

TWO TAURODONT PRIMARY MOLARS WITH PULPAL INVOLVEMENT: A MANAGEMENT APPROACH

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ABSTRACT

Taurodontism is basically a developmental disorder with large pulp chambers and furcal areas located closer to the apex. The prevalence of taurodontism is very less i.e 0.54% in primary dentition. The main problem faced in endodontic management of a taurodont tooth is the short roots which makes instrumentation almost difficult or not possible at all. So, certain modifications had to be made in pulpal therapy of a taurodont primary tooth considering the morphological changes of the tooth. This paper discusses the management of two pulpally involved taurodont primary molars in a 4.5 year old patient.

INTRODUCTION

The term “taurodontism” means “bull-like teeth”, it was given by Sir Arthur Keith in 1913 to describe a peculiar dental anomaly in which the body of tooth is enlarged at the expense of the roots [1]. The definition for taurodontism was given by Witkop in 1988 as follows - “Taurodontism is an anomaly in which large pulp chamber is present, and the bifurcation is located apically and hence that the chamber has greater apico-occlusal height than in normal teeth and lacks the constriction at the level of cemento-enamel junction (CEJ). The distance from the trifurcation or bifurcation of the root to the CEJ is greater than the occluso-cervical distance” [2]. Theoretically, a lot of aetiologies has been stated for taurodontism. It may be caused due to specialized or retrograde character or a mutation resulting from odontoblastic deficiency during dentinogenesis of the roots. Basically, it occurs due to the failure of Hertwig epithelial sheath to invaginate at the proper horizontal level. This condition appears to be familial in nature [1].

Taurodontism most frequently appears as an isolated anomaly. At times, it may be associated with various syndromes or conditions such as amelogenesis imperfecta, ectodermal dysplasia, Down’s Syndrome, tricho-dento-osseous syndrome, Klinefelter’s syndrome and Lowe Syndrome [3], Smith Magenis Syndrome [4], Williams Syndrome [5], Van der Woude Syndrome [6] and McCune-Albright Syndrome [7]. First classification of taurodontism was made by Shaw in 1928 as mild (hypotaurodontism), moderate (mesotaurodontism) and severe (hypertaurodontim) based on the relative displacement of the pulp chamber floor [1]. Hypotaurodontism - pulp chamber enlarged, least form; mesotaurodontism - bifurcation or trifurcation at the middle third of the tooth roots; hypertaurodontism - bifurcation or trifurcation near the root apices [8].

Later came many classification systems, among which that of Shifman and Chanannel (1978), in which three types of taurodontism were defined in biometric terms, remains the widely used one. Three variables are measured: V1 - vertical

height of the pulp chamber, V2 - distance between the lowest point of the roof of the pulp chamber to the apex of the longest root, and V3 - distance between the baseline connecting the two CEJ and the highest point in the floor of the pulp chamber. If $V1/V2 \times 100 > 20$ and $V3 > 2.5$ mm, then it is suggestive of taurodontism. Then, to find out the type calculate the taurodontic index ($T1 = V1/V2 \times 100$). If $TI 20-30 \rightarrow$ Hypotaurodontism, $TI 30-40 \rightarrow$ mesotaurodontism, and $TI 40-75 \rightarrow$ Hypertaurodontism [9]

Case Presentation:

