Endodontic Treatment of Mandibular Second Premolars with occult canals Using CBVT
Pratima Shenoi, Wanmala Mute, Archana Kandhari, Rahul Atara

Abstract
Missing of additional canals may result in unsuccessful root canal treatment. With the advent of highly sophisticated software like cone beam volumetric tomography (CBVT) visualization of the entire root canal anatomy is an easy task and gives a three dimensional view of the tooth. This paper reports the management of two mandibular second premolars one with three roots and three canals and another with two roots and two canals.

Key Words: Additional Canal; CBVT; Root Canal Treatment

Introduction
The objective of root canal treatment is cleaning, shaping and disinfection of root canal system followed by complete obturation and a good coronal restoration to preventing access to micro-organisms.(1) The major causes of failures in endodontic treatment are untreated canals, incorrect canal instrumentation, and improper obturation.(2) Missing additional canals may result in unsuccessful treatment and may cause during or post treatment flare-ups.

The endodontic literature shows many studies reporting mandibular premolars with more than one root and root canal.(3-5) All cases so far documented have used radiographs or operating microscopes for location and treatment of these additional canals. This paper reports the management of two mandibular second premolars with multiple root canals using Cone Beam Volumetric Tomography (CBVT).

Case Report
A 35 year old female patient was referred to the prosthetic department of V.S.P.M dental college for replacement of missing mandibular posterior teeth. Treatment plan was to make a long span bridge using the 15, 25 as abutments following the intentional endodontic treatment of both the 2nd premolars. The radiographic evaluation revealed two roots and two root canals (mesial and distal) of 25 (fig1). The right sided premolar had three roots and three canals (fig3). Variation in the anatomy was seen in both premolars hence a CBVT was advised for better evaluation of the root canal system. The CBVT confirmed the presence of mesial and distal roots and root canals in the left side premolar and showed that the mesial canal was more buccally placed than the distal one (fig 5). The right sided premolar depicted the anatomy similar to a maxillary molar i.e. a mesial, a distal and a lingual root with a canal each (fig 6). Working length determination followed by cleaning, shaping and complete obturation (fig 2,4) of all the canals was done and the patient was referred back to the prosthetic department.

Discussion
The variation in the root canal morphology is a usual phenomenon; but the challenge lies in detecting the variation from the normal and its successful treatment. Inability to find and obturate a root canal has been shown to be a major cause of failure in endodontic therapy.(2) 42% of teeth requiring retreatment are due to missed canal as confirmed by Hoen and Pink.(5) Mandibular second premolars have gained a reputation of having an aberrant anatomy.(6,7) Considering the fact that a variation in anatomy exists in the mandibular premolars one must use high-end diagnostic aids before the commencement of the treatment.

A radiograph gives us a partial view as it’s a two dimensional image of a three
dimensional object. Hence it turns out to be of limited value in complex anatomic cases. Considering all these factors a CBVT of the involved tooth was planned. The CBVT revealed that the left mandibular second premolar had three separate roots with three canals (mesiobuccal, distobuccal and lingual) and the right mandibular second premolar had two distinct roots with two canals (mesial and distal). The conventional radiograph revealed the presence of three roots and three canals but it did not reveal its buccolingual and mesiodistal orientation; which was conveniently obtained with the CBVT.

Cone beam technology has existed since 1980s but its application has recently been made in dentistry. The major advantage of CBVT is elimination of superimposition of anatomic structures and hence produces undistorted three dimensional information of the maxillofacial skeleton with a significantly lower effective radiation dose compared with conventional computed tomography (CT). CBVT also provides viewing of an image in proximal, axial and coronal planes.(8,9)

With CBVT, a three-dimensional volume of data is acquired in the course of a single sweep of the scanner using a simple, direct relationship between sensor and source. The scanner rotates synchronously through 180° to 360° around the patient’s head to obtain image and slices of the required teeth and periapical tissue can be visualized separately and in all three orthogonal planes without superimposition of the overlying structure hence preventing anatomical noise.(10,11) In the current cases, if the additional canals would have been missed it could lead to persistence of clinical symptoms and subsequent failure of the endodontic treatment.

**Conclusion**

The present case was successfully completed with the use of radiographs and CBVT imaging. The presence of extra root canals may occur far more than one expects. Hence while attempting endodontic treatment one must keep an eye open for additional canals.

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