

# “SMALL MOLAR” AS AN ENDODONTIC CHALLENGE

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## ABSTRACT

**Background:** This case report describes the successful endodontic treatment of the upper first premolar with three roots and three root canals. The prevalence of this morphological form in the population of Bosnia and Herzegovina is exceedingly uncommon. The primary objective of this paper is to highlight the difficulties in diagnosing and treating teeth with unusual root canal morphology.

**Case presentation:** To establish a diagnosis, the patient underwent a comprehensive clinical examination including endodontic tests and radiographic imaging. Analyzing the segmented CBCT image confirmed the presence of three roots and three root canals, as predicted. The T-shaped outline of the access cavity was achieved using an ultrasonic cone diamond tip. The obstruction in the palatal canal was successfully resolved using the step-down instrumentation technique. Following the application of calcium hydroxide medication, the canals were filled using the monocone obturation. A follow-up periapical image, one year later, revealed periapical tissue healing.

**Conclusion:** Practitioners must be aware of the possible morphological variations of root canals. CBCT imaging is recommended for precise diagnosis and treatment planning in these clinical situations.

**Keywords:** atypical root canal morphology, first upper premolar, endodontic treatment, CBCT

## Introduction

The main goal of endodontic treatment is to eliminate microorganisms as much as possible from the entirety of the root canal system through effective cleaning and shaping procedures. Achieving this goal requires practitioners' knowledge of root canal morphology. Ignoring anatomical features can lead to iatrogenic errors, such as unrecognized and untreated root canals which can increase the risk of the treatment failure [1].

The external appearance and morphology of the root canals of the first upper premolar are highly variable. According to the previous study, in the population of Bosnia and Herzegovina, Vertucci type IV, characterized by two completely separate canals in one or two roots, was the predominant form accounting for 56.5%. Following this, Vertucci type II, featuring two canals merging into one, constituted 18.5%. Only 2.2% of the first upper premolars exhibited the form, characterized by three roots and three completely separate canals [2]. Because of the third root, this particular form was often referred to in literature as the "small molar" or "ridiculous molar," owing to its resemblance to adjacent molar teeth. Management of these cases is challenging due to their infrequency and challenges in diagnosis, access, instrumentation and restoration [3].

The periapical radiograph of the tooth is the most common tool used for assessing the morphology of roots and root canals. However, it is important for the clinician to recognize the limitations of the two-dimensional image. Therefore, in certain cases, it may be necessary to perform three dimensional CBCT (Cone Beam Computed Tomography) imaging to get more detailed information and to prepare for endodontic treatment of teeth with atypical morphology [4,5].

This case report describes the nonsurgical endodontic treatment of the maxillary first premolar with three roots and three root canals.

## Case report

A 20-year-old female patient presented at the Department of Restorative Dentistry with Endodontics at the Faculty of Dentistry with Dental Clinical Center, complaining of discomfort in the right

upper jaw region. The patient's medical history was unremarkable.

The intraoral clinical examination revealed a carious lesion located disto-proximally on tooth 14. The tooth exhibited mild sensitivity to vertical percussion and did not respond to the cold test. A panoramic radiograph was obtained to evaluate the patient's overall dental condition. The radiograph revealed a large carious lesion on tooth 14, located near the pulp chamber. Additionally, it displayed an unusual shape of the roots (**Figure 1**). The subsequent periapical radiograph revealed a maxillary first premolar with three roots and a periapical radiolucency surrounding the apical portion of the palatal root (**Figure 2**). The anatomy of three distinct roots was verified by segmental CBCT imaging (**Figure 3**). Periapical radio-lucencies were detected on the palatal and mesio-buccal roots, as shown in **Figure 4**.



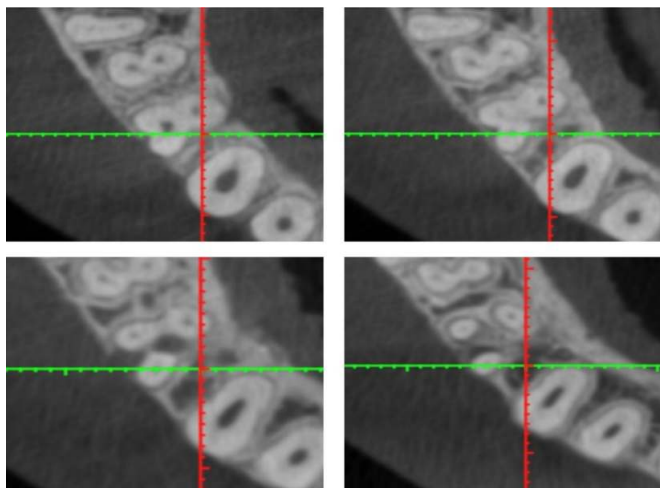
**Figure 1**

An orthopantomogram revealed a deep carious lesion on tooth 14, along with an unusual root morphology.



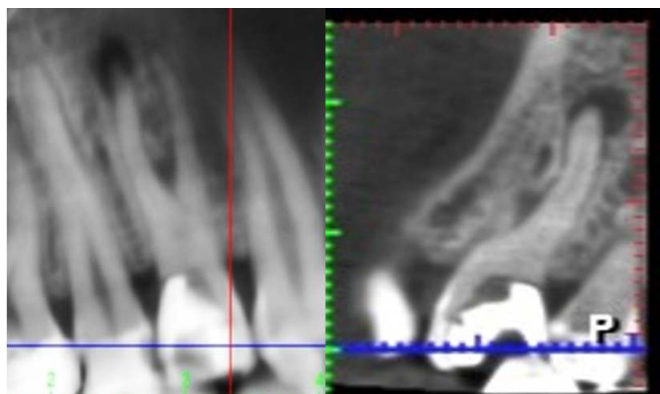
**Figure 2**

Initial periapical radiography shows a maxillary first premolar with three roots and periapical radiolucency.