A 4.5 year old male patient came to the Department of Paediatric and Preventive Dentistry with the chief complaint of painful decayed lower right and left back teeth for the past 2 months. Pain history revealed sharp, intermittent pain, aggravated on food lodgement and relieved at rest, no relevant history of nocturnal pain and fever. Past dental history revealed that the patient had undergone endodontic treatment followed by restoration in the upper front teeth before 2 months, however he was uncooperative throughout the procedure and the whole treatment was done under physical restraint. The patient’s behaviour was rated 1 (Definitely Negative) in Frankl Behaviour Rating Scale as observed while taking intraoral photos and radiographs. Therefore treatment was planned to be done under general anaesthesia. Intraoral findings showed the presence of all primary teeth with class II dental caries in 54, 64, 74, 84; multisurface caries in 75, 85; 51, 52, 61, 62 showed strip crown of which the crown of 51 appeared to be dislodged (Fig 1, 2, 3). Radiographic examination of 75 and 85 revealed that there was radiolucency involving enamel, dentin and pulp, extremely large pulp chamber with greater occluso-apical height, lack of cervical constriction, short roots and bifurcation only a few millimetres above apices of roots - suggestive of hypertaurodont teeth (Fig 4, 5); Interpretation of 74 and 84 showed radiolucency involving enamel, dentin and approximating pulp (Fig 4, 5); 54 and 64 showed radiolucency involving enamel and dentin; all the first primary molars also showed to exhibit some degree of taurodontism milder than the second molars (Fig 6, 7). CBCT was advised to evaluate other

primary teeth and the development of unerupted permanent teeth and it also showed that all the Es exhibited the features of hypertaurodontism whereas all the Ds also exhibited taurodontism (milder form than the Es). All the permanent successors were present. The occluso-apical height of the pulp chambers as measured from CBCT : 55 - 7.8 mm, 54 - 3.2 mm , 64 - 3.6 mm , 65 - 9.5 mm , 75 - 6.8 mm , 74 - 3.8 mm , 84 - 4.4 mm and 85 - 8.4 mm (Fig 8,9,10,11,12,13,14,15)

From the subjective, objective and radiographic findings, the patient was diagnosed to have taurodontism in all the molars. 74,75,84,85 - Dental caries with reversible pulpitis; 54, 64 - Dental caries. The patient's parents were explained about the condition and the treatment was planned to be pulp capping in 74 and 84 , superficial pulpotomy in 75 and 85 , SSC in 54 and 64 , preventive resin restoration in 55 and 65 under general anaesthesia. Medical examinations and tests were performed before 1 week of the procedure and fitness was obtained from the anesthetist. The patient got admitted the day before the procedure and re-examined by the anesthetist. Clearance for

dental procedures was given. Signed informed consent was obtained from the parent. Pre-operative verbal and written instructions were given to the parent regarding diet restrictions and medications to be taken. The patient was taken to the OT on the day of the procedure, anesthesia was induced and the treatment was started. Direct SSC was given in 55, 54 and 64 due to the proximal carious lesion. Moving on to the left mandibular arch, LA was administered. Rubber dam isolation of 74 and 75 with the clamp engaging 75 was done (Fig 16). Caries was completely excavated using a short shank TFS 22 bur in 74 and 75 .The pulp got exposed in 75 and there was no pulpal exposure in 74 .In 75, the following procedure was done: the roof of the coronal pulp chamber was removed. The superficial pulp was removed using a sharp spoon excavator. Saline irrigation was done. As expected the pulp chamber was deep and the floor of the chamber was not able to be visualized. Hemostasis was tried to be achieved by moistening cotton pellet with saline and placing it over the pulp tissue



