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An unusual anatomy of radix Entomolaris: Mandibular first molar with 6 canals

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Abstract

The anatomy of root canals is quite complex. The primary objective of root canal treatment is to eliminate infection and achieve a proper seal both at the apex and coronal area through effective filling. If the root canal system is not thoroughly cleaned and shaped, and if proper three-dimensional filling is not carried out, it often leads to treatment failure. Clinicians need to be aware of these anatomical variations to ensure successful treatment. Mandibular first molars usually have three or four root canals, and it's rare for them to have five or more. However, a recent study found a rare anatomical variation in which the mandibular right first molar had six root canals. This was discovered during endodontic treatment, using dental loupes and microscopes. This case report shows that using magnification with microscopes increases the likelihood of finding additional canals.

Keywords: Radix entomolaris, anatomical variations, mid distal canal, mandibular molar

Introduction

Success in endodontics relies on various factors, including diagnosis, proper access, and the application of skills for thorough cleaning, shaping, and obturation of the root canal system^[1]. Therefore, it is essential to be aware of the complexities of root canal morphology to ensure the success of the root canal treatment^[2]. The mandibular first molars typically have two root canals on the mesial side and one or two on the distal side. A common variation is the radix entomolaris, which has an extra third root located on the lingual side^[1].

The presence of an extra root in the mandibular first molar is known as radix molaris (RM). This supernumerary root is typically found in the distolingual position (radix entomolaris [EM]) and has a global prevalence ranging from 0.7% to 33.1%. When the additional root is situated on the mesiobuccal side, it is referred to as radix paramolaris (PM)^[3]. It has been reported in literature that the occurrence of RE is under 5% within white Caucasian, African, Eurasian, and Indian populations. In contrast, it is found at a rate of 5-30% among ethnic groups with Mongoloid characteristics, such as the Eskimos, Chinese, and Native Americans^[4].

Occasionally, there may be an extra canal known as the middle mesial canal, which is situated in the mesial root. This canal is found in the developmental groove between the mesiolingual and mesiobuccal canals. The reported occurrence of a middle mesial (MM) canal varies from 1% to 15%. Another rare finding is the existence of three canals within the distal root. The third canal, called the middle distal (MD) canal, is positioned between the distolingual and distobuccal canals. The presence of three canals in the distal root is considered extremely rare, with a reported incidence of 0.2-3%^[1].

However, the presence of six or more root canals is a rare occurrence, and teeth with such anatomy are only documented in a limited number of case reports in the literature^[4].

Case Presentation

A 16 year old male patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of pain in the lower right back tooth region while chewing and sensitivity to cold and hot food. On clinical examination grossly destructed tooth - 46 (fig-1) was noted with loss of lingual tooth structure.

Tooth was tender for percussion. Radiographic examination revealed radiolucency extending to the pulp with periapical widening. Diagnosis of symptomatic apical periodontitis with pulp hyperemia was made. Root canal treatment or extraction options were given to the patients parents, they opted for Root canal treatment. Prognosis was explained to the patient and his parents and consent was taken.

Root canal treatment was initiated with administration of local anesthesia and rubber dam isolation. Complete removal of caries was done and pre-endodontic buildup was done with composite. Access opening was done under magnification and orifices identified were Mesiobuccal (MB), mesiolingual (ML), distobuccal (DB), distolingual (DL) (fig-2). In addition to this midmesial and mid distal canals were located. Working length was determined and radiograph was taken in mesial and distal angulations (fig-3.a, 3.b), which revealed presence of extra distolingual root which suggest; Radix entomolaris. Cleaning and shaping of all the canals were done using rotary

system (NeoEndo flex files) with irrigation of 3% sodium hypochlorite. RC prep (Prime) was used as lubricant. Final irrigation was done with saline and canals were dried using paperpoints and Master cone radiograph was take (fig-4) and obturated using MTA fillapex (Angelus) as a sealer. Post obturation radiograph was taken (fig-5) and tooth was restored with temporary restoration. Patient was asked to report back after 2 weeks for permanent restoration. In the second appointment due to week tooth structure it was decided to place Endocrown. Core buildup was done using composite and tooth preparation was done for endo crown (fig-6). Upper and lower impressions were made and sent to lab for fabrication of ceramic endocrown -46. Patient was recalled after 3 days, Endocrown fit was checked and evaluated for highpoints. Finally the crown was etched with hydrofluoric acid and rinsed and dried. Silane coupling agent was applied and cementation of the endocrown was done(fig-7) using Relyx U200-Self-adhesive resin cement (3M).



Fig 1: Preoperative picture of grossly destructed -46



Fig 2: Access opening showing MB ML MM DB DL MD canals



Fig 3: a) Showing working length of 3 distal canals b) working length of 3 mesial canals



Fig 4: Master cone radiograph



Fig 5: Radiograph of final obturation taken in 2 different angulations



Fig 6: Tooth preparation done for Endocrown



Fig 7: Ceramic crown cementation -46

Discussion

This case report discusses a rare occurrence of a mandibular first molar with 3 roots and 6 root canals. The operator can better plan the endodontic treatment by critically evaluating multiple angled radiographs. Discovering additional canals requires a thorough understanding of root canal morphology and its frequent variations^[5].

A study by Chavda et al. demonstrated that magnification, along with ultrasonics, significantly aids in identifying the thin mid-mesial canal (MMC). These canals are very small and may be located deep within the isthmus, but using a dental operating microscope at higher magnification makes them easier to locate. Ultrasonic tips can be helpful in clearing the area between the MB and ML orifices, and caution should be exercised when using smaller files to navigate these canals. The ultrasonic tip eliminates the need for a traditional handpiece, as its head size may obstruct the field of vision^[6].

Dental loupes and microscopes are crucial tools for assisting endodontists and general dentists in locating anatomical

variations, such as the middle mesial canal (MMC) in mandibular first molars. The MMC can be challenging to detect due to its location between the mesiobuccal and mesiolingual canals. Dental loupes provide improved clarity and depth perception, thus enhancing the likelihood of identifying the MMC^[7, 8].

It is important for the clinician to perform a thorough clinical examination and interpret images accurately in order to detect any variations and remain aware of them both before and during endodontic procedures. Specifically, it is important to investigate and identify third mesial and distal canals in mandibular molars when planning root canal therapy. Additionally, the mesial and distal grooves of mandibular molars should be examined and cleaned^[4].

Conclusion

In this case report, the endodontic treatment of a mandibular 1st molar with 6 canals is discussed. Having 6 canals in a mandibular 1st molar is rare, so it's important to thoroughly investigate each case clinically and radiographically to detect any variations in the internal anatomy of the teeth. Every effort should be made to locate and treat the additional canals in the mandibular first molar in order to achieve a higher level of success.

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Author's Contribution

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Conflict of Interest

Not available

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