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Management of Primary Molars with Missing Succedaneous Teeth - A Case Series

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ABSTRACT:
Background: Congenital absence of permanent teeth, particularly these condpremolars, is the most common form of non-syndromic dental agenesis. It can significantly affect the developing dentition in children, necessitating timely diagnosis and appropriate management to preserve function and prevent malocclusion.
Aim: This case series aims to present the clinical management of primary molars in pediatric patients with congenitally missing succedaneous second premolars.
Materials and Methods: Three non-syndromic pediatric patients, presented with pain in primary molars and were radio graphically diagnosed with congenitally missing second premolars.
Endodontic management, including pulpectomy and obturation using gutta-percha, was performed to retain the primary molars, followed by restoration with stainless steel crowns.
Results: All the three cases demonstrated successful preservation of the primary molars with no signs of periapical pathology or symptoms on follow-up.
Conclusion: Early identification of congenitally missing permanent teeth through radiographic screening is essential. Preservation of a symptom aticorrestorable primary molars can be a viable long-term space-maintaining strategy in cases where succedaneous teeth are absent. Biocompatible, non-resorbable materials such as gutta-percha, MTA, and Biodentine™ offer promising outcomes for maintaining function and preventing space loss.
Keywords: congenitally missing teeth; second premolar agenesis; pediatric endodontics

I.INTRODUCTION

Congenital tooth agenesis, and/dental agenesis or hypodontia, involves the absence of six or fewer teeth and is one of the most intriguing problems in the development of the human dentition.[1] It results from a disruption in the initiation phase of tooth formation in the dental lamina and affects the permanent dentition more frequently than the primary dentition.

Excluding the third molars, the prevalence of hypodontia ranges from 1.6 to 36.5%, depending on the population studied. The majority of comprehensive studies have focused on Caucasian populations, where the reported prevalence of hypodontia ranges between 4% and 6%.[2] In-contrast, the prevalence of congenitally missing second premolar teeth in the Dravidian population (Chennai, Tamil Nadu) was 1.02% [3] where as in Andhra Pradesh and Telangana, researchers found an overall hypodontia prevalence of 1.4%, with the mandibular second premolar being the third most commonly congenitally missing tooth after maxillary lateral incisors and mandibular incisors.[4] Amongst the paediatric orthodontic patients aged 9-15 years, mandibular second premolar agenesis was found in 4.7-5% of the subjects.[5]

Females are more commonly affected than males in a ratio of 3:2. The mandibular second premolars are the most frequently missing teeth, followed by the permanent maxillary lateral incisor and the maxillary second premolar. Unilateral agenesis of second premolars is more common than

bilateral agenesis.[2]

The etiology of tooth agenesis remains unclear; however, both genetic and environmental factors are known to play a significant role in its development.[6] Several genes have been implicated including PAX9, MSX1, AXIN2, LTBP3,and EDA.[7] Mutations in the MSX1gene have been primarily linked to the absence of the second premolars and third molars, and may occasionally involve other teeth such as first molars.[8] Numerous studies, particularly those involving monozygotic twins, have demonstrated the significant genetic contribution to their development.[9] In addition to non syndromic cases, tooth agenesis can also be a feature of syndromic conditionswhichincludedcraniofacialanomaliessuch ascleftlip,cleftpalate,orboth, as well as genetic disorders like ectodermal dysplasia, Down syndrome, Rieger syndrome, and Book syndrome.[8]

The condition can lead to considerable functional, aesthetic, and psychological challenges, often necessitating coordinated care across multiple dental and medical specialties.[10]

II. CASE PRESENTATION

The following case series, are the clinical observation of children presenting to the Department of Pediatric and Preventive Dentistry, ITS Dental College, Hospital and Research Centre, Greater Noida.

Case 1:

A thirteen-year-old boy reported with the chief concern of pain in the lower right back tooth region since 1-2 months. An intraoral periapical radiograph (IOPAR) was advised (Fig. 1) wrt 85 which revealed caries involving enamel, dentine and pulp along with the absence of the right mandibular second premolar tooth bud, with no evidence of a dental sac or calcification. Given this finding, an orthopantomogram (OPG) was subsequently recommended to assess the presence of other developing teeth and to rule out any additional missing teeth. The panoramic radiograph confirmed that all other successor teeth were present in their appropriate developmental stage (Fig 2). The clinical examination revealed a non-syndromic child. The parents were asked about any history of congenitally missing teeth among the child's first-degree relatives and other family members, and they reported that the child's sister also had congenitally missing right mandibular second premolar tooth buds.

