

ENDODONTIC MANAGEMENT OF MAXILLARY SECOND MOLAR WITH TWO PALATAL ROOTS: A CASE REPORT

Dr. Swapnil B. Manwar¹, Dr. Dakshata D. Sankhe², Dr. T. Manisha Choudary³,
Dr. Bharat Deosarkar⁴, Dr. Maneesha Das⁵

PG student^{1,2}, Professor & Head of Department³, Reader^{4,5}

Department of Conservative Dentistry and Endodontics, Saraswati Dhanwantari Dental College and Hospital & Post-Graduate Research Institute, Parbhani, Maharashtra, India.

ABSTRACT-

Endodontic treatment may sometimes fail because morphological features of the tooth adversely affect the treatment protocol. Variation in the number or morphology of roots is challenging and may lead to failure of the root canal treatment if not recognized. It is common for the maxillary second molar to have three roots with three or four canals, but it is rare to have four separated roots. This paper reports a case of a maxillary right second molar with two palatal roots and two palatal root canals. Cone beam computed radiograph was taken to confirm the root morphology. The root canal treatment and case management are also explained.

KEYWORDS- Cone beam computed tomography, maxillary second molar, root canal treatment, second palatal Canal, David Green explorer (DG-16)

INTRODUCTION-

Anatomic variation in the number of roots and root canals can occur in any tooth. Although such cases occur infrequently, dentists should be aware of them when considering endodontic treatment. The maxillary second molars usually have three roots with three or four root canals. Anatomical variation of this tooth has been reported by several investigators. Slowey was the first dentist to report an endodontic treatment of the second maxillary molar with two distinct palatal roots while **Baratto Filho et al.** 2002 reported two palatal roots in two of the maxillary second molars.¹

The presence of two palatal roots in the maxillary molars, particularly in the second molars, is a rare phenomenon. A double palatal root is not easy to detect clinically, as the extra root canal usually is superimposed by buccal root canals. This issue may complicate root canal treatment and increase the failure rate. A number of reports have addressed the morphological

variations of the root canal system of palatal root of the maxillary molars.²

The aim of the present report was to describe nonsurgical endodontic treatment of a maxillary second molar with two palatal canals.

CASE REPORT

A 37-year-old female with a non-contributory medical history was referred to the Department of Conservative Dentistry and Endodontics at Saraswati Dhanwantari Dental College and Hospital with a complaint of severe discomfort with her right maxillary teeth. The clinical and radiographic examinations revealed a maxillary right second molar with deep occlusal silver restoration with tenderness on percussion. The clinical findings, radiographic findings, and pulp vitality test led to a diagnosis of irreversible pulpitis with acute apical periodontitis with maxillary right second molar (Figure 1), necessitating endodontic therapy.



Fig 1- Pre-operative Radiograph

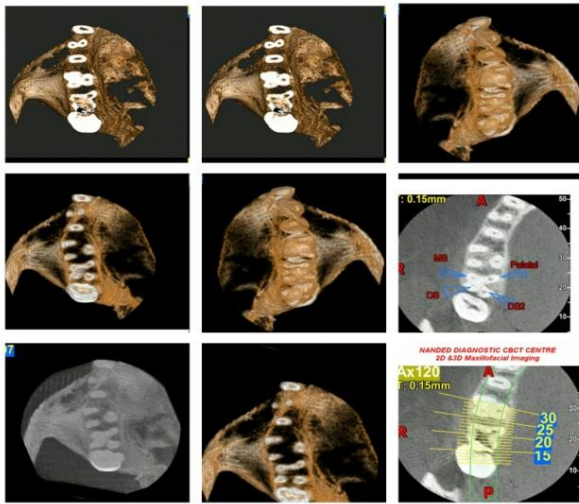


Fig 2- CBCT analysis

Radiographic evaluation of the involved tooth revealed an unusual anatomy. Cone Beamed Computed Tomography was advised to confirm the tooth anatomy (Figure 2). The tooth was anesthetized and isolated with a rubber dam. The standard access opening was prepared with Cavity Access Set (Dentsply Maillefer, Ballaigues, Switzerland). Examination of the pulp chamber confirmed the presence of four orifices: two on the buccal aspect and two on the palatal aspect. Access cavity was modified from conventional triangular to square shape in order to achieve straight line access for all canals.

The second palatal canal (Figure 3) was explored with a David Green explorer (DG-16) and its presence was confirmed with an operating microscope.



Figure 3- access opening with 17

Mesiobuccal (MB) and Distobuccal (DB) canals were located in their regular locations at the angles in the floor- wall junction, and two palatal canals, mesio-palatal (MP) and disto-palatal (DP) orifices, were located at 3 mm distance between them

