

## Case Report

# Root canal therapy of a supernumerary tooth fused with maxillary second molar: a case report

Linrui Wu<sup>1</sup>, Bohong Shi<sup>2</sup>, Ru Zhang<sup>3</sup>, Jiarong Liu<sup>1</sup>

<sup>1</sup>Department of Stomatology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, P. R. China; <sup>2</sup>Department of Stomatology, People's Hospital of Rizhao, Rizhao, Shandong, P. R. China; <sup>3</sup>Department of Stomatology, Central Hospital of Rizhao, Rizhao, Shandong, P. R. China

Received December 7, 2017; Accepted October 9, 2018; Epub April 15, 2019; Published April 30, 2019

**Abstract:** Presented in this report is a referral case of maxillary second molar with developmental anomaly. A small crown of a supernumerary tooth fused to the second molar on its buccal side. The unusual morphology and complicated root canal system rendered diagnosis and treatment difficult. Periapical radiography and cone-beam computed tomography were employed for the evaluation, diagnosis and treatment planning in this case. Micro-ultrasound instrument and operating microscope helped us handle unusual complexities of the root canal system. The radiological examinations, in combination with other state-of-art clinical instruments clearly revealed the anatomical anomalies and successfully assisted the treatment.

**Keywords:** CBCT, fused teeth, root canal therapy

### Introduction

A fused tooth represents a developmental anomaly characterized by uncommon morphological features and a complicated root canal system [1]. Pindborg [2] defined fusion as a union between dentin and/or enamel of two or more separate developing teeth. The incidence stands somewhere between 0.1%-1% in permanent dentition and 0.5%-2.5% in primary dentition [3-5]. Fused teeth are relatively less common in the molar area than in the anterior area [6]. The developmental stage of union dictates whether the pulp chambers and root canals are merged or separated [7, 8]. Diagnosis and endodontical treatment of such cases are extremely difficult due to their atypical root anatomy and unpredictable root canal system. We successfully treated a maxillary second molar with developmental anomaly by non-surgical root canal therapy and the therapeutic process is reported as follows.

### Case report

#### *Clinical information*

A 23-year-old female presented with a chief complaint of spontaneous and radiating pain in the right maxillary posterior region, and the pain prevented her from falling asleep during

the night. The patient was referred to the Department of Endodontics, Union Hospital, Huazhong University of Science and Technology, Wuhan, China, and was diagnosed with irreversible pulpitis by the first attending dentist on the basis of immediate, excruciating and painful sensation on cold pulp test. Then, the caries was removed, the pulp chamber was opened and the tooth was mediated with antipulp by the dentist.