Due to presence of pain in the retained primary mandibular right second molar and the absence of the successor permanent tooth bud, prompt treatment was imperative. The treatment plan included pulpectomy wrt 85 followed by obturation with gutta percha. After parental consent was obtained, local anesthesia was administered using 2% lignocaine hydrochloride with 1:200,000 epinephrine (Lignox, Indoco Remedies Ltd., Mumbai, India). Access preparation was done and working lengths were determined. (Fig 3). Biomechanical preparation was performed upto size 25K-file (Mani,Inc., Tochigi, Japan). Thorough irrigation was done using 0.9% w/v sodium choloride and 1% hypochlorite was used for irrigation which was then dried using sterile paper points. The canals were then obturated with gutta percha (Fig 4). Post endodontic restoration was done using glass ionomer cement (GC Fuji II, Tokyo, Japan) which was followed by the placement of stainless steel crown (3M ESPE, St. Paul, MN, USA) wrt 85 (Fig 5).

Case 2:

A seven year old girl reported with the chief complaint of pain in the upper right back tooth region since one week. Clinical examination revealed dental caries wrt 65.

There were no signs of intraoral swelling or mobility of the affected tooth.

An IOPA radiograph was advised wrt 65, which revealed carious lesion involving enamel, dentin and pulp along with the congenital absence of the maxillary second premolar (Fig. 6). Based on this observation, an OPG was subsequently recommended to assess the overall dental development and identify any additional missing teeth.

The OPG confirmed the bilateral absence of both maxillary and mandibular second premolars on the right and left sides, indicating multiple congenitally missing teeth (Fig 7).

The other developing permanent teeth appeared to be within the normal stages of development. A detailed family history was taken, which revealed no known incidence of congenitally missing teeth among immediate family members, indicating a non-syndromic presentation. Considering the importance of retaining the primary second molar due to the absence of its permanent successor, endodontic treatment was performed wrt 55. This involved biomechanical preparation of the canals followed by obturation with gutta-percha (Fig 8). The tooth was subsequently restored with a preformed stainless steel crown.

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Case 3:

A six year old boy reported with the chief complaint of pain in the lower left back tooth region since 2 days. Clinical examination revealed deep dentinal caries wrt 75. An IOPA radiograph was taken which revealed pulpal involvement in relation to tooth 75 along with the congenital absence of the left mandibular second premolar (Fig 9). To assess for any additional congenitally missing teeth, an OPG was advised (Fig10). However, it revealed no other missing teeth.

There was no relevant family history of congenitally missing teeth reported. Considering the symptomatic retained primary molar and the absence of its permanent successor, it was decided to preserve the tooth through endodontic treatment to maintain arch integrity and occlusal function. After obtaining parental consent, local anesthesia was administered and access opening was performed. Biomechanical preparation of the canals was carried out, working length was determined (Fig 11) followed by obturation using gutta-percha (Fig 11). The tooth was subsequently restored with a stainless steel crown to ensure durability and long-term functionality.

III. DISCUSSION

Congenital absence of teeth is frequently observed in individuals with conditions such as cleft lip and palate, ectodermal dysplasia, and Down syndrome. However, it is uncommon in healthy and non-syndromic patients. Primary teeth with complete crown and root structures, and no permanent successor, should be retained whenever possible. This would help maintain arch length and preserve the space, potentially eliminating the need for future orthodontic or prosthetic interventions.[11]

Root canal filling materials for primary teeth should be biocompatible, promote healing through the formation of mineralized or fibrous connective tissue and resorbat a rate comparable to that of the natural root resorption process. Additionally, they should also facilitate easy placement and removal when needed, exhibit antimicrobial properties, remain insoluble in oral fluids and not lead to tooth discoloration.[12] Primary teeth lacking a successor of ten exhibit no evidence of root resorption. Therefore, the root canal filling material used in such retained primary teeth should be non-resorbable and biocompatible. Materials such as gutta-percha along with the newer materials introduced eg. Mineral Trioxide Aggregate (MTA), and Biodentine™ are suitable options for this purpose.