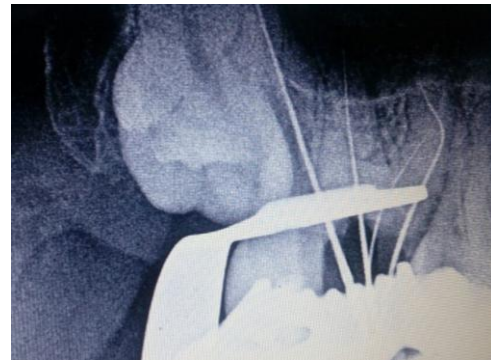


Figure 4- Working Length radiograph of 17

[Figure 4]. The pulp tissue was extirpated and the working length of each canal was determined using the apex locator (J. Morita Dentaport ZX, Japan) and confirmed with a periradicular radiograph. Coronal enlargement was done with Gates Glidden drills to improve the straight-line access. Canals were instrumented to the master files size 30 K (Mani, Inc., Japan) with copious irrigation with sodium hypochlorite 5.25% (LOJIC CHEM, Saudi Arabia) and normal saline (0.9% W/V sodium chloride-PSI, Saudi Arabia) alternatively. Canals were dried with paper points (Sure Dent, Korea) then dressed with a nonsetting calcium hydroxide (USP, Pulpodent, USA). The access cavity was temporized with intermediate restorative material (PLASTOR, GHIMAS, Italy). At the second visit after one week, all four root canals were biomechanically prepared using

crown-down technique with ProTaper NiTi rotary instruments (Dentsply Maillefer, Ballaigues, Switzerland). The canals were irrigated with 2.5% sodium hypochlorite and 17% EDTAC alternatively between each file during instrumentation. The root canals were then obturated by cold lateral condensation technique with gutta-percha cones and AH-Plus sealer (Dentsply De Trey GmbH, Konstanz, Germany)



Figure 5- Post-operative radiograph of 17

(Figure 5). The tooth was restored with dual cure composite resin (LuxaCore Z, DMG, Germany). The patient was then referred to the prosthodontic department for crowning.

DISCUSSION-

Root canal morphological variations of human teeth must be always considered before beginning the treatment. Maxillary second molars have the most complicated root canal system in permanent dentition.³⁻⁵ Number of roots and canals of the maxillary second molar can occur unilaterally or bilaterally.⁶⁻⁸

This report presents a variation of the maxillary second molar which dental practitioners do not frequently consider in practice. **Peikoff et al.** reported six variations of a second maxillary molar in a retrospective study as Three distinct roots and canals (56%), three separate roots and four canals (two mesiobuccal canals) (22.7%), three roots and canals uniting mesiobuccal and mesiobuccal canals (9%), two separate roots and canals (6.9%), a single root with one canal (3.1%), and four roots or canals including two palatal canals (1.4 %).⁹ Palatal orifices in our report were located wider than that of the buccal orifices. This

anatomic feature appears to be like the clinical photograph in the previous studies.¹⁰⁻¹²

The unusual anatomy of the maxillary second molar is difficult to diagnose because of its posterior location. The superposition of the anatomical structures on the radiographs of this region may fail to diagnose a second palatal root canal.¹³ Studies have shown that only three dimensional radiographs could grant accurate information about the location of both palatal canals either within one common root or in two of the separate roots.¹⁴

Successful endodontic treatment is based on the clinical trial of diagnosis, chemo-mechanical preparation (includes cleaning and shaping and disinfection of the root canals), and obturation. The clinician should be aware of the possible root canal morphology and canal space anatomy. Any variation or deviation from the normal canal anatomy may limit the success rate of root canal treatment. Proper design and preparation of access cavity is of utmost importance to visualize and inspect the entire pulp chamber floor.¹⁵ In the present case initial access cavity was triangular in shape, later was modified from conventional triangular to square shape in order to achieve straight line access for all canals. As recommended by **Holderrieth S et al.** careful examination with operating microscope and DG-16 enabled the location of two palatal canals.¹⁴ All the recommended guidelines according to **Ahmed HMA et al.**¹⁶ for treating and filling such complex canals including unobstructed access cavities, pre-curvature of all files used, careful progression through each file size, thorough irrigation with flexible needles, and filling of the canals using suitable-sized flexible spreaders were strictly followed to avoid procedural complications and mishaps.

According to **Christie et al.** molars with 2 palatal roots usually have a wide mesiodistal dimension on the palatal side; therefore, the access cavity outline for these teeth will be rectangular, square or trapezoidal rather than triangular.¹⁶ According to **Ahmed HMA et al.** prior to commencing the mechanical instrumentation of

accessory roots/root canals, it is mandatory to identify and evaluate the morphological features including the thickness of the root dentine and any canal curvatures as this will assist in selecting the most appropriate instrumentation technique. Some accessory roots in maxillary molars are quite small and exhibit thin dentine walls. Hence, careful attention is required in order to avoid over-enlarging the canals as this may lead to a lateral (strip) perforation. The same principles are required if warm root filling compaction techniques are to be used as these require more dentine to be removed for proper accommodation of the heat carriers, delivery needles and pluggers. According to **Kannan SK et al.** four-rooted maxillary molars may exist with dilacerated roots. Furthermore, detailed exploration of pulpal floor under proper magnification and illumination increases the possibility of detecting and treating the entire pulp system in teeth with aberrant morphology.¹⁵ Owing to the challenges in interpreting the morphologic variations on radiographs, the use of operating microscope, visualization techniques, cone beam or spiral computed tomography scan are recommended.¹⁴

CONCLUSION-

Knowledge of possible variations in internal anatomy of human teeth is important for the successful outcome of endodontic treatment. Proper diagnosis and a careful clinical and radiographic inspection are required for endodontic success in teeth with a number of canals above that are normally found. Applying the principles of access cavity preparation and use of magnifying tools, 3 dimensional radiographs like CBCT, etc are very important to recognize and detect any aberration in the morphology of the tooth to be treated. The possibility of two palatal canals should be scrutinized in second maxillary molars.

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ADDRESS OF CORRESPONDENCE

Dr. Dakshata D. Sankhe, PG Student, Department of Conservative Dentistry and Endodontics, SD Dental College & Hospital, Parbhani.

EMAIL ID- dr.dollysankhe@gmail.com