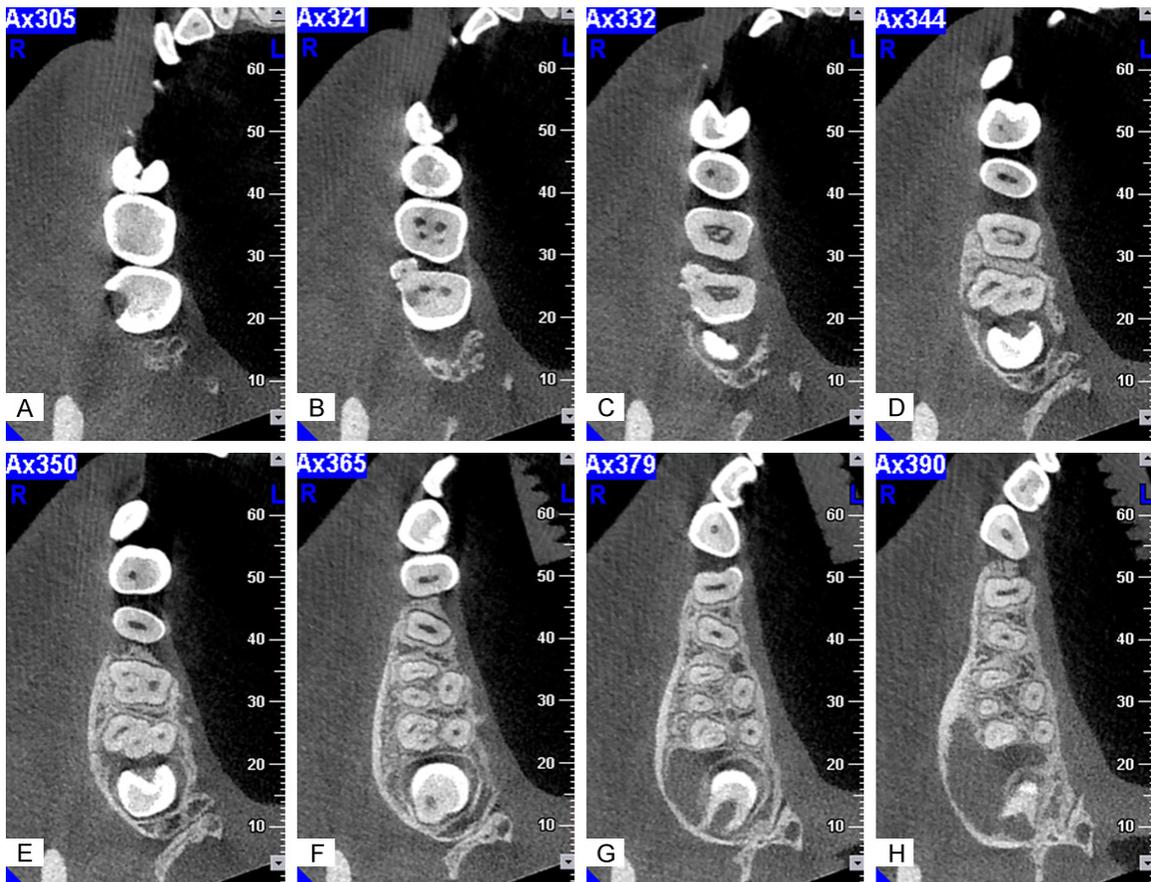
Clinical examinations revealed a temporary restoration in tooth #17 and an abnormal morphology of the crown. A supernumerary tooth was detected on the buccal aspect of the maxillary right second molar, suggesting probable fusion with an adjacent supernumerary tooth. No discomfort was perceived upon palpation, percussion or bite testing after the treatment by the first dentist. The mobility was within physiologically normal limits. Periodontal probing exhibited no periodontal pocket around the tooth.

Radiographic examination showed that periodontal ligament space was intact around teeth and there existed no periapical pathosis. The CBCT images (**Figures 1 and 2**) revealed independent pulp cavities in the coronal area of the

## A supernumerary tooth fused with maxillary second molar



**Figure 1.** Plane of coronal CBCT section of maxillary right second molar. A and B. Showed different sections on coronal plane of maxillary right second molar, and the supernumerary tooth is on the buccal aspect, the periodontal ligament space was intact around teeth and there existed no periapical pathosis.



**Figure 2.** Plane of axial CBCT sections of maxillary right second molar. A-H. Showed the sections from crown to root apex, fused maxillary second molar and conerescent supernumerary tooth can be seen. The main tooth has three canals, including mesiobuccal canal (MB), distobuccal canal (DB), and palatal canal (P). The supernumerary tooth's canal was separated from mesiobuccal canal and they join together in the apical area.

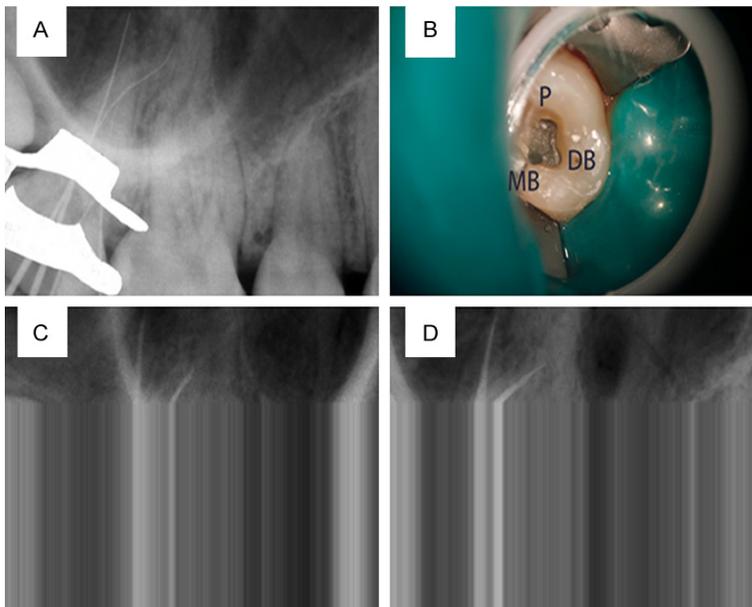
paramolar and maxillary right second molar. Nonetheless, the root of the paramolar joined

with the mesiobuccal root about 3 mm below the cement-enamel junction.

