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Endodontic management of mandibular second premolar with Vertucci Type V canal configuration

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Abstract
A 58-year-old male presented with pain in the lower right posterior region. Clinical and radiographic evaluation revealed a fractured restoration with secondary caries involving the pulp in mandibular right second premolar, diagnosed as symptomatic irreversible pulpitis with symptomatic apical periodontitis. Root canal treatment was initiated under magnification, revealing complex canal anatomy. Cone-beam computed tomography (CBCT) confirmed a Vertucci Type V configuration, with a single canal bifurcating into buccal and lingual canals at the middle third. The canals were shaped and obturated using warm vertical compaction. This case highlights the importance of advanced imaging and magnification in identifying and managing complex root canal systems.

Keywords: Mandibular second premolar, Vertucci Type V, CBCT, endodontic treatment, complex canal anatomy

Introduction
Mandibular premolars typically exhibit a single root and canal, but anatomical variations are not uncommon. The second premolar, in particular, may present with complex canal configurations that challenge conventional endodontic approaches. This report documents the diagnosis and successful management of a mandibular second premolar with a Vertucci Type V canal configuration, emphasizing the role of CBCT and dental operating microscope in achieving clinical success.

Case Presentation
A 58-year-old male reported with pain in the lower right posterior region for one week. Intraoral examination revealed a fractured restoration in mandibular right second premolar, which was tender on percussion. Pulp vitality tests (EPT and cold test) elicited lingering pain. Radiographic evaluation showed secondary caries involving the pulp, confirming a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis.

Treatment Procedure
- Local anesthesia administered; rubber dam isolation achieved.
- Initial access revealed file deviation and suspected extra canal.
- Angulated radiographs suggested complex anatomy; CBCT (Carestream CS 8200) was advised.
- CBCT revealed a single root with a canal splitting into buccal and lingual canals at 11 mm from the occlusal surface.
- Access cavity refined; working length determined.
- Biomechanical preparation (BMP) completed to size 25/04% for both canals.
- Irrigation protocol: 3% NaOCl activated with EndoActivator, followed by 17% EDTA (1 min/canal), and saline flush.
- Canals dried with paper points and obturated using AH Plus sealer and warm vertical compaction.
- Composite restoration placed; PFM crown fabricated and cemented.

Discussion

Mandibular premolars typically feature a single root and canal, often with an oval cross-section. However, canal configurations can vary significantly based on factors such as ethnicity, race, and gender. The mandibular second premolar, in particular, demonstrates a high degree of anatomical variation, which can complicate endodontic procedures. Studies have reported that 5.2%, 4.4%, and 2.5% of patients may present with mandibular second premolars containing two or more canals [1].

Treating mandibular premolars poses a challenge due to the internal morphology of the pulp cavity, which may include multiple root canals, apical deltas, and lateral canals [1]. Additionally, small access cavities can reduce visibility, making canal identification more difficult. Specific studies on the Indian population have shown that the prevalence of Vertucci Type V configuration in mandibular second premolars is relatively low, with one clearing technique study reporting an incidence of approximately 17.5% [2].

Another study using CBCT analysis confirmed the rarity of Vertucci Type V configuration in mandibular second premolars, with Type I being the most common [3]. In cases where canal bifurcation occurs, identifying a "fast-break" point on radiographs can be a useful diagnostic clue [4]. In this case, features that suggested the presence of an extra canal included:

- A pulp chamber that appeared unusually large in the buccolingual plane
- Abrupt buccal deviation of the file
- The fast-break phenomenon on radiographs

Cone-beam computed tomography (CBCT) has emerged as an invaluable diagnostic modality for visualizing complex root canal anatomy in three dimensions [5]. In this case, CBCT imaging (Carestream CS 8200) revealed a single root with a canal that bifurcated into buccal and lingual canals at the middle third, approximately 11 mm from the occlusal surface. This information was critical for refining the access cavity and ensuring complete debridement and obturation.

The buccal and lingual canals were enlarged to size 25/04% to preserve peri-cervical dentin, given the narrow root morphology. The use of a dental operating microscope, angulated radiographs, and CBCT imaging facilitated accurate diagnosis and successful endodontic management. As highlighted in recent literature, combining digital technologies such as CBCT with magnification significantly improves treatment outcomes in cases with complex canal configurations [6, 7].

