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Identification and treatment of second mesiobuccal canal in primary maxillary molars during pulpectomy procedure in pediatric dental patients

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***Abstract*---**Endodontics in primary teeth is a significant challenge in pediatric dental patients due to behavioural, anatomic and access related issues. The role, these primary teeth serve is important for space maintenance, mastication, speech and occlusion. The permanent molars have shown high prevalence of second mesiobucal

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canal as outlined by many studies which have been crucial for endodontic success. In case of primary teeth, a similar question can be raised by attempting to evaluate presence of MB2 canals in primary maxillary molars. This paper aims to sensitize the possibility of presence of MB2 canals in primary maxillary first and second molars with discussion about identifying, instrumenting and obturating such canals for the increased diagnostic and prognostic accuracy in primary molar endodontics.

***Keywords*---**endodontics, primary molars, mesiobuccal, MB2, obturation, pulpectomy.

Introduction

Comprehensive understanding of root canal morphology including presence of abnormally shaped canals and presence of extra canals is crucial for successful endodontic therapy. Poor understanding of root canal morphology poses significant challenges during location, instrumentation and/or obturation of the canals triggering failure of treatment. The mesiobuccal root of permanent maxillary molars has been studied almost regularly over the past few decades. A large number of documented variations of the root anatomy and consequent failure of detection of canals; rationalize frequent failure of pulp therapy in these teeth.[1] Presence of second mesiobuccal (MB2) canal in permanent maxillary molars is fairly common but also commonly undiagnosed and untreated despite abundance of literature.[1,2] A systematic review and meta-analysis of prevalence studies inferred that prevalence of MB2 canal was as high as 74.8% in permanent maxillary molars while an independent study by Lee et al reported prevalence at 86.8%[3,4]

Primary teeth are known to display a wide range of anatomic variations in pulp space morphology. Physiologic and pathologic root resorption accompanied by continuous dentin deposition is known to increase complexity in the morphology of the root canals.[5,6] Such changing dynamics of root canal system challenge the clinician, posing a threat to success of treatment. Often, radical pulp therapy in the form of pulpectomy is indicated in primary teeth with necrotic or irreversibly inflamed pulp tissue. It is rightfully quoted that primary teeth serve as the best space maintainers for permanent dentition.[7] Preserving the teeth until natural exfoliation is imperative to prevent arch length discrepancies. Therefore, adequate knowledge and understanding of root canal morphology is fundamental for expertise in pulp extirpation procedures in primary teeth. However, unlike permanent molars, insufficient literature is available on prevalence of second mesiobuccal canal (MB2) in primary maxillary molars. An in vitro study conducted by Katge and Wakpanjar reported incidence of second mesiobuccal canal in primary first and second molars to be 10%.[7] Fumes et al reported 20% incidence of second mesiobuccal canal in primary maxillary molars using micro-computed tomography study but no evidence of second mesiobuccal canal was noted by Jose and colleagues in primary maxillary first molars.[8,9] To the authors' knowledge no article in published literature clinically identifies and treats MB2 canals in primary maxillary molars during pulpectomy procedure.

Aim

To identify and treat second mesiobuccal canals in primary maxillary molars.

Methodology

Primary maxillary molars that were selected for pulpectomy procedures based on the diagnosis of irreversible pulpitis, pulp necrosis and dentoalveolar abscess with favourable prognosis (as decided clinically and radiographically). After access opening, an active attempt was made to locate MB2 canal clinically using a sharp straight probe or an ultrasonic scaler along the line joining MB1 to palatal canal. In case of difficulty to locate MB2 canal, a small endodontic file #8 or #10 K file was used to explore with copious amounts of EDTA and intermittent sodium hypochlorite irrigation. After confirming the presence of MB2 canal clinically (Figure 1), the canals were prepared adequately using hand or rotary systems and were obturated like remaining primary canals. A radiograph was subsequently taken to confirm the obturation of the second mesiobuccal canal (Figure 2). The post-obturation IOPA radiographs confirmed presence of MB2 canal, its preparation and obturation. Subsequently, post-obturation restoration and stainless-steel crown were placed in all cases.

Since the author experienced a higher frequency of occurrence of MB2 canals in second maxillary molars, a similar attempt was made to identify them in primary first molars. Owing to this, a few cases did report presence of MB2 in primary maxillary first molars as depicted clinically (Figure 3) and radiographically (Figure 4). The frequency of occurrence was lesser in primary first molars than in second molars. Thus, a new dimension in paediatric endodontics can be explored based on these observations.