Fig 1



Fig 2



Fig 3



Fig 4: RVG – 74, 75



Fig 5: RVG – 84, 85



Fig 6: RVG - 54, 55



Fig 7: RVG - 64, 65

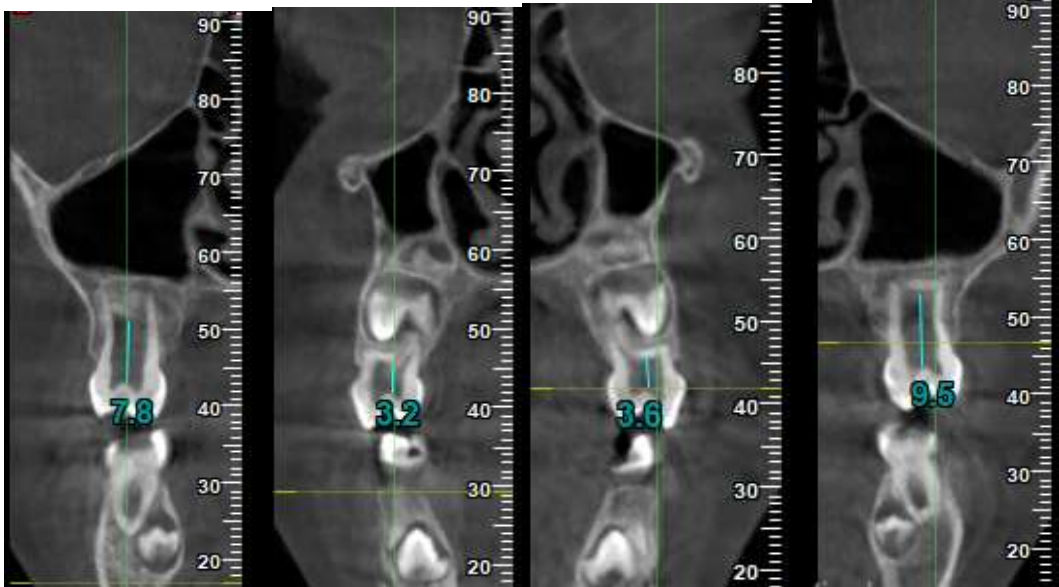


Fig 8

Fig 9

Fig 10

Fig 11

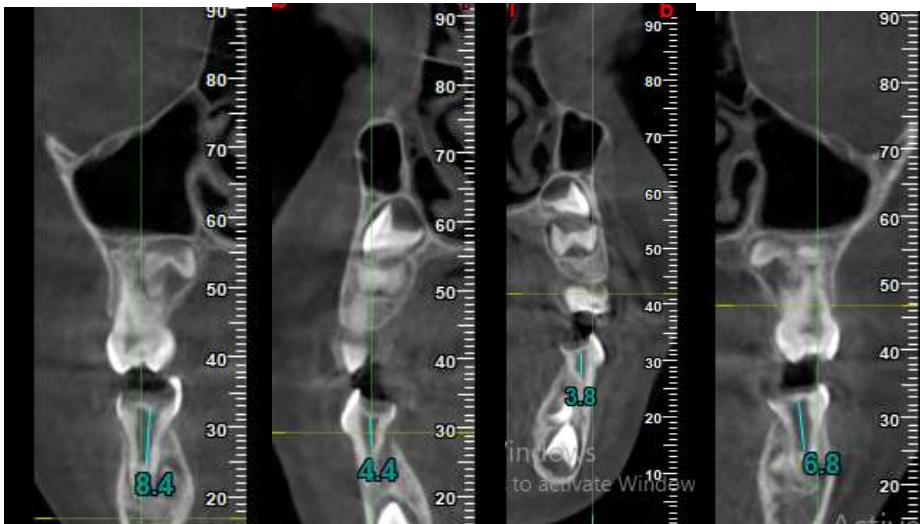


Fig 12 Fig 13

Fig 14

Fig 15

The occluso-apical height of the pulp chambers measured from CBCT: - Fig 8: 55, Fig 9 : 54 , Fig 10 :64, Fig 11 : 65, Fig 12 : 85, Fig 13:84, Fig 14 : 74 , Fig 15 : 75

for 5 minutes. But, hemostasis was not achieved. Some more pulpal tissue was then removed using spoon excavator and hemostasis was tried by the same method. Hemostasis was finally achieved (Fig 17). MTA was placed over the pulpal tissue

(Safe Endo Biostructure MTA Putty) followed by a temporary restoration (Fig 18). Indirect pulp capping using MTA (Fig 18) followed by temporary restoration was done in 74. Then; the teeth were restored with stainless steel crowns (Fig 19). This same procedure of superficial pulpotomy was done in 85 and indirect pulp capping in 84, but another form of MTA- powder

and liquid form (e-MTA:-1 tube of powder: 1 drop of liquid) was used followed by SSC (Fig 20-23)