Conclusion

Successful endodontic treatment relies on thorough knowledge of root canal anatomy and the use of advanced diagnostic aids. This case demonstrates the value of CBCT and magnification in identifying and managing rare canal configurations. Clinicians should remain vigilant for anatomical anomalies and employ all available tools to ensure complete debridement and obturation

Patient Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Endodontic Management of Mandibular Second Premolar with Vertucci Type V

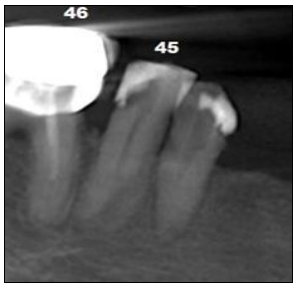
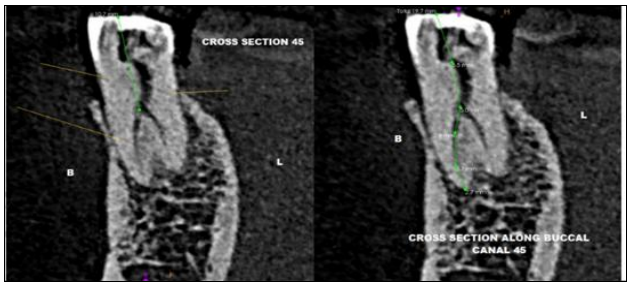


Fig 1: Preoperative radiograph



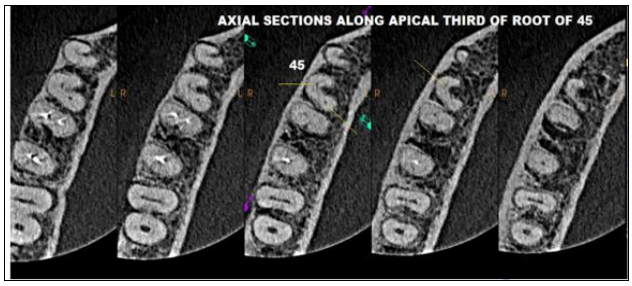


Fig 2: CBCT showing a single canal splitting into two - 45

Fig 3: Working length

Fig 4: Master cone selected

Fig 5: Obturation of 45

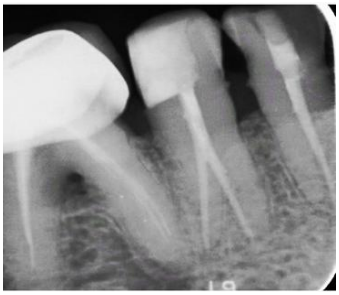


Fig 6: Post endo restoration

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Conflict of Interest
Not available

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References

1. Mamat R, Nik Abdul Ghani NR. The complexity of the root canal anatomy and its influence on root canal debridement in the apical region: A review. Cureus. 2023;15(11):e49024. doi:10.7759/cureus.49024
2. AlRahabi MK, Ghabbani HM. Endodontic management of a three-rooted maxillary premolar: A case report. J Taibah Univ Med Sci. 2019;14(3):312-316. doi:10.1016/j.jtumed.2019.04.003
3. Sieraski SM, Taylor GN, Kohn RA. Identification and endodontic management of three-canalled maxillary premolars. J Endod. 1989;15(1):29-32.
4. Olczak K, Pawlicki R, Wozniak K, *et al*. Root form and canal anatomy of maxillary first premolars: A cone-beam computed tomography study. Odontology. 2022;110(2):365-375. doi:10.1007/s10266-021-00670-9
5. Vertucci FJ, Gegauff A. Root canal morphology of the maxillary first premolar. J Am Dent Assoc. 1979;99(2):194-198.
6. Karunakaran JV, Ganeshamoorthy T, Anbarasi K, Ragavendran N, Karthick AK. Maxillary permanent first premolars with three canals: Incidence analysis using cone beam computerized tomographic techniques. J Pharm Bioall Sci. 2019;11(Suppl 2):S474-S480.
7. Jain S, Bhaskar DJ, Agali C, *et al*. New evolution of cone-beam computed tomography in dentistry: Combining digital technologies. Imaging Sci Dent. 2019;49(3):179-190. doi:10.5624/isd.2019.49.3.179

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