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Root Canal Treatment for Taurodontism in Mandibular Second Premolar - A Clinical Case report

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KEYWORDS

Scope of root canal treatment includes treating normal teeth as well as those with developmental anomalies.

ABSTRACT:

The success of endodontic treatment depends on the clinician's understanding of tooth anatomy and its variations. One such variation is **taurodontism**, a rare dental anomaly characterized by an enlarged pulp chamber and apically displaced furcation, leading to shortened roots. This condition primarily affects molars but can occasionally involve premolars. Taurodontism can occur as an isolated anomaly or be part of a syndrome, such as Klinefelter syndrome, Down syndrome, or tricho-dento-osseous syndrome. Due to its unusual anatomy, taurodontism presents significant challenges during endodontic treatment, particularly in identifying and managing the root canal system.

In this case report, we present a unique instance of endodontic treatment performed on a taurodontic mandibular premolar. Taurodontism in premolars is exceedingly rare, adding complexity to endodontic procedures. The variation in root canal morphology, coupled with an enlarged pulp chamber, necessitates a more thorough and meticulous approach to treatment. Diagnosis was confirmed using radiographic imaging, which helped in the detection of the complex root canal anatomy.

A step-by-step approach was followed, including careful access preparation, thorough cleaning and shaping of the root canals, and precise obturation to ensure complete sealing of the canal system. The use of advanced diagnostic tools and techniques, such as cone-beam computed tomography (CBCT), was essential for treatment planning and execution.

This case highlights the importance of understanding anatomical variations like taurodontism in ensuring successful endodontic outcomes. It also underscores the need for tailored treatment approaches in cases of abnormal tooth morphology, demonstrating the role of clinical skill and adaptability in overcoming challenges associated with rare dental anomalies.

INTRODUCTION:

An alteration in tooth shape known as taurodontism results from the epithelial sheath diaphragm of the Hertwig failing to invade at the appropriate horizontal level.

The Latin word "tauros," which means "bull," and the Greek word "odus," which means "tooth," were

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combined to create the phrase "taurodontism," or "bull tooth."[1]

Both deciduous and permanent teeth can exhibit it, either unilaterally or bilaterally. Premolar teeth are less affected, while permanent molar teeth are primarily affected. The traits of a Taurodontic tooth include an enlarged pulp chamber, pulpal floor displacement apically, and an absence of narrowing at the cementoenamel junction level. Mangion lists the following as the multiple causes of the aetiology of taurodontism: 1) an early developmental pattern, 2) a specialized or reverse character, 3) a Mendelian inherited recessive trait, 4) an atypical feature, and 5) a mutation during dentinogenesis Taurodontism, according to Hamner et al., is spurred on by Hertwig's epithelial sheath diaphragm's inability to invade at the appropriate horizontal level[2-3]. Although it is not a consistent characteristic of this syndrome, it is also linked to people with Down syndrome & Klinefelter syndrome patients. It is now thought to be an anatomic variance that might also exist in a population that is normal. There are reports that suggest that between 2.5% and 11.3% of the human population suffers from taurodontism.[4]
The diagnosis of the case and appropriate treatment planning are critical to the prognosis of endodontic therapy.[5] Treatment outcomes are significantly influenced by structural alterations and differences in the root canal system when implemented with the proper technique.

CASE HISTORY:

A 35-year-old male patient with generalized discomfort in the mandibular right quadrant presented to the Department of Conservative Dentistry and Endodontics. The patient reported that over the previous ten days, he had experienced pain that got worsened while sleeping and went away after taking analgesics. The pain flared up out of the blue, especially at night. Notably, no pertinent medical history was noted. Sharp, persistent pain was felt following the removal of the stimulus in both the cold and electrical pulp tests used for vitality testing. Radiolucency comprising pulp, dentin, and enamel was observed upon radiographic evaluation. The lamina dura showed a discontinuity, and PDL widening was observed with #45. A diagnosis of symptomatic irreversible pulpitis along with apical periodontitis with regard to #45 was established based on the clinical and radiographic evidence. Endodontic treatment was initiated after getting informed consent.

Clinical management

Following rubber dam (Hygienic, Coltene) separation and local anesthetic (Lignox 2%; Indoco Remedies Ltd., Mumbai), an enhanced oval-shaped access cavity was created using a round bur (Mani BR-31)[6]. Pre-curving a 10 K file (Mani Inc., Japan) by the degree of curvature. An assessment of the canals' patency was conducted using a size 10 K file (Mani Inc., Japan). An apex locator (Root ZX mini; J Morita, Japan) was used to estimate the working length, and a digital x-ray was used to verify it.
On the engine-driven gadget, a rubber stopper was used to indicate the approximate length until the apex[7-8]. Once again, a 10 K file (Mani Inc., Japan) was inserted into the canal until it reached the x-ray's working length. As a result, the canal is guaranteed to be appropriately cleaned and shaped up to the working length given by apex locator.
Later on, greater file sizes were incorporated to further shape and get the canal ready for treatment. Examples of these files are the 15 and 20 K hand files (Mani Inc., Japan). For glide path preparation, 18/0.05 (Endo plus Woodpecker) was employed. Following that, 20/0.04 (Endo plus woodpecker) was utilized up to the working length and final contouring was done by a size 25/0.06 (Endo plus woodpecker). A substantial amount of irrigation was carried out using 17% EDTA (Neo EDTA liquid) and 5.25% (Septodent Parcan) NaOCl 2 ml[9] per root canal in between each instrumentation. An ultrasonic activator (Eighteeth Medical Ultra - X-Ultrasonic Activator) was used to activate each irrigant.
After that, saline was used to flush the canals and paper points were used to dry them. A master cone radiographic image was obtained using a gutta-percha 25/0.06% (Dentsply). The sealer used for the single cone obturation procedure was Sealapex, which is based on calcium hydroxide. To preserve a strong coronal seal, composite resin (3M Filtek) was used for post-operative restoration[6-7]. Postoperative guidelines were given to the patient, and he was recalled back for additional monitoring.

