

## Endodontic Management of Mandibular Second Molar with Four Roots and Four Root Canals—A Case Report

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### ABSTRACT

In depth knowledge of the internal and external root anatomy is important for successful endodontic treatment. Failure to detect the presence of anatomic variations like extra roots or root canals may lead to inadequate preparation and disinfection of the root canal and ultimately result in treatment failure. Thorough clinical and radiographic evaluation, often with radiographs taken at different angles, is essential for a good endodontic practice. The most typical anatomy of a mandibular second molar usually presents as two roots and three or four root canals. Different variations are reported in literature like single root with a single root canal and radix ento and para-molaris. This case report describes the endodontic management of a mandibular second molar with four roots- two mesial roots and two distal roots, each root having an independent root canal.

**Keywords:** NIL

### INTRODUCTION

The aim of endodontic treatment is thorough chemo mechanical preparation and dense filling of the root canal system with a fluid tight seal. Proper assessment of the internal and external root anatomy is important for success of endodontic treatment. Failure to detect extra roots or canals may result in inadequate shaping and cleaning of the root canal and there by lead to treatment failure. A mandibular second molar typically presents as two roots and three or four root canals<sup>1</sup>. Variations like single root with a single root canal<sup>2</sup>, radix ento and para-molaris, and C-shaped configurations have been reported.<sup>3</sup> The aim of this article is to report the successful endodontic management of a mandibular second molar with four roots- two mesial and two distal roots, each having an independent root canal.

### Case report

A 36 year old female patient reported to the Department of Conservative Dentistry & Endodontics with chief complaint of pain in lower left back tooth since two weeks. The patient had intermittent pain for three months and had undergone initial stage of root canal treatment from another clinic 10 days back. Medical history was noncontributory. Clinical examination revealed dislodged temporary filling in the access cavity of **37**. Radiographic examination (figure 1) revealed dislodged coronal filling and the presence of two mesial roots and two distal roots with apparently normal periapical tissues. The tooth was anaesthetized using 1.8 ml 2% lignocaine containing 1:200,000 adrenaline and isolated with rubber dam. On exploring the access cavity two mesial canals and one distal canal were located. On further exploration under microscope (Seiler), the second distal canal was identified.



Figure 1: Pre operative x ray

The access cavity revealed 4 canal orifices two mesial and two distal (figure 2).



Figure 2

Working length was determined using apex locator. Radiographs taken at different angulations with one file placed in each of the canal revealed the presence of four separate canals with four distinct apical terminations. Shaping and cleaning was performed using a crown down preparation with pro taper files (Dentsply Maillefer) up to F2. During instrumentation thorough irrigation was done using 5% sodium

hypochlorite. The canals were dried using absorbent paper points. Lentulo spirals were used for application of calcium hydroxide as intracanal medicament. The access cavity was sealed with temporarily using Cavit (3M ESPE)

Patient was recalled after one week and the tooth was asymptomatic. Master cone radiographs were taken at different angulations (Figure 3).



Figure 3: Master cone radiograph

The tooth was obturated using gutta percha (Dentsply) and AH plus sealer and post endodontic restoration was done with amalgam (Figure 4).



Figure 4: post operative radiograph

## Discussion

Many anatomical variations of mandibular molars have been documented in literature. The most typical anatomy of a mandibular second molar usually presents as two roots and three or four root canals<sup>1</sup>. Etiology is thought to be develop during morpho-differentiation as a result of a developmental aberration of both ectoderm and mesoderm and extension of cells from the Hertwig's epithelial root sheath towards the centre dividing the original single collar into several collars<sup>16</sup>

In a study conducted by Manning *et al* in 149 teeth, 22% had single roots, 76% had two roots and 2 % had three roots<sup>4, 6</sup>. Maggiore *et al.* reported that the roots of mandibular second molar can vary from one to three roots<sup>7</sup>. A study conducted in indian population by Prasanna Neelakantan *et al* revealed that most of the mandibular second molars had two separate roots (87.8%) with three canals. Costa Rocha *et al* concluded that out of 628 extracted mandibular first and second molars 84.1% had two separate roots, 15.9% had fused roots and 1.5% had three roots<sup>5</sup>. Gulabivala *et al.*, reported out of 60 mandibular second molar 10% had single C-shaped roots whilst the rest had two roots.<sup>8</sup>

The incidence of 4-rooted mandibular second molar was 0.55%<sup>7, 8</sup>. Purra<sup>5</sup> *et al.*, reported in mandibular

second molar with four roots(three mesial roots and one distal root) though it was four rooted three out of four were mesial roots and one distal<sup>5</sup>. Martin<sup>9</sup> *et al* reported two mesial roots, a disto-buccal root and a smaller conical radix entomolaris. Peiris<sup>6</sup> also reported an ex vivo case in mandibular second molar with two mesial and two distal independent roots. Subhashini<sup>10</sup> *et al* reported four rooted mandibular second molar (two mesial and two distal) with the aid of CBCT scan.

Careful clinical and pre radiographic inspection is important for a successful endodontic treatment. Presence of an extra cusp and analysis of the cervical morphology of the roots by periodontal probing can facilitate identification of an additional root<sup>11</sup>. Various instruments like endodontic explorer, path finder, DG 16 probe and micro-opener are invaluable tools in detecting missed canal orifices. Champagne bubble test using sodium hypochlorite in pulp chamber also helps to visualize extra canal. The laws of orifice location<sup>14</sup> aid in the location of extra orifices. A modification of the classical triangular access cavity to a trapezoidal form also helps to locate extra canals.

Visual aids such as a loupe, intra-oral camera or dental microscope can, be beneficial. An additional exposure from different horizontal projections, 20 degrees from the mesial and 20 degrees from the

distal gives all the basic information regarding the anatomy of the tooth. Cone-beam computed tomography is a revolutionary technology to aid in diagnosis of complex root canal anatomy.

## Conclusion

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