

Managing Curvatures in an Atypical Mandibular Third Molar: “Radix Paramolaris”

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ABSTRACT

Third molars are known for morphological variations and atypical anatomy. Although these teeth pose difficulty in root canal treatment due to limited accessibility however, retaining third molars has gained importance in the present scenario due to their crucial role in serving as an abutment or in auto transplantation cases. This case report presents a case of Radix Paramolaris in mandibular third molar with severe curvatures of root canals in different planes and discusses its management with controlled memory files and tactile-controlled activation technique.

Keywords: Radix paramolaris, Curved canals, Controlled memory files, Tactile-controlled activation technique.

INTRODUCTION

An efficient chemo-mechanical preparation and a good hermetic seal with a three-dimensional obturation are the prerequisites for a successful root canal treatment. However various anatomical and morphological factors govern the efficiency with which cleaning, shaping and obturation of root canals can be carried out. Knowledge, understanding and awareness regarding the presence of unusual root canal anatomies can contribute largely in the successful outcome of root canal treatment.

Apart from variation in canals, literature has enough evidence to show wide occurrence of additional roots. The first literature citation of an additional third root

can be traced back to Carabelli, who crowned it as radix entomolaris (RE).^[1] The most common occurrence of this additional root has been observed in disto-lingual aspect of mandibular first molars. In case the site of occurrence of the additional root is mesiobuccal, it is called as the radix paramolaris (RP). Carlsen and Alexanderson have given a vivid description of the characteristic morphological features of these additional buccal and lingual supernumerary roots.^[2]

Although third molars exhibit a wide variety of anatomical variations but the occurrence of these additional roots has been rarely reported in these teeth. With the increase in patient's and dentist's desire to retain third molars due to the prospect of future auto transplantation or abutment for fixed prosthesis, these teeth have now gained strategic importance and in the current scenario are being salvaged and root canal treated more often.

This case report is an attempt to discuss a clinical approach to diagnosis and management of a three rooted mandibular third molar, a radix paramolaris with severely curved roots.

CASE REPORT

A 43-year-old female patient reported with a history of severe pain in lower-right posterior region since few days. On clinical examination, a long span bridge was seen extending in the area from right first premolar to third molar with severe

tenderness with respect to right mandibular third molar (48). The medical history of the patient was non-contributory. Examination of the diagnostic IOPA digital radiograph showed the presence of three roots in 48 though the origin and degree of curvature of the extra root could not be appreciated even in the angulated periapical radiographs. (Figure 1).



Figure 1 -Preoperative Radiograph of 48 showing additional root and severe curvature in canals

After recording a negative response by electric pulp tester, a diagnosis of pulp necrosis with acute apical periodontitis was established for 48 and a two-visit root canal treatment was planned. Initial access cavity preparation by endo access bur revealed the location of one mesial and one distal canal. On careful observation of the pulpal floor, an additional dark line running mesiobuccally raised the susceptibility of an additional orifice. The access cavity was hence modified ultrasonically to extend more mesiobuccally. Precurved No.8 and no.10 C-Pilot files (VDW, Dentsply) were used for further exploration and to check the patency of root canals. All the root canals exhibited severe curvatures with short radius of curvature in unexpected directions. The mesiobuccal canal had a sharp curvature in mesiolingual direction while the mesiolingual canal presented with severe curvature in distobuccal direction. Both the root canals were fine and the abrupt curvatures did not allow the passage of No. 8 C-Pilot file in apical third for initial

patency. The distal canal was wide but severely curved with an extremely short radius of curvature in a mesio lingual direction. Reduced access, difficult isolation and sharp, abnormal curvatures made biomechanical preparation a definitive clinical challenge.



