

# Typical Maxillary Bicuspid With Atypical Canal Morphology - A Unique Case Report

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## ABSTRACT

A desirable result for an endodontic treatment is dictated by good understanding of root canal morphology. Missing out on complexities of the root canal system can hamper shaping and cleaning, hence facilitating such procedures with radiography is pivotal in achieving a hermetic seal of the canal system. This case report describes a unique situation of three separate buccal canals along with a palatal canal in the two roots of an maxillary premolar and its successful management.

**Keywords:** Maxillary Bicuspid, Root canal morphology, Irrigation, Chemomechanical.

## INTRODUCTION

A successful outcome in endodontics is dependent on correct diagnosis, adequate yet conservative access to all the canals followed by thorough disinfection and three-dimensional seal, both apically and coronally. 'What the mind doesn't know, the eyes cannot see', hence comprehensive knowledge and understanding of root canal morphology and possible anomalies are essential in dictating a favourable result of any endodontic procedure. Such variations in root and root canal morphology may be attributed to a myriad of factors such as ethnic background, gender and age of the study population, and evaluation technique.<sup>(1,2)</sup>

Maxillary premolars account for 15.8%–21.5% of all treated teeth<sup>(1)</sup>. Several previous case reports have shown many configuration possibilities of 3-canal maxillary premolars, be it in a single root, or two canals in one root,

with a single canal in the other root or three separate roots (1%–6%). Four separate canals have also been reported in a three-rooted maxillary premolar.<sup>(3,4)</sup>

However, to the best of our knowledge, no case of four separate canals in a birooted maxillary second premolar has been reported so far. This rare case report discusses the successful management of such a tooth with two roots and four canals (three in buccal root and one in palatal).

## Case report

A forty-year-old male patient reported to the Department of Oral, Dental & Craniofacial Care at Yashoda Super Speciality Hospital, Kaushambi, Ghaziabad, Uttar Pradesh, India with a chief complaint of severe pain in upper left back teeth since past two days. There was no contributory medical history and extraoral

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examination revealed no signs of swelling, tenderness, or lymphadenopathy. On intraoral clinical examination, the left maxillary second premolar was decayed and tender on percussion. The tooth was within limits of physiological mobility and periodontal probing depth was normal for all other teeth. Radiographically, a carious lesion on the occlusal aspect of maxillary second premolar involving the pulp space was noted. Palpation of the buccal and palatal aspects of the tooth did not reveal any tenderness and a diagnosis of symptomatic chronic irreversible pulpitis was made. Nonsurgical endodontic treatment was planned for the same.

Informed consent was taken and local anaesthesia with epinephrine (1:100000) was administered and access cavity was prepared using Endo access bur #2. Rubber dam isolation was not used as patient was claustrophobic and was uncomfortable with the same. On deroofting the pulp chamber more than one orifice was suspected to be present on the floor of the access cavity. On refining the access cavity with an ultrasonic tip (E4D, Woodpecker Endodontic Scaler Tips) three orifices were identified in the buccal canal and one in the palatal canal. Working length of the four separate canals (buccal, mid-buccal, mid-palatal and palatal) was determined with hand K files #10 and #15 (Mani) at 20 mm, 20 mm, 21mm and 21 mm, respectively. This was confirmed radiographically at different angles for better visualisation of the unique morphology of the root canal system. <sup>(4)</sup> (Fig 1). Chemomechanical preparation was carried out using 6% rotary files till size #20 after hand filing with K file #20 lubricated using RC-Prep (Premier Dental, Philadelphia, PA, USA). Copious irrigation was done with normal saline, 3% sodium hypochlorite was used as the final irrigant. Master cone radiograph was taken after checking for apical tug back (Fig 2) and the canals were dried with #25 paper points. Obturation was carried out using cold lateral compaction technique with #20, 6% and #20, 2% gutta percha cones and AH Plus root canal sealer (Dentsply DeTrey, Konstanz, Germany) and post obturation radiograph was taken (Fig 3).