DISCUSSION:

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Due to anatomical variety and complexity, endodontic procedures on taurodontic teeth presents substantial complications. Wide pulp chambers and compact roots are two characteristics of the dental aberration known as taurodontism. Low-level bifurcation or trifurcation is common in roots.[10] From the perspective of an endodontist, taurodontism poses difficulties for root canal therapy during canal negotiation, instrumenting the canal and during obturation as well.

Due to their extreme shortness, the canals were instrumented using only the apical third of the file. It takes quite a bit of time. Owing to the difference in the internal anatomy, canal orifices were close together, deeply positioned, and had tiny canals. As such, the obturation process was far more challenging than the traditional one. Because of the position and close vicinity of the canal, the single method of obturation was also challenging to execute.[4] To get the best outcome, a mix of warm vertical condensation technique and lateral condensation technique was used. It can be difficult to completely fill the root canal system in taurodont teeth due to the intricate nature of the root canal anatomy.[11] In this instance, a modified method that combines vertical compaction of the extended pulp chamber and lateral compaction with respect to apical region. Performing endodontic deliberate replantation is another complicated treatment outcome. A taurodont tooth's large body and small surface area embedded in the alveolus make extraction less difficult, provided its roots are not widely divergent. The extraction of a taurodont tooth can be typically complicated due to the dilation of the roots in the apical third.[11-12]

CONCLUSION:

A solid grasp of the tooth's internal anatomy combined with a careful evaluation of preoperative radiographs is necessary for success. Before switching to rotary files, it is best to first negotiate the canals with hand files and make sure to irrigate the canals extensively after using every file. It is imperative to adhere to this approach consistently in order to effectively manage canals, which will ultimately result in enhanced therapeutic results and satisfaction among patients.

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FIGURE LEGEND:

FIGURE I : (Ia) Pre operative (Ib) Working length (Ic) Master cone (Id) Post operative

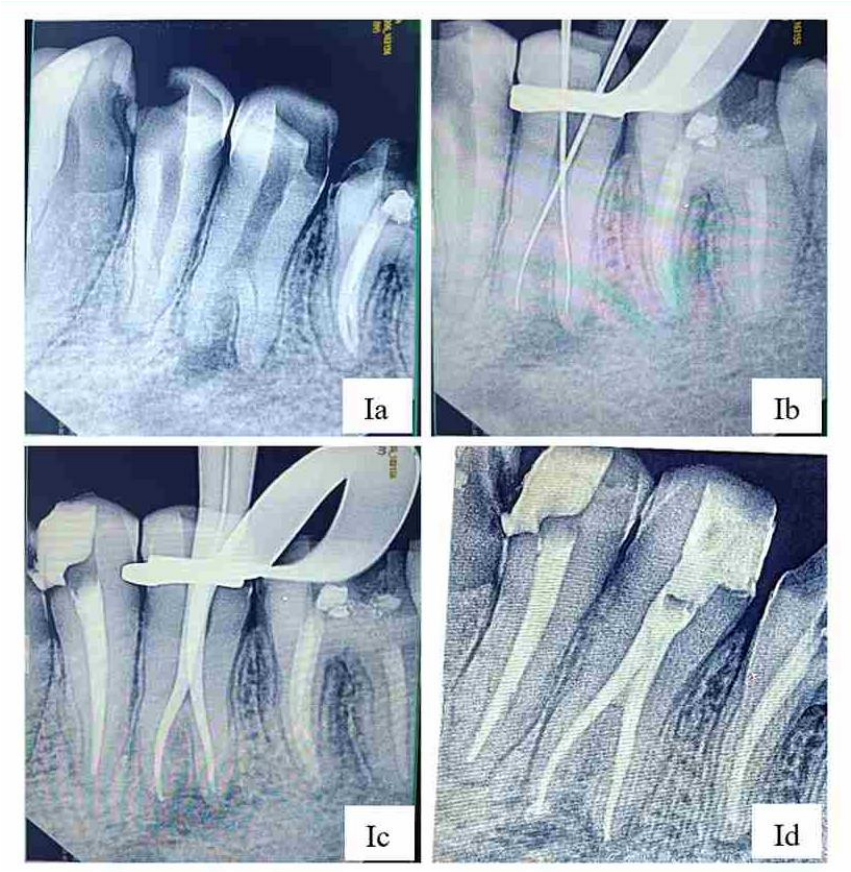

FIGURE I –

(Ia) Pre operative

(Ib) Working length

(Ic) Master cone

(Id) Post operative