

Content available at: <https://www.ipinnovative.com/open-access-journals>

International Journal of Oral Health Dentistry

Journal homepage: www.ijohd.org

Case Report

Endodontic management of taurodontic mandibular second molar: A case report

Mohit Sunil Zarekar^{1*}, Apurva Surendra Satpute², Mohini Sunil Zarekar³

¹Private Practice, Maharashtra, India

²Government Dental College & Hospital, Aurangabad, Maharashtra, India

³Charité – Universitätsmedizin, Berlin, Germany



ARTICLE INFO

Article history:

Received 24-11-2023

Accepted 02-12-2023

Available online 16-01-2024

Keywords:

Enlarged pulp chamber

Endodontic treatment

Mandibular second molar

Taurodontism

ABSTRACT

Taurodontism is an infrequent dental anomaly that predominantly affects the molars and is commonly observed in conjunction with other anomalies or as a component of a syndrome. The phenomenon, previously regarded as a characteristic of early humans, is also observed in contemporary humans albeit with a lower incidence rate. This article presents a unique case study with a female patient who was 35 years old. The patient had taurodontism, a dental condition characterised by enlarged pulp chambers in the molars. Notably, this condition was not found to be connected with any further malformations or syndromes.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

A variation in tooth shape known as taurodontism results from the epithelial sheath diaphragm of Hertwig's failing to invade at the appropriate horizontal level. The distinguishing characteristics are an expanded pulp chamber, apical displacement of the pulpal floor, and lack of constriction at the cemento-enamel junction (CEJ) level.¹ According to Witkop², taurodontism is characterised by teeth with large pulp chambers with apical displacement of the bifurcation or trifurcation, resulting in a larger apicoocclusal height of the chamber than in normal teeth.² The aetiology of taurodontism is multifaceted, often associated with the inadequate invagination of the epithelial root sheath at an early stage, leading to the formation of the cynodont. According to Shaw's (1928) assertion, the trait is transmitted as an autosomal recessive condition. The concept of dominant inheritance was proposed based on the examination of two-generation pedigrees as documented

by Goldstein and Gottlieb (1973) and Gramer and Zusman (1967). In their study, Witkop and Rao (1971) observed a sample of 8 instances and reported that none of the parents were found to be affected. Jaspers and Witkop (1980) as well as J. Varrel et al. (1990) have identified a correlation between taurodontism and X-chromosome aneuploidy.³ The condition is observed in both the permanent and deciduous dentition, occurring unilaterally or bilaterally. However, it is more typically observed in permanent molar teeth, with premolars being affected less frequently.⁴ The radiographic features observed in taurodont teeth include the presence of a rectangular pulp chamber that extends into the elongated body of the tooth, as well as shortened roots and root canals. Additionally, the furcation is typically located at the root apices, despite the crown size appearing normal (Terezhalmay et al., 2001).⁵ While there was once an association between taurodontism and syndromes like Down's and Klinefelter's, it is currently understood as an anatomical variation among the general population.⁶ In endodontic therapy, achieving a successful prognosis necessitates the identification and treatment of all root

* Corresponding author.

E-mail address: zarekarmohit@gmail.com (M. S. Zarekar).

canals. The structural characteristics of the root canal system play a crucial role in determining the specific conditions and requirements for performing root canal therapy, and can significantly impact the likelihood of achieving a successful outcome. Yeh and Hsu assert that the execution of endodontic therapy in taurodontic teeth poses significant challenges.^{7,8}