A week later, when the patient reported as asymptomatic, a crown was planned for the same

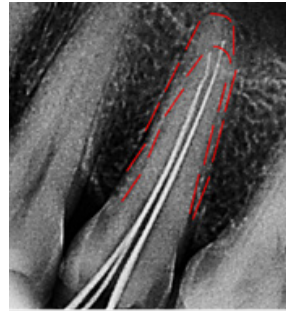


Fig. 1



Fig. 2

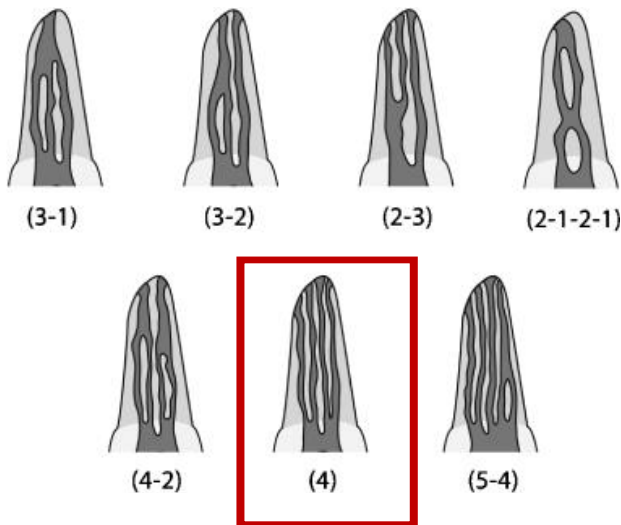


Fig. 3

tooth. The tooth was prepared, and a crown was cemented three days later. On the first month and six month follow up appointments, patient asymptomatic in relation to the concerned tooth.

## Discussion

Maxillary premolars with more than two canals have been documented in the past, however this is the first report to describe a bi-rooted premolar with three buccal canals. It is imperative that the clinician have knowledge of possibilities of variations in root canal morphology as to correctly diagnose and treat such teeth as missed canals can lead to failure of endodontic therapy. According to previous studies <sup>(5)</sup>, radiographic examination plays a key role in diagnosis and requires mesial eccentric and distal eccentric views (20 to 30-degree angulation), and the application of Clark's SLOB (Same-Lingual-Opposite-Buccal) rule to correctly identify the presence of extra roots or root canals as anomalies can occur in any part of the root. Additionally, cone beam computed tomography can be employed along with microscope guided access and disinfection to aid in better access and visibility. Many classifications of the root canal morphology have been proposed including Weine, Vertucci and Gulabivala on different populations. Gulabivala et al, proposed classification type I- VII (Fig. 4), among which type



**Fig. 4: Gulabivala's classification of root canal morphology (type I-VII)**

V has four canals that leave the pulp chamber and join to form two canals at apex<sup>(6)</sup> which describes the tooth in this case report closely.

When it comes to techniques and materials used for the chemomechanical preparation of a tooth it is essential to understand the importance of appropriate instruments, irrigation techniques and agents while maintaining canal anatomy. transportation is an undesirable deviation from the natural canal path. We used RC- Prep as a chelating agent as a previous study reported less canal transportation when compared to 17% EDTA solution<sup>(7)</sup>. RC-Prep contains 15% EDTA, 10% urea peroxide, and glycol. Perhaps this could be attributed to the presence of polyethylene glycol base in the RC-Prep that inhibited the demineralization of dentin caused by EDTA present in the paste<sup>(7)</sup>. Sodium hypochlorite has withstood the test of time in terms of disinfection of the root canal system, although the concentration of the same has been up for debate. It has been reported that effect of irrigant concentration of sodium hypochlorite (2.5% or 5%) made negligible difference to treatment outcome on periapical healing rates following root canal treatment<sup>(8)</sup>. The trend of absence making a difference to bacterial load (comparing 0.5% 50 3% or 5% NaOCl) is consistent across studies<sup>(9,10)</sup>. Hence a concentration of 3% NaOCl was employed in this case. The prognosis of a root canal treatment will be deemed favourable when there is no microleakage afterwards due to

presence of a three- dimensional seal. As lateral compaction technique gives a more controlled obturation and has low fluid permeability<sup>(11,12)</sup>, it was adopted in this case and had a satisfactory outcome.

## Conclusion

The number of root canals in the maxillary second premolars shows wide variation. This case report discusses effective management of an uncommon morphology of the maxillary second premolar with two roots and four canals. Tooth related factors (tooth type, pulpal and periapical status and tooth integrity) account for a whopping 69% of the healing outcome. The technical complexity of root canal treatment may lead to more attention being paid towards the technical aspects of the treatment (gaining access and finding canals, negotiating without blockage, enlargement without iatrogenic error, disinfecting the complex root canal network, and filling it completely without extrusion). Moreover, the importance of radiographs taken from multiple angles in to aid in endodontic diagnosis and treatment of such teeth has been highlighted. Liberal irrigation with NaOCl along with careful shaping is the mainstay of successful root canal therapy. Anatomic rarities such as the one discussed in this report need to be explored further to understand the prevalence of such morphology amongst different population groups and factors affecting their management.

## Conflict of Interest

The authors declare no conflict of interest.

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## Informed Consent

Duly signed informed consent was taken from the patient

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