

Endodontic Management Of Taurodont Teeth: A Case Series

Dr. Pradnya V. Bansode¹, Dr. M. B. Wavdhane², Dr. Seema D. Pathak³,
Dr. Janhavi Swami⁴

¹(Head Of Department, Professor, Department of Conservative Dentistry and Endodontics, GDC and Hospital, Aurangabad/MUHS, India)

²(Associate Professor, Department of Conservative Dentistry and Endodontics, GDC and Hospital, Aurangabad/MUHS, India)

³(Professor, Department of Conservative Dentistry and Endodontics, GDC and Hospital, Aurangabad/MUHS, India)

⁴(MDS Student, Department of Conservative Dentistry and Endodontics, GDC and Hospital, Aurangabad/MUHS, India)

Abstract:

Background: Taurodontism is a developmental deviation in shape of tooth which may or may not be in association with certain syndromes. An enlarged pulp chamber and apical displacement of the pulpal floor is characteristics of taurodont teeth. Endodontic treatment of such teeth can be dilemma due to increases apico-occlusal height of the teeth. This case series represents endodontic therapy of such taurodont teeth with use of certain aid in technique and technology.

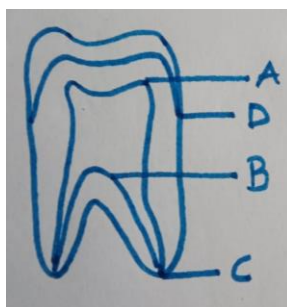
Key Words: taurodont, anatomic variability, illumination

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I. Introduction

Taurodontism is morphological condition characterized by vertically expanded pulp chambers, apical displacement of pulp floors, at expense of roots.¹ Sir Arthur Keith came up with the word taurodontism to describe the "bull-like" state in teeth (from the Latin tauro: "bull" and dont: "tooth" from Greek), in which a long root trunk encloses a high pulp chamber and short roots.^{1,2} The cause of taurodontism is unknown. The inability of Hertwig's epithelial sheath diaphragm to invaginate at a correct horizontal level is assumed to be the reason, resulting in a tooth with short roots, an extended body, an expanded pulp, and normal dentin.^{2,3} Shaw defined taurodontism as hypo, meso and hypertaurodontism based on the apical displacement of the pulp chamber floor in 1928.^{1,3} In 1978, Shifman and Chanannel determined more objective criteria on the basis of actual measurements of the tooth.⁴



Taurodont teeth were measured using Shifman and Chanannel 's criteria: the highest point of the pulp chamber roof (A), the lowest point of the pulpal floor (B), the vertical height of the pulp chamber (AB), and the distance between the cemento-enamel junction and the lowest point on the floor of the pulp chamber (DB). Taurodontism is established when $(AB/AC) * 100 > 20$ and $BD > 2.5$ mm. $AB/AC * 100 =$ Taurodontic index (TI). Taurodontism is classified into three levels: TI 20-30 for hypotaurodontism, TI 30-40 for mesotaurodontism, and TI 40-75 for hypertaurodontism.^{4,5}

Taurodontism being an anatomic variation proves as a challenge for endodontic treatment in location and negotiation of canal orifices, also in cleaning and obtaining hermetic seal due to enlarged plup chamber. This case series describes three cases of endodontic treatment of taurodont teeth.