Figure 1. Clinical location of MB2 canal in primary maxillary second molar

Figure 2. Radiographic confirmation of MB2 canal in primary second molar by post-obturation radiographs

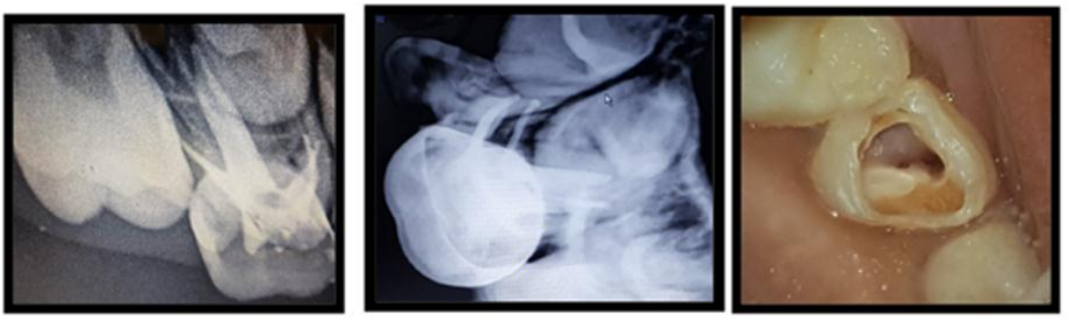

Figure 3. Clinical location of MB2 canal in primary maxillary first molar

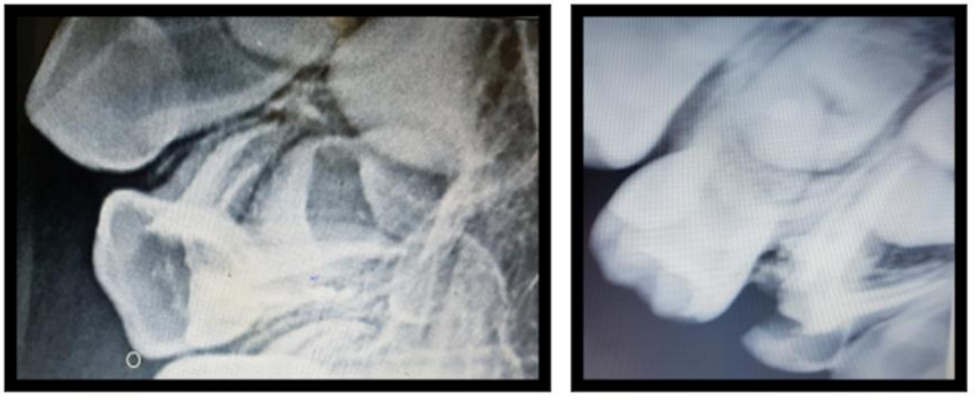

Figure 4. Radiographic confirmation of MB2 canal in primary maxillary first molar by post-obturation radiograph.

Discussion

With the incidence of MB2 canals in permanent dentition being as high as 86.8% [4], similar frequency can be speculated in primary teeth and thus, an attempt to identify MB2 canals in the primary dentition was made. Although literature does mention about the occurrence of second mesiobuccal canal with the help of extracted teeth and in vitro studies, the prevalence ranges in such studies from 0-

20%, with no studies so far claiming treatment of these second mesiobuccal canals.[7,8,9]. Primary maxillary first and second molars that were identified for pulpectomy were examined. The presence of the MB2 canal was ascertained by clinical and radiographic methods. The prevalence of MB2 canals was observed to be higher in the maxillary second molars than the maxillary first molars of the primary dentition, similar to findings in permanent teeth observed by Lee et al.[10] The MB2 canal in most cases was found to be present 1-3 mm from MB1 canal or along an imaginary line joining the original mesiobuccal and palatal canals similar to a study by Lee et al where the distance between two mesiobuccal canals was approximately 2mm each in first and second permanent molars.

It was additionally noted that, in most cases working length of MB2 canal as determined radiographically was only 1-2 mm shorter than MB1 canal implying that MB2 canals in most instances were of full length, as confirmed again by post obturation radiographs. Few cases even exhibited a MB2 canal that was closely placed to MB1 canal such that during biomechanical preparation the canals merged to form a common canal. It is noteworthy that with advancing age and chronic inflammation, root canals become narrower posing a challenge to the operator while identification and biomechanical preparation of the canals. Also, in case of primary dentition it is much difficult to access the MB2 canal due to its direction of file insertion and also smaller operating field in a pediatric dental patient. Moreover, behaviour issues may lead to a formidable issue in exploration and instrumentation of these canals.

The procedures were performed at dental clinics where conventional radiography techniques that included intraoral periapical radiographs (IOPA), radiovisiography (RVG) and photostimulable phosphor (PSP) plates were the primary diagnostic aids used to document these cases. Absence of CBCT has been identified as a limitation as it could have underestimated the presence of MB2 canals in some teeth. The other limitations of the present paper include comparison of identification and treatment strategies of MB2 canal in primary molars with permanent molars due to lack of primary research in clinical identification and treatment of these canals in primary dentition. The author recommends further research to identify and treat MB2 canals in primary molars to establish the prevalence of these canals and thus, guide standardization of its identification and treatment to optimize success of pulpectomy in primary teeth.

Conclusion

To conclude, MB2 canals are a fairly common occurrence in both primary maxillary molars. The identification, isolation and preparation of MB2 canals in the primary maxillary molars may play a vital role in achieving ideal outcome of treatment (pulpectomy) to maintain tooth in the arch as well as guide the permanent dentition inconsequentially to prevent orthodontic problems.

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