2. Case Report

35-year-old female was referred to our practice with symptomatic apical periodontitis with tooth no. #37 with non-contributory medical history, intraoral examination revealed occlusal caries (Figure 1). The radiographic analysis of the affected tooth indicated the existence of an indistinct radiolucent area in the root adjacent to the mesial & distal side, which indicates the likelihood of a periapical abscess (Figure 2). Furthermore, an atypical dental morphology was seen. The radiographic examination indicated evidence of crown enlargement, resulting in a reduction in root size. The presence of apical elongation of the pulp chamber below the cemento enamel junction (CEJ), accompanied by apical displacement of the bifurcation of roots, was observed. Additionally, there was seen a minimal restriction at the level of the cemento enamel junction (CEJ). After doing a comprehensive evaluation of the patient's symptoms, performing clinical and radiographic examinations, and gaining the patient's informed consent, endodontic therapy was initiated. The procedure entailed the delivery of 1 ml of local anaesthesia comprising 40 mg of articaine hydrochloride and 0.005 mg of epinephrine (Septanest, Septodont), along with the utilisation of a rubber dam for the purpose of isolation. Access cavity was prepared. The dimensions of the pulp chamber were very substantial, and the pulp chamber was not visually observable. Therefore, an endodontic microscope (Carl Zeiss OPMI®pico) was utilised to identify the canal orifices. The examination revealed the presence of four root canals, specifically the mesiobuccal, mesiolingual, and distal canals, which exhibited Vertucci's type III arrangement. Working length was determined an electronic apex locator (Root ZX, J. Mortina Inc, USA). The canals underwent cleaning and shaping procedures using manual k-files (Dentsply, Maillefer, USA) and RaCe NiTi rotary files in a crown down fashion. During the process of instrumentation, the canals were subjected to irrigation using a solution containing 2.5% sodium hypochlorite. At the conclusion of the instrumentation, a solution containing 17% EDTA was employed for further irrigation. The application of intracanal medicine, specifically calcium hydroxide paste, was performed. Following this, the access cavity was sealed using a cotton pellet and a temporary cement (Cavit 3M ESPE). The patient's subsequent appointment was planned to occur one week following their initial visit.



Figure 1: Preoperative clinical photograph



Figure 2: Preoperative intraoral periapical radiograph

During the subsequent visit, one week following the initial procedure, it was noticed that the tooth exhibited complete absence of symptoms during the postoperative period. The canals were irrigated using a solution of sodium hypochlorite (NaOCl) with a concentration of 2.5%. Subsequently, the canals were dried using paper points and filled with Gutta-percha mastercones (Figure 3) and DIA-ROOT BIO (DiaDent) bioceramic sealer. The remaining pulp chamber was then filled with thermoplasticized gutta percha (Obtura III MAX, Obtura Corporation). In addition to the aforementioned approach, lateral compaction was employed to attain a secure closure in the root canal. Then finally access cavity was restored with composite (Figure 4).



Figure 3: Mastercone radiograph



Figure 4: Post obturation & restoration radiograph

3. Discussion

Taurodontism is often observed in conjunction with other abnormalities and disorders. The occurrence of such occurrences has been widely documented across many communities, with reported prevalence rates ranging from 5.67% to 60% among individuals⁶. However, it should be noted that both persons included in this research were in good health and had no documented medical conditions. It is widely believed that taurodontism arise

due to the inadequacy of Hertwig's epithelial root sheath to properly undergo invagination at the designated moment. The molars are the teeth that are most commonly affected.⁷ According to the recommendations put up by Widerman and Serene, the utilisation of a 2.5% solution of sodium hypochlorite has been suggested as an effective method for the dissolution of residual pulp tissues.⁸ Therefore, the same methodology was employed in the present case. Varrela et al. (1999) provided empirical evidence to support the notion that the prevalence of taurodontism exhibits an upward trend in tandem with an increase in the number of X-chromosomes. Furthermore, their findings suggest a potential positive correlation between the expression of the trait and the number of X-chromosomes. It has been additionally proposed that a gene located on the X-chromosome, which influences the formation of enamel, may also play a role in the development of taurodontism.⁹ The expression of many transcription and growth factors, including SHH, DLX2, and Patched2, has been observed in the HERS. If there is a delay or inability of the HERS (Hertwig's epithelial root sheath) to invaginate into the mesenchyme, it leads to the apical displacement of the root furcation and ultimately contributes to the development of taurodontism.¹⁰ Based on a study conducted by Kim W. et al., it was found that among 1032 patient records with panoramic radiographs from the paediatric dental clinic at the University of Queensland Dental School, a total of 66 patients (6.4%) exhibited agenesis of at least one tooth. This finding suggests a potential association between taurodontism and hypodontia in these patients.¹¹ According to the findings of Shifman and Channanel, the mandibular second molar had the highest susceptibility, as it was implicated in almost two-thirds of all observed instances.¹² Similar finding was associated with our case. Apically positioned canal orifices are observed in instances involving a taurodont tooth, which presents a significant obstacle to dentists during the processes of negotiation, instrumentation, and obturation in root canal therapy.¹³ The achievement of adequate and thorough obturation of the root canal system in cases of taurodontism is a considerable challenge. Furthermore, there is a suggestion in the literature that post-placement should be skipped in the context of tooth repair.¹⁴ Additionally, it should be noted that taurodont teeth exhibit a diminished capacity to endure typical occlusal wear stresses, which in turn may compromise their stability inside the alveolar bone, mostly due to their reduced spatial occupancy.¹⁵

