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REVIEW ARTICLE

ENDODONTIC MANAGEMENT OF BULL-LIKE TEETH: A REVIEW AND CASE SERIES

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ABSTRACT

Taurodontism is a change in shape of the tooth as a result of failure of hertwig's epithelial sheath diaphragm to invaginate at the proper horizontal level. The characteristic features of taurodontism are an enlarged pulp chamber, displacement of the pulpal floor apically and absence of constriction at the level of the cemento-enamel junction. The most commonly affected are the permanent molar teeth, but it can occur in deciduous dentition as well. It may exist unilaterally or bilaterally and may affect any teeth or quadrants in combination. Taurodontic teeth exhibit complex root canal system, canal obliteration and the potential for additional root canal system. The root canal therapy on such teeth necessitates careful exploration of the dentinal map particularly with the help of magnifying devices, use of ultrasonic irrigation; and a modified technique for filling of the root canal space. This case series describes endodontic management of mandibular molars with taurodontism.

INTRODUCTION

Taurodontism is a developmental disturbance in shape of the tooth in which the body of the tooth is enlarged and the roots are exceedingly short. Taurodont teeth have large pulp chambers with a much greater apico-occlusal height than normal and the furcation may be only a few millimetres above the root apices.[1] The term taurodontism was coined by Sir Arthur Keith to describe the occurrence of "bull-like" teeth and its usage is derived from similarity of these teeth to those of cud-chewing animals.[2]

The exact etiology of taurodontism is not known. Hammer and his associates believe that it is caused by the failure of Hertwig's epithelial sheath diaphragm to invaginate at the proper horizontal level, resulting in a tooth with short roots, elongated body, an enlarged pulp, and normal dentin.[3]A case of taurodontism occurring concomitantly with amelogenesis imperfect has been reported by Crawford. Previously, taurodontism was related to syndromes such as Down and Klinefelter.[4] Today, it is considered as a variation in the tooth anatomy that can be found in normal population.[5]

Taurodontism has been graded according to different authors (Table. 1).[6]

The occurrence of taurodontism, although uncommon, may influence dental management of such patients. The present case series describes endodontic management of mandibular molars exhibiting taurodontism.

Case reports

Case 1

A 22-year-old male patient presented at the clinic for endodontic treatment of the mandibular left second molar. The medical history of the patient was non-contributory. At this time, the tooth was asymptomatic. On intraoral examination a normal shaped crown with a deep occlusal caries was revealed. The tooth did not exhibit sensitivity to percussion or palpation. Periodontal probing was within normal range (2–3 mm). An intra-oralperiapical radiograph of the affected tooth showed the pulp chamber reaching the furcation and extending beyond the cervical area.

The radiograph revealed two short roots at the furcation area in the apical third (Fig. 1 A), indicating hypertaurodontism according to Shifman and Chanannel (5).Hypertaurodontism on the contralateral side was confirmed by OPG (Fig. 1 H). The patient reported that his left first mandibular molar was endodontically treated before and is asymptomatic.

Lidocaine 2%, with epinephrine 1:100,000, was used for anaesthesia (Lidocaine). Magnification loupes (Allure-Prime Dental Products P. Ltd, Thane, India) were used throughout the procedure to enhance visualization of the operating field. The tooth was isolated and the access cavity was prepared. The

pulp was exposed and extirpated and the resulting bleeding was controlled by instrumentation. After instrumentation of the tooth to the furcation, three canal orifices were found: a wide distal one (D), and two narrow orifices—a mesiobuccal (MB) and a mesiolingual (ML) (Fig. 1 B). Instrumentation was performed by a balancedforce technique with K-files (MANI, INC. Japan) and Hyflex files (HyFlex CM, COLTENE ENDO). An electronic apex locator (RootZX; Morita, Tokyo, Japan) was used to calculate the initial working length (Fig. 1 C, D).The distal canal was instrumented to #25 .04% taper hyflex files (HyFlex CM, COLTENE ENDO) and the mesiobuccal and mesiolingual canal to a #20.04% taper hyflex files (HyFlex CM, COLTENE ENDO). Sodium hypochlorite3% (Prime Dental Products P.Ltd, Thane, India) and sterile saline solutions were used for irrigation. Amodified technique was used for obturation because of the close proximity of the orifices and the complex inner root canal anatomy. This comprised of lateral condensationin the apical portion and vertical compaction of the elongated pulpchamber, using the System B device (E and Q Plus-Meta Biomed Co. Ltd.). The final radiograph showed a well-condensed filling of the canal space consisting of 3 canals obturated to the predetermined length (Fig. 1 F, G).

