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Apical microsurgery of C-shaped maxillary first molar: A case report

**KEYWORDS**

Maxillary molars;
Root morphology;
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C-shaped root configuration is most common in mandibular second molars, especially in Asian populations.¹ When it comes to maxillary molars, the prevalence of C-shaped root configuration is only 1.1% for first molars and 3.8% for second molars;² however, this low prevalence highly increases the complexity of treatment. The present article aimed to report a case of apical microsurgery on a left maxillary first molar (tooth 26) with C-shaped root configuration.

A healthy fifty-year-old male, who had non-surgical root canal treatment on his tooth 26 several years ago, had suffered from a sinus tract on buccal gingiva of the tooth for a period of time. With diagnosis of chronic apical abscess of tooth 26, root canal retreatment was performed (Fig. 1A, B). During the treatment, cone-beam computed tomography (CBCT) scan was performed due to failure to locate and negotiate distobuccal and second mesiobuccal canal. The CBCT scan showed fusion between mesiobuccal, distobuccal, and palatal root of tooth 26 at the middle third, but the palatal root separated from the fused C-shaped root at the apical third, forming a semi-lunar buccal root and an isolated palatal root (Fig. 1F, G). Additionally, an extensive apical radiolucency associated with the buccal root and a small radiolucency associated with the palatal root apex were observed. The image also revealed severe obstruction in the apical 5 mm of

distobuccal canal and transportation of the second mesiobuccal canal. Because exploration for the distobuccal and second mesiobuccal canal still failed, the root canal treatment was completed since the patient was asymptomatic (Fig. 1C). Nevertheless, a recurrent sinus tract traced to tooth 26 was present after three weeks and then apical microsurgery of tooth 26 was arranged (Fig. 1D).

The CBCT scan was surveyed again before surgery in order to clarify surrounding anatomy of the surgical area.³ Firstly, there was a safe distance from the root apices and the lesion border to maxillary sinus floor. However, the distance between the palatal root apex and the outer surface of buccal bone plate was too far to reach the palatal root apex with a conventional high speed handpiece and burs (Fig. 1E). For achieving both buccal and palatal apicoectomy by buccal approach, a low speed straight handpiece along with a long carbide fissure bur (HP Carbide Bur DS7, Edenta, Switzerland) were applied (Fig. 1H). After cyst enucleation, apicoectomy, retrograde preparation and filling for both palatal and buccal root apices, and guided bone regeneration using bone graft and membrane were performed (Fig. 1I–K). One week after surgery, the sinus tract associated with tooth 26 subsided, and the patient was free from symptoms in the follow-up period.

The prevalence of maxillary C-shaped molars is extremely low and rarely mentioned in most of researches related to the morphology of maxillary molars.^{2,4,5} The advent of CBCT favored our understandings of the root configurations and variations. By conducting a thorough pre-surgery investigation and making a proper treatment plan,³ apical microsurgery of a C-shaped maxillary molar can also be successfully accomplished. With development of the technology, more apical microsurgies of posterior teeth by means of CBCT-aided dynamic navigation or static guided surgery are anticipated in the future.

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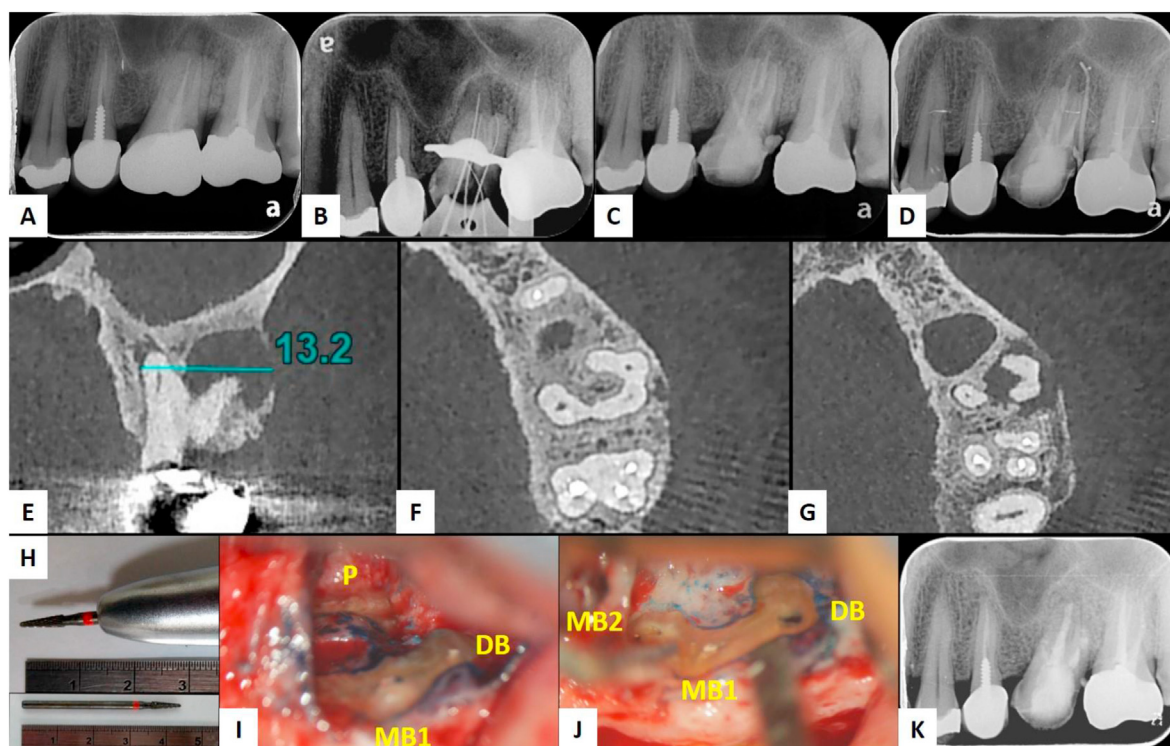


Figure 1 Clinical photographs and radiographic images of the patient. (A) Periapical film of tooth 26 before root canal retreatment. (B) Periapical film of tooth 26 during root canal retreatment. (C) Periapical film of tooth 26 after root canal obturation. (D) Periapical film of tooth 26 three weeks after root canal retreatment. The recurrent sinus tract was traced by a gutta-percha cone. (E) The estimated distance between buccal cortical plate and palatal apex of tooth 26 was 13.2 mm according to cone-beam computed tomography (CBCT) scan. The proximity of palatal apex and lesion border to maxillary sinus floor was also shown. (F) C-shaped root configuration at middle third of the root was revealed. (G) A fused semilunar buccal root and an isolated palatal root were seen at apical third of the root. (H) A long carbide fissure bur was applied for palatal apicoectomy. (I) (J) Clinical microscopic photograph of buccal and palatal root after apicoectomy of tooth 26. The semilunar buccal root including first mesiobuccal, second mesiobuccal, and distobuccal canal could be clearly seen. (K) Periapical film of tooth 26 after apical microsurgery.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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