Endodontic Management of a Fused Mandibular Third Molar with Supernumerary Tooth Using Cone-Beam Computed Tomography: A Case Report

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Patient: Male, 26-year-old
Final Diagnosis: Symptomatic irreversible pulpitis with symptomatic apical periodontitis
Symptoms: Severe spontaneous pain related to the lower right mandibular area
Medication: —
Clinical Procedure: —
Specialty: Dentistry

Objective: Congenital defects/diseases
Background: Dental fusion is a developmental dental anomaly that clinicians must be aware of and able to identify. It results from the union of 2 adjacent tooth germs affecting the normal dentition and leads to a decrease in the number of permanent teeth. Clinically, the fused teeth show excessive width and irregular anatomy and can complicate any endodontic intervention.

Case Report: A 26-year-old male patient presented to the clinic with severe pain related to the lower right mandibular area. The dental examination revealed a large tilted and irregular fused third molar with the fourth molar. The endodontic findings suggested a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis. An intraoral periapical radiograph revealed fused molars with an irregular morphology and a wide mesiodistal width. Cone beam computed tomography (CBCT) was performed after obtaining consent from the patient. The morphology of the involved tooth was obtained in sagittal, coronal, and axial CBCT slices of 0.13 mm. The pulp chamber was continuous, and the number of canals was 5 in the 3-dimensional view before initiating endodontic treatment. After we discussed the options with the patient, he decided to proceed with nonsurgical root canal treatment for the fused molar. A successful management of a fused third molar with a supernumerary tooth was performed, and a 6-month follow-up radiograph showed normal apical tissue with absence of tenderness on percussion or palpation. No clinical swelling or sinus tract swelling was observed.

Conclusions: This case report indicates that a proper treatment plan ensures predictable outcomes by the use of all available diagnostic tools.

Keywords: Case Reports • Fused Teeth

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Background

Dental fusion, a rare dental developmental anomaly, results from the union of 2 adjacent tooth germs, affecting the normal dentition and leading to a decrease in the number of permanent teeth. However, the number of teeth remains unchanged when fusion of normal teeth takes place with supernumerary teeth. Multiple cases were published for posterior and anterior and either mandibular or maxillary dentition [1-6]. Clinically, the fused teeth show an excessive width and irregular anatomy that results in malocclusion and periodontal diseases [5,7]. Complete debridement and subsequent root canal obturation might be difficult to achieve in abnormal dental fusion.

The etiology of fused teeth remains unclear, and it has been suggested that physical actions leading to tissue necrosis between tooth germs results in a fused tooth [8,9]. Additionally, trauma and genetics were suggested as possible etiologies [5,10,11].

Identification of unusual anatomical variations in the root canal system is supplemented by intraoral radiography for the clinical assessment of root shape and morphology. However, according to the position statement of the American Association of Endodontists and the American Academy of Oral and Maxillofacial Radiology, cone beam computed tomography (CBCT) must be considered the diagnostic modality of choice for any dental anomalies [12].

CBCT is a 3-dimensional (3D) imaging method that is superior to other radiographic systems for identifying multiple root canals [13]. It can facilitate the accurate view to the internal root canal system. Patel et al stated that CBCT can improve clinicians’ decision-making and management of complex anatomy [14]. In this report, we present the clinical management of a fused mandibular third molar with a supernumerary tooth, wherein abnormal anatomy was ascertained using CBCT.

Case Report

A 26-year-old male patient presented to the Department of Endodontics with severe spontaneous pain related to the lower right mandibular area. Dental history revealed that the patient had moderate pain 2 days prior, and caries removal was performed by a general dentist on #48 (lower right third molar). Intraoral examination showed a large, mesially tilted, irregular third molar fused with the fourth molar, and a temporary filling covered the occlusal and buccal surfaces (Figure 1). Further, tooth #47 had been extracted 4 years previously. In general, the patient had good oral hygiene and a non-contributory medical history.

On endodontic examination, the fused tooth showed tenderness to percussion and palpation. A cold, medium-sized cotton pellet was applied on the buccal surface of the fused molar. The tooth had a lingering pain in response to a cold stimulus. The clinical findings suggested a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis.

An intraoral periapical radiograph of the lower right mandibular area revealed a fused third molar and supernumerary tooth with an irregular morphology and a wide mesiodistal width. Radiopacity seen in the furcation area appeared to be the enamel pearl (Figure 2). In this case, the demarcation between the pulp chamber of the third molar and the supernumerary tooth was clearly visible. The patient was scheduled for a comprehensive treatment plan, including removal of the supernumerary tooth and root canal treatment of the fused molar.
tooth was difficult, as an intraoral periapical radiograph gives a 2D view with resultant superimposition of objects. In addition, the root canal configuration could not be ascertained.