## A supernumerary tooth fused with maxillary second molar



**Figure 3.** Pre-operation images. (A) (Clinical occlusal) and (B) (buccal) showed the view of maxillary second molar and supernumerary tooth after the removal of the temporary restoration. Caries on buccal and disto-side were all removed.



**Figure 4.** Operation images. A. Measurement image: K-file (Size#10) was used into root canal, and the working length of MB, ML, D, M were 23, 21, 20.5, 16 mm, B. Image of root canal orifice under a microscope; C. The trail point film: all points were reaching the apical area. D. The postoperative radiograph after obturation: all canals were properly filled.

### Treatment plan

The treatment plan was to complete the root canal therapy. The patient was informed of imaging examination results and the diagnosis, then treatment was administered with a written informed consent obtained from her.

### Therapeutic process

The pulp chamber was exposed upon removal of the temporary restoration (**Figure 3**). The canal orifices were mesiobuccal (MB), distobuccal (DB), palatal (P), mesial (M), and mesiobuc-

cal and mesial, joining together in the apical area. After local anesthesia and placement of rubber dam, K-file Size#10 was inserted into root canal, reaching apex, with the root length measured (**Figure 4A**). The working length of MB, ML, D, M were 23, 21, 20.5, 16 mm, and the canals were dredged by pathfile (Dentsply-DeTrey, Konstanz, Germany) to the size of a No. 20 file. Then the tooth was prepared with EDTA and Protaper Next rotary system (DentsplyDeTrey, Konstanz, Germany) to the size of X<sup>2</sup> (**Figure 4B**). In the entire shaping and cleaning process, the canals were fully irrigated with 5.25% sodium hypochlorite solution. Finally, all canals were mediated with calcium hydroxide and closed with Fuji TRIAGE (GC Co., Tokyo, Japan).

The patient returned to the hospital a week after discharge and reported no symptoms. After placement of rubber dam and removal of the temporary restoration, Gutta percha points (Sure Dent, Korea) in proper size were tried to test the trial point (**Figure 4C**). Then the canals were dried thoroughly with paper points (Sure Dent, Korea) and obturated using warm vertical condensation technique (Super-Endo B&L alpha II, beta, Korea) with AH-Plus root canal sealer (DentsplyDeTrey, Konstanz, Germany). After removal of the excess gutta percha in the chamber, the crown was restored with glass ionomer cement (3M ESPE, USA). The whole therapeutic process was performed under a dental operating microscope (DOM). The postoperative radiography revealed that all canals were properly and densely filled (**Figure 4D**).

During the follow-up period, the patient did not report any signs and symptoms related to the treated region. A porcelain crown was prepared in a subsequent session.

## A supernumerary tooth fused with maxillary second molar

### Discussion

Dental fusion is defined as the merging of two or more teeth at enamel and/or dentinal level [2]. The fusion may be either complete or incomplete, depending upon the developmental stage of the teeth at the time of union [9]. Such developmental anomaly is often confused with gemination. Gemination is a rare morpho-anatomic anomaly that develops when the bud of a single tooth attempts to divide, which often causes crowding [10, 11]. Fusion occurs when two teeth buds join, while gemination results from the attempted division of one tooth bud into two [12]. In fact, gemination and fusion are anomalies with similar clinical presentations and unclear aetiology [13]. The fusion could be differentiated from germination by counting the number of teeth in the arch, with the anomalous crown being counted in. A full complement of teeth is indicative of gemination, whilst one tooth less than normal is suggestive of fusion [14]. However, this rule does not apply if a normal tooth fuses with a supernumerary tooth. In this case, all teeth erupt normally including the wisdom tooth, and clinically, a small abnormal fused crown of a supernumerary tooth makes it can be classified as either dental fusion of the second maxillary molar with a supernumerary tooth or gemination of the second molar. Considering that the CBCT images revealed independent pulp cavities in the coronal area of the paramolar, we tended to use the term "fused tooth".

Both fusion and gemination are more prevalent in primary dentition than in deciduous dentition. There is a subtle difference in the predilection site of the fused teeth among areas in dental arch [15-17]. Shapira & Kuftinec [18] identified the order of decreasing frequency as: upper central incisors, molars (especially upper molars), premolars, followed by lateral incisors and canines. The present case had an involved molar in the right upper area and reports on such scenario have been very scanty.