II. Case Report 1

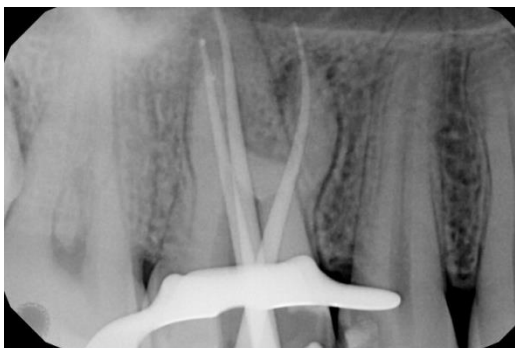
A 23 year old male patient reported to Department of Conservative Dentistry and Endodontics with chief complaint of pain in upper right back region of jaw. On clinical examination a cement filling was noted with 16. Patient gave history of initiation of root canal treatment 3 weeks ago with same tooth. The concerned tooth was tender on percussion. IOPA X-ray revealed enlarged pulp chamber at expense of root along with radiopaque restoration in crown region thus suggestive of mesotaurodontism. There was no relevant medical or family history to demonstrate that taurodontism was not related with any other syndromes or disorders in this instance. Thus the provisional diagnosis symptomatic apical periodontitis secondary to incomplete endodontic treatment with 16 was established. The treatment plan thus formulated was completion of root canal treatment of concerned tooth. The tooth was isolated under rubber dam isolation and temporary restoration was removed. The access cavity was slightly modified to obtain straight line access to all three root canals. The pulp chamber was cleaned till trifurcation and three canals were located namely mesiobuccal, distobuccal and palatal. For ease of visualization, as canal orifices were located more apically, loupes of 3x magnification along with illumination were used. The working length was established using electronic apex locator Root ZX Mini (J. Morita Corp, Tokyo, Japan). Instrumentation was carried out using a balanced force technique with K-files later it was carried out using a rotary system (M two, VDW GmbH, Munich, Germany). A 2.5% solution of sodium hypochlorite and saline along with ultrasonic activation (Ultra-X , ORIKAM) was used for irrigation. Due to enlarged pulp chamber combination technique was used for obturation. Canals were filled till orifice with vertical compaction using Fastpack pro (Eighteeth, Changzhou Sifary Medical Technology, China) and the pulp chamber was filled with thermoplasticized gutta purcha using Fast fill (Eighteeth, Changzhou Sifary Medical Technology, China). The tooth was then restored with permanent restoration. Final radiograph revealed well condensed gutta purcha in complete root canal system.



Pre-Operative Radiograph



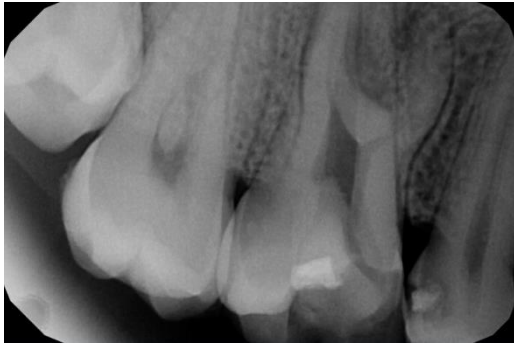
**Radiograph after Temporary
Restoration removal**



Radiograph of Master Cone



Post Obturation IOPA X-Ray



Pre-Operative IOPA X-ray



Post-Operative Radiograph

III. Case Report 2

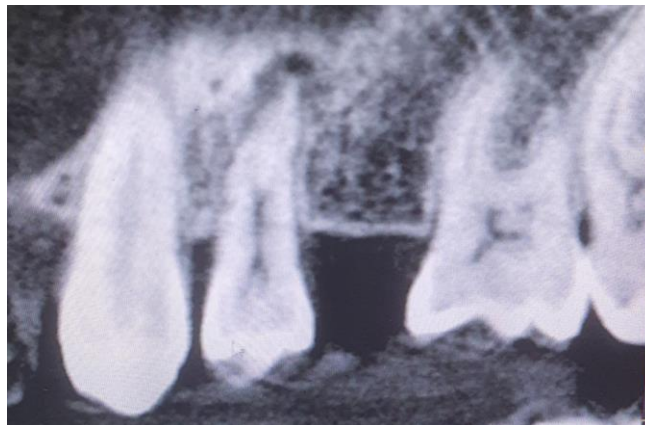
A 24 year old male patient reported to Department of Conservative Dentistry and Endodontics with chief complaint of pain in upper right back region of jaw since 3-4 days. On clinical examination partial palatal cusp fracture was noted with the tooth 14 and the same tooth was tender on percussion . The patient gave history of trauma 2 years back. Electric pulp testing revealed no response with concerned tooth. CBCT was advised for tooth number 14 on suspicion of crack or root fracture. CBCT revealed large periapical radiolucency associated with palatal root of 14. The pulp chamber was extended below CEJ level and both buccal and palatal roots were short suggestive of hypotaurodontism. The diagnosis thus formulated was symptomatic apical periodontitis secondary to pulpal necrosis. The treatment planned was Root canal treatment with 14 followed by prosthesis. The procedure was followed same as case report 1.