Figure -2 Post operative radiograph of 48 showing obturation of severely curved canals

Use of apex locator (Canal Pro Compact, Coltene Whaledent) for working length measurement preceded radiographic confirmation. Patency was established in all the three canals using numerous precurved 6/8/10 C-Plus files with watch winding motion and copious irrigation, after coronal preflaring had been completed using rotary Hyflex EDM orifice shaper (25/12%) (Coltene Whaledent). All the three root canals were prepared using a combination of Hyflex CM and EDM rotary files in a Tactile Control Activation technique. Recapitulation with no. 10 C-Pilot file and intermittent irrigation was performed using sodium hypochlorite (Canal Pro 5.25%, Coltene) after each instrumentation. The MB and ML canals were prepared to apical size 20/5% (Hyflex EDM, Coltene) while the distal canal was finished with 25/8% (Hyflex EDM One 25/~, Coltene). After completion of biomechanical preparation, canals were packed with intracanal medicament (an aqueous paste of calcium hydroxide) followed by placement of a temporary restorative material for a week. On the recall visit, the tooth was

asymptomatic and obturation of the root canals was performed with matched tapered fitted gutta-percha cones and gutta flow bioseal sealer (Coltene). (Figure 2) The access cavity was restored with nanohybrid composite restoration.

DISCUSSION

Varied morphological features are characteristics of third molars. Identification and management of such cases may pose a clinical challenge especially due to anatomic location of these teeth. Somasundaram *et al* and Wang *et al* in their CBCT based studies (on Central India and Chinese population respectively) reported highest prevalence of two roots in mandibular third molar. [3] Prevalence of three roots may range anywhere between 2-5% depending on the population type. Diagnosis of supernumerary root may be a challenge with two-dimensional imaging however use of pre and intra operative periapical radiographs with tube shift technique (or the buccal object rule) should assist clinicians in determining whether supernumerary roots are present on the lingual (Radix Entomolaris) or buccal (Radix Paramolaris) aspects, when cone beam volumetric tomography is not available to assist with making a diagnosis. Also, careful clinical inspection of tooth crown and cervical morphology may serve as an additional aid in diagnosis. [4]

This case describes the management of Type A radix paramolaris with Type C root curvature in mandibular third molar. Abnormal apical curvatures (mesial and lingual) were negotiated by C plus files which are stiffer files with active end cutting tip and are very helpful in negotiation of significantly curved canals. After establishing patency, the instrumentation was performed by HyFlex CM (Coltene-Whaledent, Allstetten, Switzerland) and Hyflex EDM rotary instrument system which are extremely flexible and are made of controlled memory wire (CM); a new type of Ni Ti system which has been subjected to a specific

thermomechanical processing and which lacks shape memory (typical for the conventional NiTi instruments). HyFlex EDM instruments are further resistant to cyclic and torsional fatigue increasing their resistance to fracture due to their manufacturing by an electrical discharge machining (EDM) process. The non-contact machining procedure of EDM precisely melts and evaporates the wire's surface via pulsed electrical discharge making the surface of files harder. [5] There are several studies showing Hyflex CM and EDM files to be more flexible as compared to other available Ni-Ti instruments resulting in lesser canal transportation and shaping errors. [6] Thus, the use of these files helped in the preservation of original anatomy of curved canals and prevention of any mishap during instrumentation.

Tactile-controlled activation technique was used for shaping of the canals. The technique involves activating nickel-titanium rotary files after it is engaged in the canal and then withdrawing the files immediately. Only three apical strokes are recommended to be given after the initial engagement of the file before withdrawing it; which minimizes instrumentation time. This novel method of crown-down instrumentation is quite useful for preparation of curved canals as it avoids separation of instruments and also has a less tendency of over flaring the canals. [7]

There may be other issues related to the root canal treatment of third molars such as limited accessibility for instrumentation, difficulty in placement of rubber dam and even limited visual access by magnification aids, caution in periapical extrusion of irrigants due to vicinity of inferior alveolar nerve, difficulty in obtaining radiographs due to difficult placement of radiographic sensors etc. [8]

Difficult accessibility and curvature of these teeth along with limited mouth opening may also increase the frequency of iatrogenic errors such as straightening of root canals resulting in loss of working length, ledge formation, transportation,

zipping, perforation and even instrument separation. [9]

Hence, these factors should also be kept in consideration before embarking on the treatment of mandibular third molar.

CONCLUSION

Severe canal curvatures even in case of teeth with difficult accessibility like the third molars can be managed successfully by the use of controlled memory instruments, tactile activation technique and skill and patience of the operator.

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