Those fused teeth are more vulnerable to caries and/or periodontal conditions [19, 20]. Due to their unusual shape, it is difficult to make a definite diagnosis and to give right treatment, since the conventional intraoral periapical imaging produces only a 2-dimensional image. As to this case, the first referral dentist advised the patient to take a CBCT when she found the fused tooth. The 3-dimensional images, plus its

high resolution, offered us more valuable information about the root system, which substantially facilitated the treatment [21-24].

Fused teeth were usually treated by extraction in the past. Recently, several novel treatment alternatives has being proposed in the literature, including non-surgical root canal treatment (NSRCT) or sectioning of the adjacent teeth to retain the teeth [25, 26]. Reports on fused maxillary molars or gemination in molar area are rare. Song et al. [27] reported a case who had the maxillary right molar involved, with a large extra cusp on the buccal aspect. The canal of the supernumerary tooth and distobuccal root canal of the first molar fused 2 mm below the cement-enamel junction. Root canal treatment was administered only on the supernumerary tooth, given that the maxillary first molar responded normally to stimuli. After 1 year of follow-up, he had no clinical symptoms, and the maxillary right first molar remained vital. Foran et al. [28] reported a concrescence of maxillary second and third molars that necessitated NSRCT, and a 15-month follow-up showed the prognosis was excellent. Saeed Asgary [29] reported a maxillary right second molar fused with a supernumerary tooth, which was diagnosed as chronic apical abscess, and treated with NSRCT. Radiological examination 1 year after the treatment showed healthy periodontal condition and complete bone regeneration. In this case report, we presented a case of fused right second molar with a paramolar on the buccal side. The CBCT images helped us to have a three-dimensional view of the root system and the auxiliary equipment made the treatment easier. For instance, rubber dam isolated the involved tooth from other parts and saliva, and created a clean operative field. Micro-ultrasound instrument and operating microscope helped us precisely locate the root canal.

### Conclusion

Presented in this report is a rare case of bilateral fusions of maxillary second molar fused with a paramolar. Successful endodontic treatment depends on use of advanced equipment and techniques. Three-dimensional CBCT provided us with valuable information about the root canal system and contributed substantially to the success of the endodontic therapy.

# A supernumerary tooth fused with maxillary second molar

## Acknowledgements

This work was supported by grants from the Hubei Natural Science Foundation (No 2017-CFB747, the grant holder is Jiarong Liu).

## Disclosure of conflict of interest

None.

**Address correspondence to:** Dr. Jiarong Liu, Department of Stomatology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, 1277# Jiefang Avenue, Wuhan, Hubei, P. R. China. Tel: +86-27-85726480; +86-1533726-3509; E-mail: kqyyjlr@aliyun.com