**Figure 3**

In axial CBCT view, three separate roots were confirmed.



**Figure 4**

Periapical radiolucencies on mesiobuccal and palatal root- coronal CBCT view.



**Figure 5**

Postoperative periapical image -obturation control.

Pulp necrosis with asymptomatic apical periodontitis was diagnosed.

### Case management

To create optimal circumstances for performing endodontic therapy, the decayed tissue was removed and the distal wall of the crown was replaced with a composite filling.

The endodontic procedure was carried out under aseptic conditions with the use of an operating microscope (Carl Zeiss OPMI Pico, Germany). The access cavity has been modified in order to ensure straight access to the root canals. After entering the pulp chamber with a diamond round bur, the access cavity was expanded mesiodistally and palatal. An ultrasonic cone diamond tip (Satalec Acteon, France) was used to achieve T-shaped outline form [6]. Examination of the pulp chamber floor revealed three root canals orifices. The coronary parts of all three root canals were widened with an orifice opener. Subsequently, root canals were negotiated by using a small hand K file size 10 (Denco Medical Co., Shenzhen, China) with watch-winding movements. The patency and glide path were established in mesio-buccal and distobuccal root canals. However, an obstruction had to be removed from the palatal root canal. The obstacle was overcome using the step-down technique. The coronal and middle thirds of the canal were initially prepared by using Denco Pro-flexy files up to size 25/04. This allowed the pre-bent K-file size 10 to scout the apical anatomy [7]. The working length of all three root canals were established by using an electronic apex locator (Woodpecker Guilin, China). Endodontic treatment was continued using Pro-flexi rotary files (Denco Medical Co., Shenzhen, China), following in the sequence with copious irrigation with a combination of 3% NaOCl and 40% citric acid. The canals were dried with paper points and an intracanal dressing of calcium hydroxide (Calxyl, OCO-Preparate GmbH, Germany) was applied in all three root canals for two weeks. The access cavity was sealed by temporary restorative cement (Cavit-G, 3M ESPE, St. Paul, MN, USA).

Subsequently, the root canals were filled with gutta-percha and epoxy sealer (AH Plus, Dentsply Maillefer, Tulsa, OK, USA) using monocone obturation technique. The endodontic fillings were sealed with temporary restorative cement (Cavit-G,



**Figure 6**

Follow- up periapical image one year after treatment.

3M ESPE, St. Paul, MN, USA) and a postoperative radiograph was taken (**Figure 5**). The next day, the temporary filling was replaced with a composite restoration.

The complete resolution of the process in the bone was observed on follow- up periapical image one year later (**Figure 6**).

## Discussion

Failure to recognize additional root canals is a common cause of endodontic treatment failure. The process of identifying and accessing root canals in teeth with atypical canal morphology represents a challenge in endodontics. The morphology of the root canals of the first maxillary premolar shows considerable variability. Studies indicate that up to 6% of these teeth possess three canals [2, 8, 9].

Identifying the three canals in the maxillary premolar on preoperative radiographs can often be difficult. Despite the fact that preoperative periapical radiography only provides a two-dimensional image of a three-dimensional object, there are certain indicators that suggest the possible existence of a third canal or root. If there is a sudden straightening or loss of radiolucent canal in the pulp cavity, it is advisable to consider the presence of a third canal (10). Sieraski et al. [5] discovered that in straight-on radiographs of maxillary premolars, if the mesio-

distal width of the mid-root image is the same as or larger than the mesio-distal width of the crown, it is highly probable that the tooth has three roots. However, this rule cannot be applied in situations where the premolar has two roots, of which there are two canals in the buccal root.

Although periapical radiographs are commonly used in endodontics, there are certain clinical scenarios where CBCT imaging is necessary for further diagnosis. The utilization of CBCT imaging is progressively being embraced to enhance the examination of atypical canal morphology and to efficiently detect supplementary roots. In addition, the pictures provide a more precise visualization of bone tissue resorption [11]. In our particular situation, a segmented CBCT scan was conducted before performing endodontic therapy due to the suspicion of an extra root. The CBCT scan revealed the presence of three separate roots in the first upper premolar. The loss of bone structure above two roots, the palatal and mesiobuccal, was also observed.

The number one guide in determining the outline form of the access cavity is the location of the root canal orifices [12]. The access cavity, in our case, was modified from an oval to a T-shaped form to show the orifices of the buccal root canals. When there is a risk of perforation, it is important to use ultrasonic tips to create an access cavity for better visibility and precision in dentin removal (13). In the present case, the ultrasonic diamond tip was used to achieve outline form.

## Conclusion

The success of endodontic therapy relies on dentists' ability to identify the morphological variability of the tooth. Knowledge of standard tooth anatomy and possible deviations leads to good planning of further treatment and reduces the possibility of procedural error. The CBCT imaging allows for a clear analysis of the position and number of extra roots and canals, as well as the existence and size of the periapical process.

**Declaration of Interest:** Authors declare NO conflict of interest.

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