After three month, the teeth were clinically asymptomatic; absence of extraoral or intraoral swelling, abscess and sinus tract; radiographically, there was no furcal radiolucency and no signs of pathological external root resorption or internal root resorption (Fig 24-27)



Fig 16



Fig 17

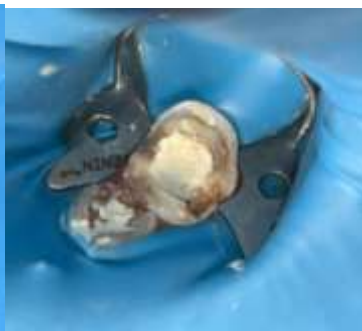


Fig 18



Fig 19



Fig 20



Fig 21



Fig 22



Fig 23



Fig 24



Fig 25



Fig 26



Fig 27

DISCUSSION

In the present case, taurodontism of all the primary molars is an isolated anomaly, not associated with any other syndrome, hypodontia or tooth agenesis. Some authors postulate that taurodontism can be associated with other conditions whereas some don't[10]. Taurodontism can't be identified clinically because there is no apparent anomaly in

the clinical crown. It can be diagnosed only via radiograph[11]. In the present case the distance between the baseline connecting the two CEJ and the highest point in the floor of the pulp chamber is > 2.5 mm for all the molars which is suggestive of taurodontism[9]. The teeth of complaint with reversible pulpitis 75 and 85 were extremely hyperemic. Routine pulpectomy is impossible due to very short root

canals. Complete pulpotomy is also difficult because of the large volume of pulp chamber and difficulty in locating the orifices. Also, the replacement of the complete pulp chamber with MTA can make the physiologic resorption process delayed because it is known that the resorption rate of MTA is lesser than that of other conventionally resorbable pastes such as zinc oxide-eugenol, iodoform and calcium hydroxide commonly used for pulpectomies [12]. A two visit pulpotomy with formocresol is also not possible because the procedure is done under GA. Extraction was also not planned because the mandibular first permanent molars have not erupted and maintaining the second primary molars seem to be important[10]. Moreover, from the pain history and radiograph, the inflammation is thought to be limited only to the superficial pulpal tissue. MTA was a novel material introduced by Torabinejad and co-workers in 1990s. It is biocompatible, possess the ability to induce hard-tissue formation in pulpal tissues and it promotes rapid cell growth. MTA also has an antibacterial effect on some facultative bacteria [13]. Several studies show that MTA is a successful pulpotomy agent for primary and permanent molar[14][15]. Thus, superficial MTA pulpotomy was chosen as the treatment procedure. The full procedure was done under rubber dam isolation to avoid contamination of the pulpal tissue. All the peripheral caries was removed to prevent bacterial contamination once the pulp is exposed and improve the visibility of the exposure site[16]. The superficial pulp was removed carefully using spoon excavator as suggested[16]. Post excavation haemorrhage was controlled using a cotton pellet moistened with saline. No other irritating solution is used which would react with pulp unnecessarily [16]. The status of the remaining pulp is to be assessed before placing MTA over it, so no other material is placed over it which would alter the stasis of haemorrhage [16]. Once hemostasis is found to be achieved, MTA is placed over the pulpal tissue. Here, 2 forms of MTA (powder-liquid for 85 and putty for 75) were used to assess for any differences in the prognosis.

CONCLUSION

Taurodontism appears absolutely normal clinically and could be detected only in radiograph. This stresses the importance of radiographic evaluation before planning any treatment. The treatment plan for a taurodont tooth is completely different from that of a normal tooth. It should be decided based on the degree of taurodontism, the inflammatory status of the pulp, the resorption status of the roots, the age of the patient and the presence or absence of permanent successors. Pulpotomy seems to be the best option in this case. However, long term follow up is necessary to evaluate the prognosis.

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