## References

- [1] Duncan WK, Helpin ML. Bilateral fusion and gemination: a literature analysis and case report. *Oral Surg Oral Med Oral Pathol* 1987; 64: 82-7.
- [2] Pindborg JJ. *Pathology of the dental hard tissues*. Philadelphia: WB Saunders; 1970; 58-64.
- [3] Aryanpour S, Bercy P, Van Nieuwenhuysen JP. Endodontic and periodontal treatments of a geminated mandibular first premolar. *Int Endod J* 2002; 35: 209-14.
- [4] Liang RZ, Wu JT, Wu YN, Smales RJ, Hu M, Yu JH, Zhang GD. Bilateral maxillary fused second and third molars: a rare occurrence. *Int J Oral Sci* 2012; 4: 231-4.
- [5] Salem Milani A. Endodontic management of a fused mandibular second molar and paramolar: a case report. *Iran Endod J* 2010; 5: 131-4.
- [6] Rajab LD, Hamdan MA. Supernumerary teeth: review of the literature and a survey of 152 cases. *Int J Paediatr Dent* 2002; 12: 244-54.
- [7] Croll TP, Rains NJ, Chen E. Fusion and gemination in one dental arch: report of case. *ASDC J Dent Child* 1981; 48: 297-9.
- [8] Brook AH, Winter GB. Double teeth. A retrospective study of 'geminated' and 'fused' teeth in children. *Br Dent J* 1970; 129: 123-30.
- [9] Ballal S, Sachdeva GS, Kandaswamy D. Endodontic management of a fused mandibular second molar and paramolar with the aid of spiral computed tomography: a case report. *J Endod* 2007; 33: 1247-51.
- [10] Gupta S, Singla S, Marwah N, Dutta S, Goel M. Synodontia between permanent maxillary lateral incisor and a supernumerary tooth: treatment perspective. *J Oral Health Comm Dent* 2007; 1: 52-5.
- [11] Cho KM, Jang JH, Park SH. Clinical management of a fused upper premolar with supernumerary tooth: a case report. *Restor Dent Endod* 2014; 39: 319-23.
- [12] Gadimli C, Sari Z. Interdisciplinary treatment of a fused lower premolar with supernumerary tooth. *Eur J Dent* 2011; 5: 349-53.
- [13] Tsesis I, Steinbock N, Rosenberg E, Kaufman AY. Endodontic treatment of developmental anomalies in posterior teeth: treatment of geminated/fused teeth-report of two cases. *Int Endod J* 2003; 36: 372-9.
- [14] Humerfelt D, Hurlen B, Humerfelt S. Hyperdontia in children below four years of age: a radiographic study. *ASDC J Dent Child* 1985; 52: 121-4.
- [15] al Shalabi RM, Omer OE, Glennon J, Jennings M, Claffey NM. Root canal anatomy of maxillary first and second permanent molars. *Int Endod J* 2000; 33: 405-14.
- [16] Rwenyonyi CM, Kutesa AM, Muwazi LM, Buwembo W. Root and canal morphology of maxillary first and second permanent molar teeth in a Ugandan population. *Int Endod J* 2007; 40: 679-83.
- [17] Neelakantan P, Subbarao C, Ahuja R, Subbarao CV, Gutmann JL. Cone-beam computed tomography study of root and canal morphology of maxillary first and second molars in an Indian population. *J Endod* 2010; 36: 1622-7.
- [18] Shapira Y, Kuflinec MM. Multiple supernumerary teeth. Report of two cases. *Am J Dent* 1989; 2: 28-30.
- [19] Nunes E, de Moraes IG, de Novaes PM, de Sousa SM. Bilateral fusion of mandibular second molars with supernumerary teeth: case report. *Braz Dent J* 2002; 13: 137-41.
- [20] Ghoddusi J, Zarei M, Jafarzadeh H. Endodontic treatment of a supernumerary tooth fused to a mandibular second molar: a case report. *J Oral Sci* 2006; 48: 39-41.
- [21] Peters OA, Laib A, Rügsegger P, Barbakow F. Three-dimensional analysis of root canal geometry by high-resolution computed tomography. *J Dent Res* 2000; 79: 1405-9.
- [22] Yin X, Cheung GS, Zhang C, Masuda YM, Kimura Y, Matsumoto K. Micro-computed tomographic comparison of nickel-titanium rotary versus traditional instruments in C-shaped root canal system. *J Endod* 2010; 36: 708-12.
- [23] Paqué F, Ganahl D, Peters OA. Effects of root canal preparation on apical geometry assessed by micro-computed tomography. *J Endod* 2009; 35: 1056-9.
- [24] Fan B, Cheung GS, Fan M, Gutmann JL, Bian Z. C-shaped canal system in mandibular second molars: part I-anatomical features. *J Endod* 2004; 30: 899-903.
- [25] Cetinbas T, Halil S, Akcam MO, Sari S, Cetiner S. Hemisection of a fused tooth. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007; 104: e120-4.

## A supernumerary tooth fused with maxillary second molar

- [26] de Siqueira VC, Braga TL, Martins MA, Raitz R, Martins MD. Dental fusion and dens evaginatus in the permanent dentition: literature review and clinical case report with conservative treatment. *J Dent Child (Chic)* 2004; 71: 69-72.
- [27] Song CK, Chang HS, Min KS. Endodontic management of supernumerary tooth fused with maxillary first molar by using cone-beam computed tomography. *J Endod* 2010; 36: 1901-4.
- [28] Foran D, Komabayashi T, Lin LM. Concrescence of permanent maxillary second and third molars: case report of non-surgical root canal treatment. *J Oral Sci* 2012; 54: 133-6.
- [29] Asgary S. Endodontic treatment of a maxillary second molar with developmental anomaly: a case report. *Iran Endod J* 2007; 2: 73-6.