Mohit et al. reported a case of a 6 year old girl with retained primary mandibular second molar in which pulpectomy was performed and gutta-percha was opted as the material for root canal filling due to its non resorbable property. Follow up radiograph after12monthswas recorded in which the tooth remained a symptomatic. Similarly in a case report by Gahlod et al. the retained primary molar was successfully managed with a pulpectomy, and obturation was carried out using gutta-percha.[13] Follow-up evaluations confirmed that the tooth remained functional and asymptomatic, with no clinical or radiographic signs of pathology. Biodentine™ is regarded as a substitute for traditional calcium hydroxide-based materials. It is a bioactive cement that possesses mechanical properties comparable to those of natural dentin. Ganesh Jeevan and an et al. reported an unusual case of a primary maxillary second molar with double roots with missing permanent first and second premolars which was obturated using Biodentine™. During follow-up, the retained primary second molar remained functional, with no signs of pain and periapical pathology indicating Biodentine™ as a promising material for long-term preservation of retained primary teeth.[14] Similarly, Thankachan etal. used Biodentine™ as the obturating material for a primary mandibular second molar without a permanent successor. The follow up results showed that the tooth remained clinically a symptomatic and functionally stable, with no signs of periapical pathology or root resorption.[15]This case also supports the use of Biodentine™ as a biocompatible and effective material for the long-term retention of primary teeth in the absence of a permanent successor.

Multiple research studies have used traditional grey and white MTA as a material to fill the roots of primary teeth without a permanent replacement.

Tunc and Bayrak reported a case in which they used white mineral trioxide aggregate (MTA) to retain the mandibular second primary molar for an extended period due to the absence of a succeeding premolar. After three years, radiographic imaging showed root surface resorption in the furcation are a however, the tooth remained functional.[16]Similarly, O'Sullivan SM et al. carried out the obturation using MTA and follow-up evaluations revealed that the tooth remained asymptomatic, functional, and showed no signs of periapical pathology or resorption, indicating that MTA is an effective and biocompatible option for long-term retention of primary molars without permanent successors.[17]

In contrast to these conservative approaches, another treatment modality involves timely interceptive removal of the second primary

molar to promote natural space closure, particularly as the second permanent molar begins to erupt.

Studies have shown that the mesial movement of the first permanent molar can naturally close up to 84% of the space.[18] In a study conducted by Northway et al. hemi section was implemented as an initial step in space closure, followed by the use of fixed or thodontic appliances. However, the limitation of this study was that the treatment outcomes could not be solely credited to the hemi section procedure, as orthodontic intervention also played a role in achieving the final space closure.[19] However, hemi section is generally not advised as an interceptive extraction method for patients with congenitally missing mandibular second premolars especially in children as this approach carries a higher likelihood of complications which include post operative discomfort, increased risk of infection or inflammation, and potential damage to adjacent teeth or developing permanent tooth buds.[18]

IV. CONCLUSION

The congenital absence of second premolars, though relatively uncommon in non-syndromic pediatric patients, necessitates careful diagnosis and long-term management. The presented case series underscores the clinical significance of early detection through radiographic evaluation and highlights the viability of preserving retained primary molars in the absence of permanent successors. Endodontic treatment utilizing materials such as gutta-percha, MTA, and Biodentine™ has demonstrated favorable outcomes in maintaining function and preventing space loss. Selection of the appropriate treatment modality should be guided by the patient's age, occlusal status, and individual clinical presentation. Long-term follow-up and multidisciplinary approach are imperative to ensure optimal functional and aesthetic outcomes.

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Figure1: IOPA radiograph wrt 85

