



# Aberrant Pathway from Frustration to Fascination: Mandibular Second Premolar with Three Root Canals: A Case Report

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Human mandibular premolars gained popularity as they have complex root and root canal morphology. Multiple roots and canals are more common in mandibular first premolars when compared to mandibular second premolars. The occurrence of three root canals and separate foramina in mandibular second premolars is not common. In this case report, endodontic management of a three-rooted mandibular second premolar is discussed.

**KEYWORDS:** Mandibular second premolar, Root canal, Endodontic management

## INTRODUCTION

Complicated root canal morphology is a challenge in all phases of endodontic treatment and it should be handled with more care otherwise it will lead to poor prognosis. Complete knowledge of morphology and anatomy of root canal is necessary for a successful endodontic treatment.<sup>1</sup> Improper instrumentation and cleaning of root canal can result in endodontic failure.<sup>2</sup> Many times extra root canals are missed out specifically in teeth which have more anatomical variation. Mandibular premolar has more failure and flares up because of its variation in canal anatomy.<sup>3</sup>

Mandibular premolars have vast variation in their pulpal space. In a study done by Baisden MK et al. (1992) reported that 76% and 24% premolars have Type I canals and Type IV canal respectively.<sup>4</sup> Cleghorn BM et al. (2007)<sup>5</sup> found that majority of mandibular second premolars had one root (99.6%), 0.3% of them had two roots, and only 0.1% had three roots. About 5.3% of mandibular premolars have two root canal with two foramen and 44% with two canals & one foramen and very few (0.4-5%) have three root canal and three foramen.<sup>6</sup> The purpose of present study is to report and describe the clinical findings and proper endodontic care of mandibular second premolar with unusual findings of three root canals.

## CASE REPORT

A 26 year old male patient with a non-contributory medical history reported to the department of Conservative Dentistry and Endodontics at

Rajasthan Dental College and Hospital, with a complain of pain in left lower posterior region and pain aggravating with hot intake since 5 days.

Clinical examination revealed a proximal carious left mandibular second premolar and first molar. The teeth 35 and 36 were tender on percussion and painful on palpation. Radiographic examination showed proximal radiolucency approaching to pulp and apical periodontium showed widening. A diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made for teeth 35 & 36 and root canal treatment was planned (Figure 1).

Radiograph of 35 depicted complex root canal anatomy. More than two root canals were suspected because of sudden change in radiographic density of the root canal space at the middle of root.

After the administration on local anaesthetic containing 2% lignocaine with 1:80000 epinephrine (Lignox A, Warren, Indoco), the tooth was isolated with rubber dam. Access opening was done with round diamond bur and pulp chamber was approached. Sharp DG 16 explorer was used for locating the canal orifice.

In tooth number, 35 two main canal orifices, Mesio Buccal and distobuccal were found. After visualization under magnifying loupe (Seiler loupes) the presence of a third lingual canal was detected. Canal patency was achieved and a #8

C+ file (Dentsply) was precurved and inspected in a mesiobuccal, distobuccal and lingual direction to reach trifurcation into second and third root. Apex locator was used for establishing working length and it was confirmed by radiograph. Root canal patency was confirmed by radiograph as single canal trifurcating in the middle one third and coinciding with the separation of the three roots (Figure 2).

Crown down techniques was used for cleaning and shaping of all canals under vigorous irrigation with 5.25% sodium hypochlorite & 17% EDTA with K files and rotary protaper files (Dentsply). Calcium hydroxide was used as intracanal medicaments for one week and access opening was filled with inter-medicate restorative material (IRM). After 1 week the symptoms had subsided. Dressing of calcium hydroxide was removed, 5.25% sodium hypochlorite, normal saline and 17% EDTA was used for irrigation. After final rinse with saline canal was dried using paper points and Mastercone x-ray was taken to check canal patency (Figure 3). Protaper gutta percha points were used for obturation and AH26 sealer (Dentsply, De Trey, Konstanz, Germany) with single cone technique up to the trifurcation level (Figure 4).

Backfilling was done using warm vertical condensation technique. For evaluating the quality of obturation, post obturation radiograph was taken. Access opening was filled with composite and a radiograph was taken after post obturation to check the coronal sealing. The patient was made ensure for recall visit after a week for clinical and radiographical examination (Figure 5). The patient reported after a week and after clinical and radiographical evaluation, he was found asymptomatic.

## DISCUSSION

Mandibular second premolars with two root canals have been reported many times. The occurrence of three separate root canals is very rare in proportion. Vary rare occurrence (0.4%) of mandibular second with 3 root canals was reported.<sup>7</sup> Vertucci FJ (1984) reported two separate & distinct canals in 2.5% of mandibular second premolars but no case of 3 root canals was reported by him and its incidence is very rare (0.1%).<sup>8</sup>

It was reported in various studies that approximately 98% of mandibular premolars have single root.<sup>8-10</sup> Three roots were found in 0.2% of the teeth while four roots were very rare and were reported in 0.1% of teeth studied. It was observed that there may be racial differences for the presence of two or more canals in mandibular premolars. Mandibular premolars with more than one root canal were found high in Negroids (32.8%) compare to Caucasians (13.7%).<sup>11</sup>

Mandibular premolars having two root canals were reported in 1.6% of Caucasians & 2.6% in Negroid population.<sup>12</sup> Clinician should be aware about these variations, their anatomy & morphology and location of canal orifices. Radiograph with variation of 15-20° horizontally along the long axis of the root should be taken to confirm the total number of root and root canals in premolar teeth. A study done by Yoshioka T et al. (2007) showed that sudden narrowing of canal system by parallel radiograph suggests about multiplicity of canal.<sup>13</sup> Complete knowledge of root canal anatomy, physiology and biology increases the prognosis of endodontic treatment. Proper instrument knowledge and how to use these instruments effectively also increases the outcome of the treatment.<sup>14</sup>

There are certain advanced techniques like magnification which should be used for improving visualization and access to root canals. In rare cases, for better understanding of morphology and access of root canal, Tuned aperture computed tomography and Cone Beam Computed Tomography (CBCT) can be used.<sup>15</sup> However high cost and accessibility with extra radiation makes them limited in routine use.

## CONCLUSION

Mandibular second premolars have less prevalence of multiple roots, root canals and foramen when compared to first premolar. There are chances of missing additional canals while doing root canal treatment and it will lead to poor prognosis. Therefore it is necessary to put extra effort in locating two or more canals in mandibular second premolar.

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**LEGENDS**



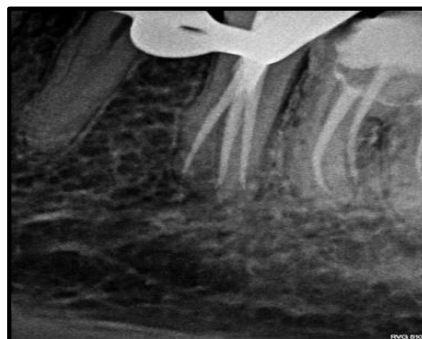
**Figure 1.** Pre-operative Radiograph (IOPA)



**Figure 2.** Working Length Determination



**Figure 3.** Master Cone IOPA



**Figure 4.** Obturation



**Figure 5.** Post-operative IOPA