4. Conclusion

Taurodont teeth require complicated root canal therapy, which takes time and presents difficulties for many endodontists. This morpho-anatomical alteration, which is more common in second molars than in first molars, necessitates careful consideration in both the radiological

and clinical diagnosis. Dental professionals need to be more knowledgeable about the many types of dental diagnoses. More knowledge of the numerous and diverse dental treatment techniques that can be selected and used in accordance with the diagnosis is required of clinicians.

5. Source of Funding

None.


6. Conflict of Interest


None.


References

1. Mohan RPS, Verma S, Agarwal N, Singh U. Taurodontism. *BMJ Case Rep.* 2013;2013:bcr2012008490.
2. Bafna Y, Kambalimath HV, Khandelwal V, Nayak P. Taurodontism in deciduous molars. *BMJ Case Rep.* 2013;2013:bcr2013010079.
3. Joshy VR, Jose M, Mohammed R. Taurodontism of multiple teeth-A case report. *Oral Maxillofac Pathol J.* 2011;2(1):132–6.
4. Sahu YR, Jain A. Endodontic Management of Taurodontism in Maxillary Molar: A Case Report. *Int J Sci Stud.* 2016;4(5):271–4.
5. Jafarzadeh H, Azarpazhooh A, Mayhall JT. Taurodontism: a review of the condition and endodontic treatment challenges. *Int Endod J.* 2008;41(5):375–88.
6. Deshpande NM, Kulkarni MU, Shah D, Desai N. Taurodontism in Permanent Molars: Report of two cases. *J Adv Med Dent Sci Res.* 2018;6(10):131–3.
7. Hayashi Y. Endodontic treatment in taurodontism. *J Endod.* 1994;20(7):357–8.
8. Chowdappa NS, Hegde MN, Shetty S, Bhat GT. Management of taurodont right mandibular second molar tooth: A case report. *J Indian Acad Dent Spec Res.* 2014;1:80–2.
9. Jayashankara CM, Shivanna AK, Sridhara KS, Kumar PS. Taurodontism: A dental rarity. *J Oral Maxillofac Pathol.* 2013;17(3):478.
10. Chetty M, Roomaney IA, Beighton P. Taurodontism in dental genetics. *BDJ Open.* 2009;7(1):25.
11. Kim W, Lai P. Association of taurodontism with hypodontia: a controlled study. *Pediatr Dent.* 1989;11(3):214–9.
12. Sert S, Bayırlı G. Taurodontism in six molars: a case report. *J Endod.* 2004;30(8):601–2.
13. Sambandam TV, Ramesh S. Taurodontism a challenge in endodontics: A case report. *J Adv Pharm Edu Res.* 2017;7(3):349–51.
14. Baranwal AK. An anatomical challenge to clinical endodontics. *Ann Prosthodont Restor Dent.* 2016;2(4):105–9.
15. Einy S, Yitzhaki IH, Cohen O, Smidt A, Zilberman U. Taurodontism—Prevalence, Extent, and Clinical Challenge in Ashkelon, Israel—A Retrospective Study. *Appl Sci.* 2022;12(3):1062.

Author biography

Mohit Sunil Zarekar, Dentist (Paedodontics & Preventive Dentistry)  <https://orcid.org/0000-0002-5101-896X>

Apurva Surendra Satpute, PG Resident  <https://orcid.org/0009-0000-7011-5581>

Mohini Sunil Zarekar, Master's Student  <https://orcid.org/0009-0001-3425-8240>

Cite this article: Zarekar MS, Satpute AS, Zarekar MS. Endodontic management of taurodontic mandibular second molar: A case report. *Int J Oral Health Dent* 2023;9(4):294-297.