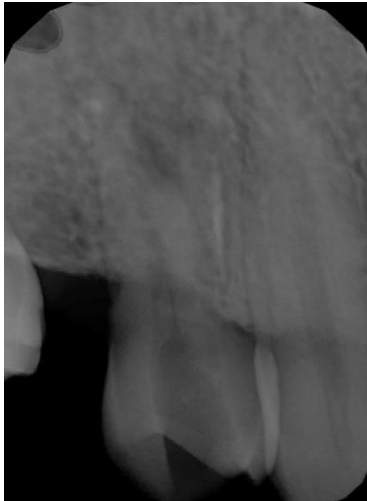
Pre-Operative IOPA X-ray



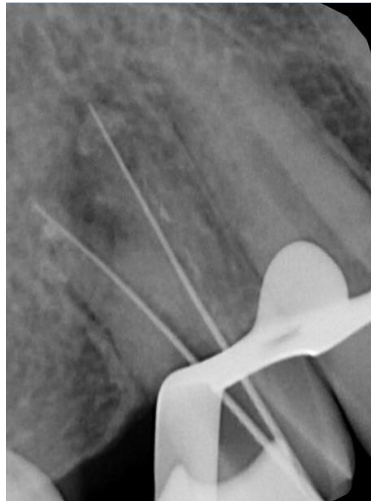
Pre-Operative CBCT -Sagittal View



Pre-Operative CBCT Coronal View With 14



IOPA after access opening



Working length determination



Intracanal medicament of Ca(OH)_2 placed for 2 weeks



Master cone IOPA X-ray



Post-Obturation IOPA X-ray



IOPA X-ray after 6 months Follow up

IV. Case Report 3

A 32 year old patient reported to Department of Conservative Dentistry and Endodontics with pain in lower right back region of jaw since a week. On clinical examination deep disto - occlusal caries was noted with 47. The tooth was tender on percussion .The patient gave history of continuous pain. IOPA X-ray revealed radiolucency involving enamel, dentin as well as pulp chamber. The pulp chamber was enlarged suggestive of mesotaurodont. The diagnosis then formulated was symptomatic apical periodontitis secondary to irreversible pulpitis. The treatment decided was Root canal treatment with 47 followed by crown prosthesis. The process followed was same as case report 1.



Pre-Operative IOPA X-ray



Post- Operative IOPA X-ray

V. Discussion

Witkop defined taurodontism as: 'Taurodont teeth have pulp chambers in which the bifurcation or trifurcation is displaced apically, so that the chamber has a greater apico-occlusal height than in cynodont teeth and lacks a constriction at the level of the CEJ. The distance from the bifurcation or trifurcation of the roots to the CEJ is greater than the occlusal-cervical distance'.⁶ This aberration may present as an isolated attribute or be linked with conditions such as hypophosphatasia or sex chromosome shifts such as Klinefelter's syndrome, Down's syndrome, X-chromosome aneuploid syndrome with ectodermal defects, Mohr's syndrome, trichodonto-osseous syndrome, and Maroteaux-Lamy syndrome. The most frequently affected teeth are the molars.^{7,8} Endodontic therapy in taurodont teeth has been regarded as challenging and complicated. Durr et al. proposed that morphology might interfere with orifice positioning, and there by rendering difficulties in instrumentation and obturation.⁸ All of the cases in this case series benefited from the use of magnification along with illumination, thorough debridement with sodium hypochlorite irrigation and ultrasonics, as well as thermoplasticized gutta purcha obturation with a combination of vertical compaction technique, which diminished the risk of dead spaces.⁹

VI. Conclusion

Present case series depicts endodontic therapy of a maxillary molar, a maxillary premolar and a mandibular molar with taurodontism with modified techniques which all assisted in achieving successful prognosis.

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