Figure 2: Panoramic view of absence of mandibular right second premolar

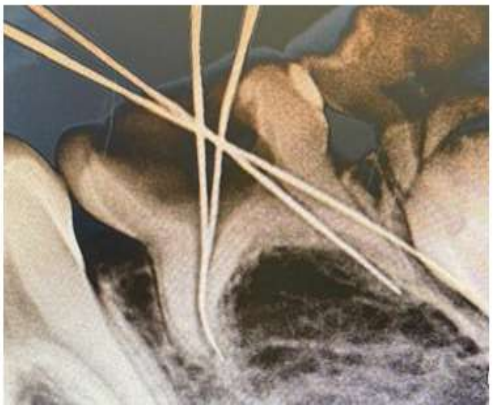

Figure 3: Working length determination wrt 85

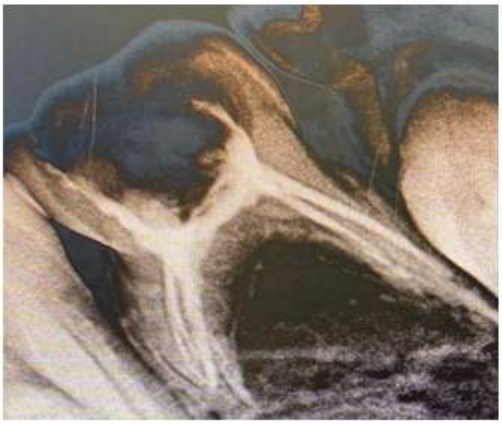

Figure 4: Obturation with guttapercha wrt 85

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Figure 5: Placement of stainless steel crown wrt 85

Figure 6: IOPA radiograph wrt 65

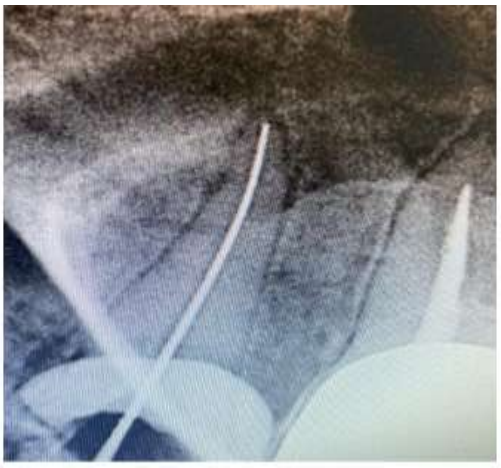

Figure7:Determination of working length wrt 65

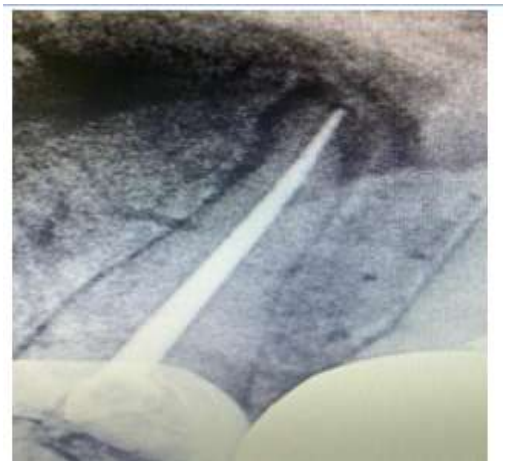

Figure 8: Obturation with guttapercha wrt 65

Figure 7: Panoramic view of bilateral absence of both maxillary and mandibular second premolars on the right and left sides

Figure 9: IOPA radiograph wrt 75

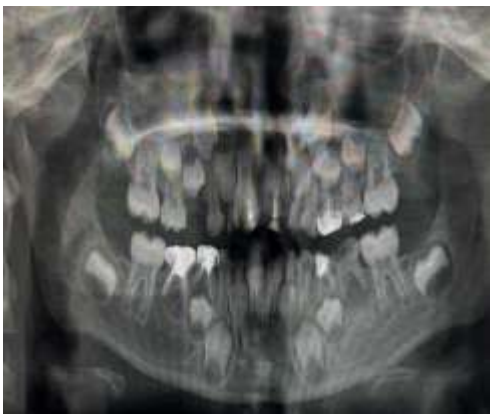

Figure 10: Panoramic view of missing mandibular left second premolars

Figure 11: Determination of working length wrt 75

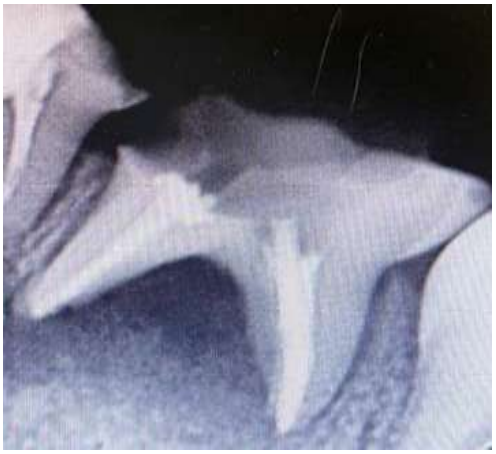

Figure 12: Obturation with gutta-percha wrt 75