After obtaining adequate anaesthesia and rubber dam isolation, the access cavity was prepared. Magnification loupes (Allure-Prime Dental Products P.Ltd, Thane, India) were used throughout the procedure to enhance visualization. The tooth was instrumented to the furcation area where two canal orifices were found: a wide distal one (D), and one narrow orifice of mesial canal (M). Both the canals were instrumented as described in Case 1.The distal canal was instrumented to #25 .04% taper hyflex files (HyFlex CM, COLTENE ENDO) and the mesial canal to a #20 .04% taper hyflex files (HyFlex CM, COLTENE ENDO). Sodium hypochlorite 3% (Prime Dental Products P.Ltd, Thane, India) and sterile saline solutions were used for irrigation. Obturation was carried out using modified technique as described in case 1. The post obturation radiograph depicted a well-condensed filling consisting of 2 canals obturated to the predetermined working length (Fig. 2 D, E).

Case 3

A 22-year-old female patient presented at the clinic for endodontic treatment of the mandibular left first molar. The medical history of the patient was non-contributory. At this time, the tooth was symptomatic.

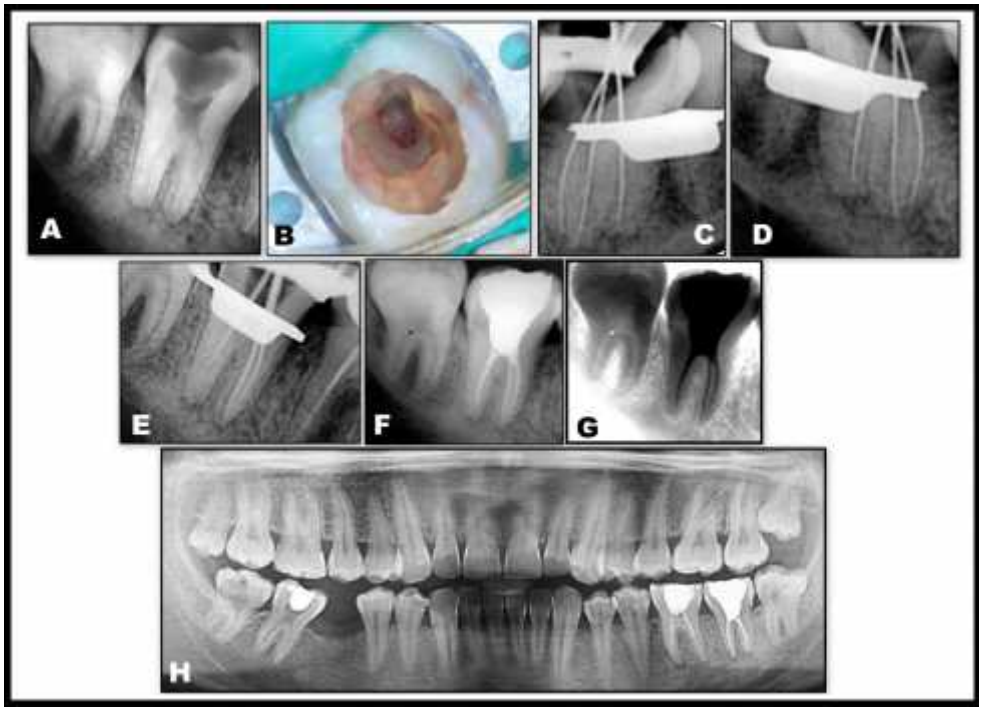

Figure 1 A- Preoperative IOPA, B- Clinical picture of pulp chamber, C- Working length IOPA (mesial angulation), D- Working length IOPA (distal angulation), E- Master cone IOPA, F- Postoperative IOPA, G- Inverted image of postoperative IOPA, H- OPG.

Case 2

A 50-year-old female patient presented at the clinic for endodontic treatment of the mandibular left second molar. The patient's medical history was non-contributory. The tooth was symptomatic and sensitive to percussion and palpation. Clinical examination revealed a normal shaped crown with a deep disto-occlusal caries. The pulp chamber was seen reaching the furcation and extending beyond the cervical area onan intra-oral periapical radiograph of the affected tooth. Periodontal probing was within normal range (2–3 mm).

