C Shaped Canal Morphology in a Mandibular Second Molar: A Case Report

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Abstract:
The root canal anatomy of mandibular second molars is complex and varies greatly, with the most common arrangement consisting of 2 mesial canals along with a distal canal. There are other variations as well, like a C-shaped canal system, two canals, and four canals. The diagnosis and treatment of a mandibular second molar with an unusual root canal configuration—one canal in a single conical root—are discussed in this case study. After a clinical evaluation and radiographic analysis of the case, tooth #37 was found to have symptomatic irreversible pulpitis and symptomatic apical periodontitis. Root canal therapy and composite buildup were then scheduled. Clinicians need to be knowledgeable about the different tooth anatomy and have the necessary training and expertise to enable them to make the most of the appropriate therapeutic and diagnostic resources at their disposal in order to maximise the standard of dental care given to their patients.
Keywords: C shaped canal, 2nd Mandibular Molar, Root canal treatment.

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INTRODUCTION

One of the human body's most complex anatomical structures is the root canal system. A thorough understanding of tooth anatomy is necessary for the best long-term outcome from root canal therapy. Preventing and treating pulp bacterial disorders is the main objective of endodontic therapy[1]. Identification, chemo-mechanical cleaning, and shaping of the root canal systems are necessary to accomplish these goals[3]. Variations in the shape of canal configurations, auxiliary canals, bifurcations, trifurcations, isthmuses, and anastomoses make endodontic treatment difficult. Insufficient understanding of the intricate architecture of teeth may be the cause of failure in root canal therapy[3]. Because of their complicated anatomy, missing canals during root canal therapy may result in treatment failure.

With regard to their complex anatomy, missing canals during root canal therapy may result in treatment failure. Achieving a satisfactory obturation and negotiation of every root canal significantly improves the overall course of treatment[2]. The most common two well-defined roots in mandibular molars are the mesial root, which has two canals, and the distal root, which has one or two canals. The form, configuration, and quantity of root canal alterations in mandibular second molars have been thoroughly studied in endodontic literature[4]. Additionally, additional recognised anatomic differences in mandibular molar teeth include the existence of one, two, four, or a C-shaped canal, as well as taurodontism in a single root[4]. In an Indian population, Reuben et al. found that the frequency of a single canal was 1 out of 125.
This increases the overall prevalence rate to approximately 1% [5]. Furthermore, 1.3%[6] of second

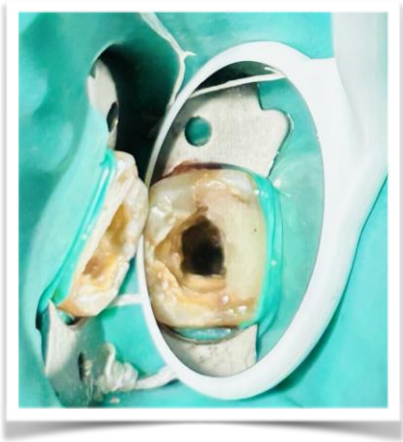
molars had the Vertucci type 1 canal structure, according to Weine et al. Vertucci types I, II, IV, and V have been used to classify the mesial canal design in single-rooted mandibular molars, but Vertucci type I [7] is typically reported for the distal root canal layout. In a Saudi Arabian population, Alfadley et al. have shown the uncommon presence of a Vertucci type I canal in a second molar[8]. Since it lowers the likelihood of root canal treatment failures, a thorough understanding of the anatomy and variations of the root canal is crucial. Variations in the shape of the root canal are a persistent issue, especially in teeth with numerous roots to root canal treatment and successful diagnosis. Extra canals, apical deltas as well as and lateral canals are examples of common morphological alterations in canals, and their frequency and significance have been extensively studied[9]. The aim of this case study is to discuss a unique root canal morphology that has not been frequently documented in endodontic literature, pertaining to a mandibular second molar with a single root and single canal.

CASE REPORT

A 37-year-old male patient arrived at the MIDSR Dental College, Latur, to see the conservative dentistry and endodontics department. His main complaint was pain in the area of his lower left back teeth, which had been there for the previous eight days. Upon reviewing the chief complaint's medical history, it was discovered that tooth #37's pulpal therapy had begun in a private clinic ten days prior, but had not yet been finished. No prior history of fever, pus discharge, night pain, or swelling was present. Medical history did not matter. "Previously started pulpal treatment with symptomatic apical periodontitis" was the diagnosis given for this tooth. The patient gave their informed consent before this case was published. The patient refused to have tooth #36 retreated in any way. An extraoral examination turned up nothing noteworthy. A periapical radiograph was used to make the radiographic assessment. Since tooth #37 was an effective tooth with a favourable prognosis, the decision was made to proceed with and finish the root canal therapy.

