

## The retreatment of a mandibular second premolar with unusual canal anatomy

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### Abstract

Mandibular premolars usually have a single root and canal. Complex root canal system with atypical variations is a common finding among them. Failure to identify such a one can affect the prognosis of endodontic treatment.

Apart from knowledge and sophisticated instruments, a good clinical expertise is required in identifying, tracing and treating such a root canal system.

This case report is on the retreatment of a left mandibular second premolar (44) having a Vertucci's Type III canal configuration. Inability to identify this canal configuration led to a missed canal, faulty obturation and post treatment apical periodontitis.

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Success of an endodontic therapy depends on the thorough debridement and obturation of the pulp space. However root canal system is highly complex and show wide variations.

A detailed knowledge of these canal variations and good clinical skill is prerequisite for successful root canal treatment.

Many have reported mandibular premolars with atypical variations in the form of multiple canals. Vertucci has documented these variations and classified them into

Type I -VIII canal configurations.

Inability to identify and treat these canal variations would lead to the origin of flare ups during or after root canal treatment or endodontic failure demanding retreatment.

This case presentation is about the retreatment of a root canal treated left mandibular second premolar (44) having a Vertucci's Type III canal configuration. Failure to identify this variation led to missed canal and endodontic failure.

### Case Report

A 27 year old male patient with a non contributory medical history was referred to the department of conservative dentistry and endodontics, MCOADS, Mangalore, with a chief complaint of pain in the right mandibular region.

He gave a history of root canal treatment followed by placement of metal crown in relation to right mandibular second premolar (44) by a general practitioner one year back.

On clinical examination tooth 44 was rotated tender on percussion. Radiographic observation revealed a Vertucci's type III canal configuration with a missed, unobtured canal and faulty gutta percha obturation in the other canal.

These findings revealed non resolving symptomatic post treatment periapical radiolucency (endodontic failure) due to missed canal and faulty root canal treatment was made (Fig 1) and retreatment was suggested to the patient.

The full metal crown and access restoration was removed followed removal of gutta percha obturation using chemical solvent Xylene and endodontic H files (MANI, Inc. Japan). The canal system was re-entered and the missing canal was negotiated with a precurved 15 size K -file (MANI, Inc. Japan). The radiograph confirmed this negotiation and revealed a Vertucci's Type III canal configuration. The new working length was determined and the canal system was cleaned and shaped in a crown down method with Gates Glidden

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drills (MANI, Inc Japan) and Protaper (Dentsply Maillefer, Switzerland).

2.5% Sodium hypochlorite and 17% EDTA solutions were used as intra canal irrigants. Calcium hydroxide (Voco) was used as an intracanal medicament.

One week later the canal system was obturated with gutta percha and AH Plus sealer (Dentsply Maillefer, Switzerland) by lateral compaction technique (Fig 2).



**Fig 1:** Pre operative

The obturation was confirmed radiographically and gutta percha was removed from the coronal portion of the canal to facilitate core build up with silver amalgam (Dentsply) using corono-radicular stabilisation.

In the recall visit after nine months (Fig 3), the tooth was found asymptomatic with significant resolution of the lesion.



**Fig 2:** Post obturation



**Fig 3:** 9 months follow up

### Discussion

Root canal system variations are well documented in the endodontic literature. Vertucci's has classified canal anatomy into Type I to VIII configurations.

Studies have reported that incidence of canal variations or aberrations in mandibular premolars are common and have insisted on giving due considerations to it for successful endodontic treatment<sup>2,3,4</sup>.

The non resolving post treatment apical periodontitis or periapical radiolucency suggestive of endodontic

failure can occur due to various reasons and inability to identify and obturate the canal variation being one among them.

Endodontic failures due to missed or untraced canals occur mainly due to lack of anatomic knowledge, clinical expertise and availability of suitable instruments<sup>2</sup>.

In this patient, 44 showed Vertucci's Type III canal configuration. According to Vertucci, in Type III canal configuration one canal leaves the pulp chamber and

divides into two in the root, the two merge and exit as one canal (1-2-1)<sup>2</sup>.

Failure to identify this variation led to missing of one bifurcated canal. In addition to this, faulty obturation in the other canal subsequently caused endodontic failure. The retreatment carried out on this occasion was successful in negotiating and obturating the canal variation.

Few reports have inferred that Vertucci's Type III canal configuration is the least occurring anatomical variant when compared to other types<sup>2,4</sup>.

Since the prevalence and significance of canal variations is well known, unless otherwise proven, each tooth should be suspected of having additional canals.

Every attempt should be made to explore the canal system for atypical variations during endodontic treatment. In this regard, apart from clinical knowledge and skill, the use of good preoperative radiographs (both straight and angled), Radiovisiography (RVG), Magnifying loupes, operating microscopes and additional lighting (Fibre optic transillumination) would be beneficial<sup>5</sup>.

### Conclusion

Failure to identify the aberrations in the canal configuration of mandibular premolars can affect the outcome of endodontic treatment. Apart from

anatomical knowledge and expertise, a thorough clinical examination and radiographic evaluation along with the use of newer technologies would be useful in the detection and adequate obturation of atypical canal variations.

### References

1. de Almeida-Gomes F, de Sousa BC, dos Santos RA. Unusual anatomy of mandibular premolars. *Aust Endod J.* 2006; 32: 43–5.
2. Cohen S, Hargreaves KM. *Pathways of the pulp.* 9<sup>th</sup> edition . UK: Mosby; 2006. P. 149-165&918-954.
3. Rodig T, Hulsmann M. Diagnosis and root canal treatment of a mandibular second premolar with three root canals. *International Endodontic Journal.* 2003; 36:912-9.
4. Iyer VH, Indira R, Ramachandran S, Srinivasan MR. Anatomical variations of mandibular premolars in Chennai population. *Ind J Dent Res.* 2006;17(1):7-10.
5. Rhodes JS. A case of unusual anatomy: a mandibular second premolar with four canals. *International Endodontic Journal.* 2001;34:645–8.