Two short roots were seen at the furcation area in the apical third (Fig. 2 A), indicating hypertaurodontism according to Shifman and Chanannel (5). Hypertaurodontism on the contralateral side was confirmed by OPG (Fig. 2 F).

On intraoral examination a normal shaped crown with fracture buccal wall of the tooth. Orthodontic banding was done immediately with the affected tooth (Fig. 3 A). The tooth exhibited sensitivity to percussion or palpation. Periodontal probing was within normal range (2–3 mm). An intra-oral periapical radiograph of the affected tooth showed the pulp chamber reaching the furcation and extending beyond the cervical area.

The radiograph revealed two short roots at the furcation area in the apical third (Fig. 3 A), indicating hypertaurodontism according to Shifman and Chanannel (5). Hypertaurodontism on the contralateral side was confirmed by OPG (Fig. 3 G).

Lidocaine 2%, with epinephrine 1:100,000, was used for anaesthesia (Lidocaine).

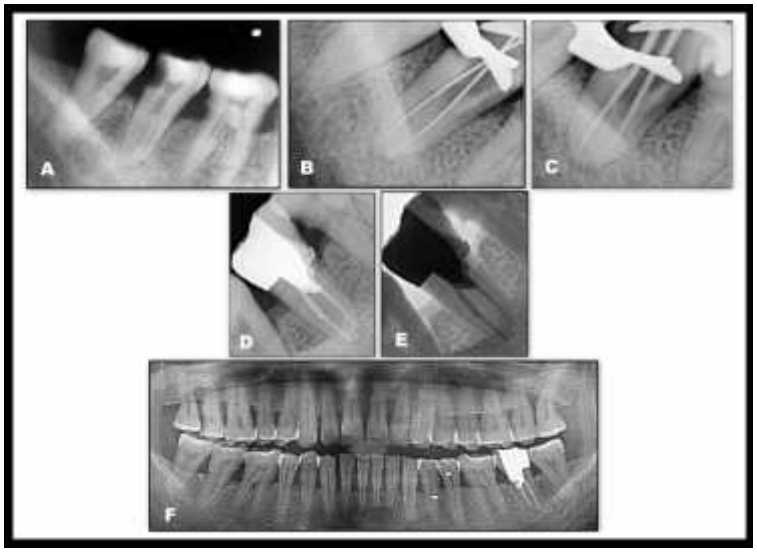

Figure 2 A- Preoperative IOPA, B- Working length IOPA, C- Master cone IOPA, D- Postoperative IOPA, E- Inverted image of postoperative IOPA, F- OPG.

Magnification loupes (Allure-Prime Dental Products P.Ltd, Thane, India) were used throughout the procedure to enhance visualization of the operating field. The tooth was isolated and the access cavity was prepared. The pulp was exposed and extirpated and the resulting bleeding was controlled by instrumentation. After instrumentation of the tooth to the furcation, three canal orifices were found: a wide distal one (D), and two narrow orifices—a mesiobuccal (MB) and a mesiolingual (ML) (Fig. 3 B).

Same as Case 1 and 2

The final radiograph showed a well-condensed filling of the canal space consisting of 3 canals obturated to the predetermined length (Fig. 3 D, E, F) and the band was removed.

DISCUSSION

The clinical implications of taurodontism teeth have increased chance of pulp exposure due to caries and dental procedures. It can complicate prosthetic and/or orthodontic treatment planning. Taurodontism, although not very common have to be highlighted due to its influence on diverse dental treatment modalities.[7]

Mandibular second molar teeth show more variations in canal configuration compared to other molars. Taurodontism is an anomaly in tooth shape which is characterized by elongated body of pulp chamber and shortening of roots and its occurrence is not rare that is 0.25-11.3% of the population.