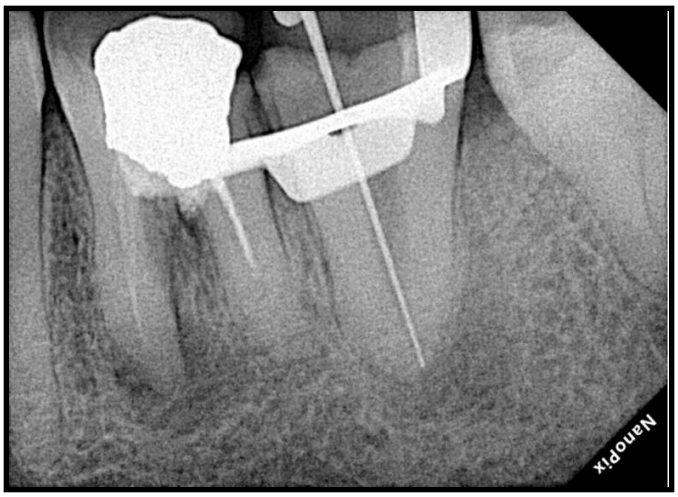
Pre-operative Radiograph

The course of treatment was completed in two visits. On the first visit, a single carpule (1.8 millilitres) of 2% lidocaine mixed with 1:80,000 epinephrine was used to locally anaesthetize an inferior alveolar nerve block. For tooth isolation, a rubber dam was used. Secondary caries and the occclusal temporary restoration were removed. With a high-speed handpiece and endodontic bur round-diamond-FG in regular-shank, a traditional method for preparing access cavities was established. Composite resin was used for preendo buildup.



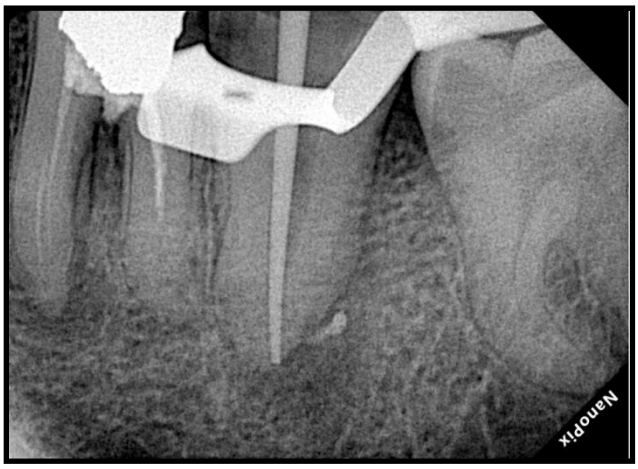
Clinical Photograph after Preendo Buildup

The canal working length was determined using Jmorita RootZX II apex locator and preliminary radiographs.



Working Length Determination

Using the ProTaper Next rotary system (Dentsply Sirona, USA) up to the file size F3, cleaning and shaping were accomplished. 5.25% sodium hypochlorite (NaOCl) was used to irrigate the canal extensively, and ethylenediaminetetraacetic acid (EDTA) was used for the final irrigation. Throughout the pulpal therapy, recapitulation and canal patency verification were carried out. After that, a zinc oxide restoration based on eugenol was used to temporise the tooth. On the second appointment, the interim repair was taken out. After using sterile absorbent paper tips to dry the canals, an AH plus resin-based sealer was applied. A combination of cold lateral compaction and size F3 gutta-percha was used to obturate the canals. Glass-ionomer restoration was used to temporarily restore the tooth. After a week, the patient was checked on again to report root canal therapy completed to a satisfactory degree. After that, the patient was referred to the prosthodontics department so that a full-coverage restoration could be made.



Master Cone Selection

Post-Operative Radiograph

DISCUSSION

This case study discusses a mandibular second molar with a single root and single canal that had an unusual root canal morphology. An optimal result from a root canal treatment starts with a carefully planned access cavity preparation. When a highly complicated root canal system lacks a good access opening, it becomes difficult to instrument and irrigate it. Any racial group may experience the development of aberrant canal anatomy, depending on a number of factors including sex, age, and population ethnicity. Single canals can be diagnosed with the aid of several instruments. These instruments include various radiography techniques like cone beam computed tomographic imaging

(CBCT) and visual inspection under magnification. The diagnosis of canal abnormalities is also aided by multiple angled radiographs.

One of the most prevalent variations is the mandibular second molar's C-shaped canal. With a 21.8% incidence. For example, in a case report published in 2000, Fava et al. described a patient who had one root and one canal in each of their upper maxillary molars and mandibular second molars10. After evaluating the Iranian subpopulation's canal configuration, Rahimi et al. (2008) reported that 4.3% of the population had Vertucci Type I. It's interesting to note that bilateral presence of uncommon results in an individual was reported by Sabala et al. (1994)12. Their symmetrical analysis revealed 56% symmetry in the total amount of root canals between both left and right teeth in the same subject, and 100% symmetry in the number of roots14.

Second molar root canal therapy can be difficult. The majority of iatrogenic access opening errors happen when looking for additional or missing canals. If the clinician is well-informed about the general location and dimensions of the pulp chamber, iatrogenic errors may be minimised. The dentist ought to be aware that, despite the higher incidence of extra canals, there are situations in which there may be fewer canals than the commonly assumed canal shape. Second molars are located posteriorly, so thorough access cavity preparation is necessary to prevent any accidents.

CONCLUSION

The mandibular second molar with its unique anatomy—a single root and single canal—is highlighted in the case study. A satisfactory course of treatment for such cases can be achieved with a careful and comprehensive examination of the tooth supported by multiple radiographs.

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