally. Wide fused root surface delays the resorption of the primary teeth [3], leading to delayed exfoliation. Importantly, the fused teeth may cause malocclusion and spacing in dental arches [4]. Based on the literature, different population and races show a 0.2% - 2.5% incidence of fusion [1]. Fusion may occur in both the deciduous and the permanent dentition, but it is more common in the former than the latter [2]. Predominantly, fusion occurs in the incisors and canines with relatively equal distribution between the two jaws yet the incidence is very rare in molars [5]. While fusions are often unilateral, bilateral fusions have also been reported with a 10% chance of occurrence [6]. The aetiology of fusion has not fully been clarified. The proposed theories have included mechanical necrotizing force with interdental soft tissue destruction or persistent lamina between early phases of tooth buds formation [1, 7]. Genetic tendencies have also been stated [8]. They may be noticed when there are irregular crowns or when the teeth count reveals a missing tooth; the dysmorphic teeth are considered as one. When fusion occurs in a normal tooth and its adjacent supernumerary, the total number of the teeth may remain normal [1]. Pulpal involvement in fused teeth is considered as a challenging issue in endodontics. This paper tries to report the successful conservative endodontic management of the fused maxillary central and adjacent lateral incisors with caries involving the pulp.

### Case report

A 25-year-old Iranian female patient was referred to the Department of Endodontics, Dentistry School, Mashhad, Iran. She complained about a malformed tooth and claimed that she had been suffering from a vague pain in the right mid- upper region, with a periodic sensitivity to cold and warm foods, since the previous 11 months. The pain had ceased a month prior to her attendance at the department. Her past medical history was not significant and there was no positive familial history of similar anomaly.

### Clinical Findings

Oral cavity examination revealed a right maxillary permanent incisor which was abnormally enlarged in

the mesiodistal diameter but normal in height, with slight discoloration on the labial surface and soft deep rampant caries on the lingual aspect down to a semi-flattened bifid cingulum. The enamel was missing on almost three quarters of the lingual surface, except for the intact 1 to 2 mm incisal and interproximal margins with exposed eburnated dentin in some areas (Figure 1). There were no other anomalies, including supernumerary or dysmorphic teeth, or other apparent hard or soft tissue lesions. The periodontium was normal and the patient had acceptable oral hygiene. The teeth count revealed a decreased tooth number. Extraoral examination findings were not significant. Further endodontic oriented examinations revealed negative sensitivity tests (cold, hot, electric pulp tests). There was no sensitivity to palpation or percussion and neither mobility nor furcation involvement was detected.



**Figure 1** Intraoral view of the fused maxillary right central and lateral incisors

### Radiographic evaluation

Periapical radiography confirmed fused right maxillary incisors with a single root, including two separate canals and a common pulp chamber. There was no pulp stone and both canals' length measured 18 mm. Root canals were not significantly curved or calcified. Periapical radiolucency suggested a chronic apical periodontitis. Furthermore, the teeth were not endodontically or aesthetically treated previously (Figure 2).

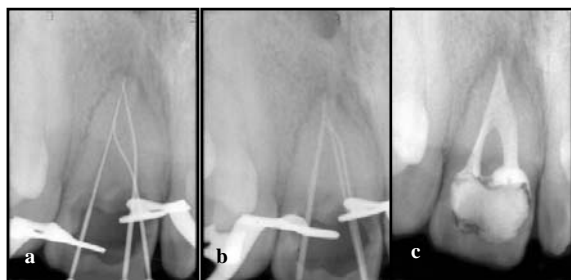


**Figure 2** Preoperative radiograph demonstrated periapical radiolucency

Based on clinical and paraclinical examinations, the patient was diagnosed with fused maxillary right incisors with necrosis. A conservative non-surgical root canal therapy was planned and informed consent was obtained.

### Endodontic Therapy

The teeth were anesthetized with supraperiosteal infiltration of lidocaine containing 1/80.000 epinephrine (Darou-pakhsh, Iran). Under rubber dam isolation, the caries were removed with a low speed angle round bur, and a single access to the pulp chamber was gained. Further examinations revealed one orifice for each tooth in the mid incisogingival diameter. The canals were negotiated using a No. 15 stainless steel K-flex file (Maillefer, Ballaigues, Switzerland). The working length was estimated using the same file (No.15) and it was confirmed with radiography. The radiography revealed a type 2, in Weine classification (Figure 3a).



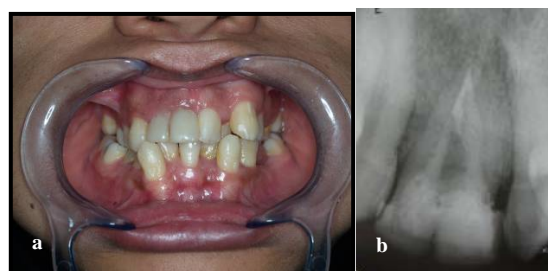
**Figure 3a** Working length determination X-ray **b** Master cone confirmation X-ray **c** Post obturation radiograph

The master apical file was No. 25 for all three canals. Further filing could cause the central incisor's inter-canal thin layer of eburnated dentin collapse and create a common path for the central incisor canals. A periapical radiography was obtained to check the master apical cone's (Figure 3b). The canals were irrigated with 2.6% sodium hypochlorite and instrumentation was done using step-back technique up to No. 45 K-flex file (Maillefer, Ballaigues, Switzerland). Gates-Gliddens No. 2 and 3 (Millefer, Ballaigues, Switzerland) were used for shaping the coronal one-third of the canals. The canals were finally flushed with normal saline and then dried with paper points. Calcium hydroxide paste (RC cal, Prime Dental products) was temporarily; put in the canals for 20 days, so that the

less accessible areas of the canals' system would be disinfected. After that, the canals were filled with gutta percha which was condensed with lateral condensation technique and sealed with AH26 sealer (Dentsply, De Trey, Konstanz, Germany) (Figure 3c). Finally, the coronal cavity was filled with the temporary filling (Cinabartar, Iran).