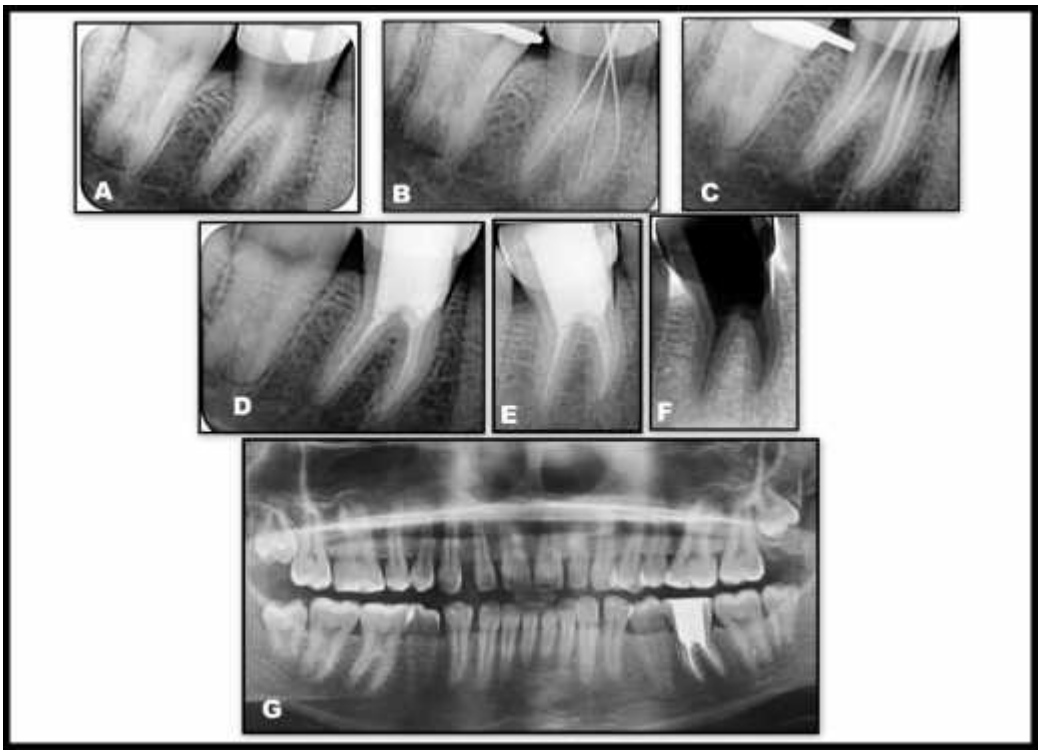

Figure 3 A- Preoperative IOPA, B- Working length IOPA, C- Master Cone IOPA, D- Postoperative IOPA (distal angulation), E- Postoperative IOPA (mesial angulation), F- Inverted image of postoperative IOPA, G- OPG.

Taurodontism can only be notice and diagnosed radiographically as external tooth morphology resembles normal anatomic configuration. Taurodontism may or may not be associated with syndromes like Down, Klinefelter's, Apert's, Mohr syndrome and Tricho-dento-osseous Syndrome. It has also shows high prevalence with labial or palatal clefts. However, this anomaly is also common in healthy populations.[7.8]

In cases 1, 2, 3 the patients were apparently healthy adults without any known systemic diseases. The endodontic treatment in taurodont teeth has been described to be complex and tough. Durr *et al*. suggested that morphology of the tooth could influence the location of the canal orifices, thus creating difficulty in instrumentation of the canals and obturation.[9] Out of five cases presented by Cohen and Taintor, two required endodontic therapy, in which treatment was difficult to accomplish.[10] Each case demonstrated variation in the number of root canals. A complicated endodontic treatment of a mandibular molar with Taurodontism has been reported by Hayashi, where only three out of canals five canals could be successfully instrumented to the apex.[11]

Endodontic treatment of taurodont teeth, the dentist should appreciate the complexity of the root canal system, canal obliteration and configuration, and the potential for extra roots and canals. Utmost care should be given to exploration of the grooves between all the orifices, particularly with magnification, use of ultrasonic irrigation, and a modified filling technique is particularly important.[12]

The present cases describe the successful completion of endodontic treatment of Taurodontism with mandibular left molars, which appeared difficult to perform with conventional techniques. It is very important for a clinician to be familiar with Taurodontism not only with regards to clinical complications but also its management. Taurodontism also provides a valuable clue in detecting its association with many syndromes and other systemic conditions.[7]

CONCLUSION

Endodontic Management of teeth with Taurodontism is complex procedure because of variation in the canal anatomy and orifice location. The success of the treatment was mostly attributed to the use of magnifying devices, which allowed the location of the all canal orifices to be easily seen and use of modified obturating technique. Diagnosis of this condition is utmost important not only due to its dental significance but its most likely relation with syndromes and associated risk.

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Conflict of Interest

The authors have no conflict of interest

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