CBCT (SiDEXIS XG, Sirona 3D, Germany) was performed after obtaining consent from the patient. The morphology of the involved tooth was obtained in sagittal, coronal, and axial CBCT slices of 0.13 mm. All the CBCT slices, including the 3D view, were visualized and reviewed by a specialized dental radiologist to determine the external and internal morphology of the fused molar. The pulp chamber was continuous, and the number of canals was 5 in the axial view (Figure 3) before initiating treatment.

The risks, benefits, and options of each treatment were explained to the patient, including extraction and implant or nonsurgical root canal treatment, and he decided to proceed with nonsurgical root canal treatment. After obtaining consent from the patient, local anesthesia was administered as an inferior alveolar nerve block with 2% lidocaine and 1: 100 000 epinephrine (Lignospan,
In addition, buccal infiltration was administered using 4% articaine and 1:100,000 epinephrine (Septocaine, Septodont, Louisville, Canada). Owing to the complex tooth anatomy, an access opening was done under cotton roll isolation, and rubber dam isolation was carried out after a pinpoint pulp exposure was confirmed by an apex locator. Careful exploration under a dental operating microscope using a DG 16 endodontic explorer (Hu-Friedy, USA) revealed 5 canal orifices. The internal outline of the floor formed an irregular configuration, with 2 orifices in the mesial, 2 in the middle, and 1 in the distal side. Coronal flaring was performed using an orifice opener, Sx Protaper (Dentsply, Maillefer, Ballaigues, Switzerland). Working length was measured using a small hand file (Mani, Japan) with the help of an apex locator (Root ZX; Morita, Tokyo, Japan). The canals were prepared to 30/04 using X7 EdgeEndo rotary files (Edge Endo, USA), reaching full working length under copious irrigation with 2.5% sodium hypochlorite and 17% ethylenediaminetetraacetic acid (EDTA; Meta-Biomed, Korea). After instrumentation, 17% EDTA irrigation was performed for 2 min to remove the inorganic part of the smear layer, followed by 2.5% sodium hypochlorite for 10 min to remove the organic part using a syringe and a 30-gauge needle. The total volumes of sodium hypochlorite and EDTA introduced into the canals were 30 cc and 10 cc, respectively. A radiograph was taken with the master cone size of 30.04 for all 5 canals to confirm the working length. The canals were then dried with standardized paper points (Dentsply, Maillefer, Ballaigues, Switzerland) and obturated using hydraulic-bonded condensation (BC) with a BC sealer (EndoSequence BC, Brasseler, Savannah, GA, USA) and gutta-percha (Dentsply, Maillefer, Ballaigues, Switzerland). A postoperative final radiograph was taken (Figure 4A), and the access was restored with temporary filling (Cavit, 3M ESPE Dental Products, St Paul, MN, USA).

Discussion

In this report, we present the clinical management of fused molars with supernumerary teeth. The prevalence of this anomaly is reported to be in the range of 0% to 0.2% in permanent dentations [4,15,16]; however, in primary dentition, the prevalence is higher [3]. Although it can occur in any region of the arch, the occurrence is more frequently associated with the anterior region, and unilaterally [6]. The complex root canal system for fused teeth might complicate any endodontic intervention. In addition, periapical pathosis was found to be associated with fused roots when compared with non-fused roots [17].

Access cavity preparation in a nonsurgical root canal treatment of fused teeth with an unusual anatomy can be difficult. After a careful evaluation of the radiograph, the operator can initiate the access cavity without rubber dam isolation [18]. Tooth inclination and root eminence can be seen and palpated as the access opening progresses. The use of magnification combined with the awareness of pulp chamber location assists in creating a proper access cavity. As soon as the chamber is exposed, the access preparation must be completed under rubber dam isolation.
Intraoral periapical radiographs are an essential diagnostic tool in endodontology. They can provide information about this complex anatomy; however, periapical radiographs do not consistently reveal the actual anatomy of the root canal system [19]. The interpretation of the root canal system on a 2D image is altered by superimposition and bone density. CBCT can provide a 3D view of the pulp chamber before initiating endodontic treatment and appears to overcome the limitations of the traditional intraoral periapical radiographs. Currently, different types of CBCT scanners are available on the market, with several fields of view [20]. In endodontics, the limited field of view is recommended to produce a higher resolution than a large or medium field of view. It was confirmed that CBCT provides significant additional information to the clinician, which could change the treatment plan and the initial diagnosis for complicated cases [21]. CBCT has been approved as an effective diagnostic tool for identifying unusual anatomy [22]. Matherne et al [13] showed that CBCT imaging always resulted in a greater number of teeth morphology identification, compared with other techniques.

**Conclusions**

In this report, we described the successful management of nonsurgical root canal treatment of fused third molars with supernumerary teeth that was performed using CBCT imaging. Successful treatment can be predicted when clinicians use a proper treatment plan and utilizing all available diagnostic tools.

**Declaration of Figures’ Authenticity**

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