### Aesthetic Reconstruction and Follow-up

The patient attended the restorative and aesthetic department of the mentioned school after twenty days. The temporary filling was removed and a fiber reinforced composite (FRC) post (D.T light-post, RTD, France) was inserted into each canal. Final permanent coronal restoration with resin composite was performed and the teeth were further recontoured and reshaped to improve the appearance of the teeth. The stimulation of the normal teeth was accomplished through a shallow vertical groove on the facial aspect (Figure 4a). The patient was strictly instructed to keep oral hygiene in order to prevent periodontal disease and attend the department after three months for follow-up examinations. She missed the scheduled follow-up but she attended the department after six months. The teeth were asymptomatic and, in comparison to the initial radiography, the radiolucency had almost vanished (Figure 4b). With regard to the treated teeth, the patient did not have any complaint about pain, tenderness, or any other problems.



**Figure 4a** Intraoral view after aesthetic restoration **b** Radiographic view after 6 months follow-up

### Discussion

In this section the diagnostic and treatment modalities and dilemma of a fusion case will be discussed. Fusion and gemination may be challenging to diagnose, especially when there is a supernumerary tooth or when hypodontia exists. As it was mentioned

above, the diagnosis of fusion may be accompanied with difficulty and it may be incorrectly diagnosed for gemination, since the two are somehow similar. However, they have different etiologies [9]. In gemination, subdivision of the tooth bud is incomplete and this gives rise to two dental units. This bifid tooth is considered as a single dental unit, thus the number of teeth is normal. Gemination of the central incisor in combination with hypodontia of the lateral incisor may simply be showed up as a lateral incisor fusion; "double tooth" [1].

Many multidisciplinary endodontic approaches have been described which show how to deal with such anomalous teeth [1, 10-12]. As to the treatment of such cases, many aspects should be considered. The deciduous teeth may require no treatment while the permanent teeth do require esthetic augmentation. Generally, two approaches are decided. 1) In the case of independent pulp chambers and root canals, it is preferred to wait until the late stage of adolescence so that the pulpal recession, separating of the teeth, and aesthetic restoration of both teeth would be possible. When the affected tooth is supernumerary, it is best to remove it. 2) When the affected teeth have a common pulp chamber with independent root canals, it is better to adopt more conservative approaches. So, non-surgical root canal therapy is preferred. Then the teeth should be restored and recontoured to resemble the normal ones [9]. Teeth hemisection may be accomplished intra- or extraorally with immediate replantation, depending on the situation and the clinician's decisions [10-12]. It should be noted that both surgical and non-surgical treatment may be considered in the two cases. Another option is to extract the anomalous tooth with further orthodontic space correction. The whole process should be accomplished under expert hands familiar with these challenging developmental anomalies

It is postulated that in the case of pulpal necrosis associated with periradicular periodontitis, a two to three weeks of root canal dressing with calcium hydroxide can be of great value due to the significant pH increase which may further prevent bone resorption. Besides, it has some bactericidal properties [13]. However, it is indicated that this medication may decrease the resistance of the root to

fracture [14]. Overall, the mentioned characteristics of calcium hydroxide may rationale the 20-day delay till completion of obturation [13] and delayed final restoration to provide a chance of more reduction in periapical radiolucency and bone reformation. It should be mentioned that in the final restorative session, post space preparation required the removal of excessive gutta percha and this was the pitfall of the procedure. This deficit could clearly affect the final outcome of the endodontic therapy although it was minimal in the presented case. According to previous reports, communication between the pulp chambers of the fused or geminated teeth is a common feature, which should be broken down to facilitate a straight-line access to the root canals. They also confirmed the existence of communication between the root canal systems of the fused teeth. In the case of lack of discernible communication between the pulp chambers or root canal systems, it is recommended that separate systems be considered as one entity. It should be highlighted that the judicious use of ancillary radiographic techniques may better reveal the internal anatomical complexity of such dysmorphic teeth and may help in the avoidance of intra-operative hazardous events and long term treatment failure. It is due to the fact that locating the exact path of canals may be difficult intra-operatively. In this regard, in one of the studies, a computerized 3D model was implemented to reconstruct two double teeth with a very complex internal anatomy [15]. Moreover, a cone beam CT scan (CBCT) can be a valuable adjunct for a better visualization of the anatomy and the exact location of the teeth, especially when surgical approach is planned [16].

### Conclusion

In every patient with unusual large diameter and diagnosis of pulpal pain, the fusion should be considered. A non-surgical approach to more aggressive surgical methods should be to discussed and sought before any attempt in order to obtain best possible outcome.

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