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Agensis of second premolars in maxilla and mandible - A rare case report



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ABSTRACT

Congenital missing or absence of 6 or less teeth is known as Hypodontia which is a usual part of more complex set of developmental problems. Most cases of tooth agenesis involve hypodontia. In reference to second premolar, agenesis of a single second premolar is the most common form and occurrence of agenesis of four second premolars in both maxilla and mandible is not a very common condition. The purpose of this report is to describe a case of agenesis of a four second premolars in all the four quadrants in a 17 year old boy. Patient referred to the pediatric dentistry department as chief complaint of pain in the left lower back tooth region since one week. Clinical examination revealed the retained four primary second molars in both the arches of right and left sides and orthopantomograph confirmed the diagnosis. Pulpectomy was performed in maxillary left as well as mandibular left and right primary molars and maxillary right second molar was grossly decayed which was extracted. In addition to case report, this article discusses possible etiological factors along with various treatment modalities.

Keywords:

Agensis, developmental anomaly, Hypodontia, maxilla, mandible, permanent dentition, second premolars

Introduction:

Tooth agenesis is the most common developmental disorder of human dentition, affecting 25% of the population. Orders of Agenesis include third molars, followed by Mandibular second premolars that accounts for 2.5% to 5% among USA and European population [1]. Such absences ensue bilaterally in 60% of instances. The development of second premolars presents remarkable instability like delayed development. For instance, initial mineralization of the mandibular second premolars on an average takes place at 13 years of age and that may range from 2 years and 3 months to 3 years and 7 months); however, this tooth may appear up to 6 years, after 9 years or even at 13 years of age [2].

Only one epidemiological study has specifically addressed the agenesis of second premolars. Stritzel, Simons, Gage evaluated 176 white European patients with agenesis of second premolars and observed that the mandible was more affected than maxilla and observed the absence of one or two second premolars in 75% of the cases [3].

Albashaireh in Jordan [4], Goren in Palestine [5], Maatoukin Japan [6] and Cholitgul in New Zealand reported the second mandibular premolars and then the maxillary lateral incisors as the most common absent teeth. However, the absence of the third molars and next the maxillary lateral incisors and the second mandibular premolars to be the most frequent ones [7]. According to the widely accepted definition as given by Stewart [8] oligodontia means agenesis of numerous teeth (more than 6) which is considered as a normal variant and commonly seen in permanent dentition whereas hypodontia defined as, absence of one or few teeth and anodontia complete absence of teeth.

A recent meta-analysis reported prevalence of hypodontia in various populations with highest being the Australian Caucasians followed by have the highest prevalence (6.3) of hypodontia, followed by European Caucasians (5.5%) and North American Caucasians (3.9%) [9]. Agenesis of teeth causes various problems like difficulty in mastication, verbal dysfunctions, and disturbances in developing occlusion and also affects aesthetics. Hence, one time diagnosis could assist in making an effective treatment and preventing the complicated problems.

Case Report:

A healthy 17 year old male patient referred to the department of paedodontics, with complaint of pain in left lower posterior teeth since 3 days. First visit to the dentist, past medical and family history was not relevant. Upon intraoral examination teeth present are

17,16,55,14,13,12,11,21,22,23,24,65,26,27
47,46,85,44,43,42,41,31,32,33,34,75,36,37

Oral hygiene was good, with Angles class I molar relationship and with normal overjet and overbite. Left lower second primary molar had deep dental caries and was tender on percussion. All the four primary second molars were retained. Intraoral periapical radiographs revealed congenitally missing all the four second premolars. Pulpotomy was performed in relation to 65, 75 & 85 (Figure 2 & 3) and maxillary right primary second molar was extracted due to gross decay.

Figure 1 - Intraoral picture showing retained primary second molars in the maxilla and mandible.



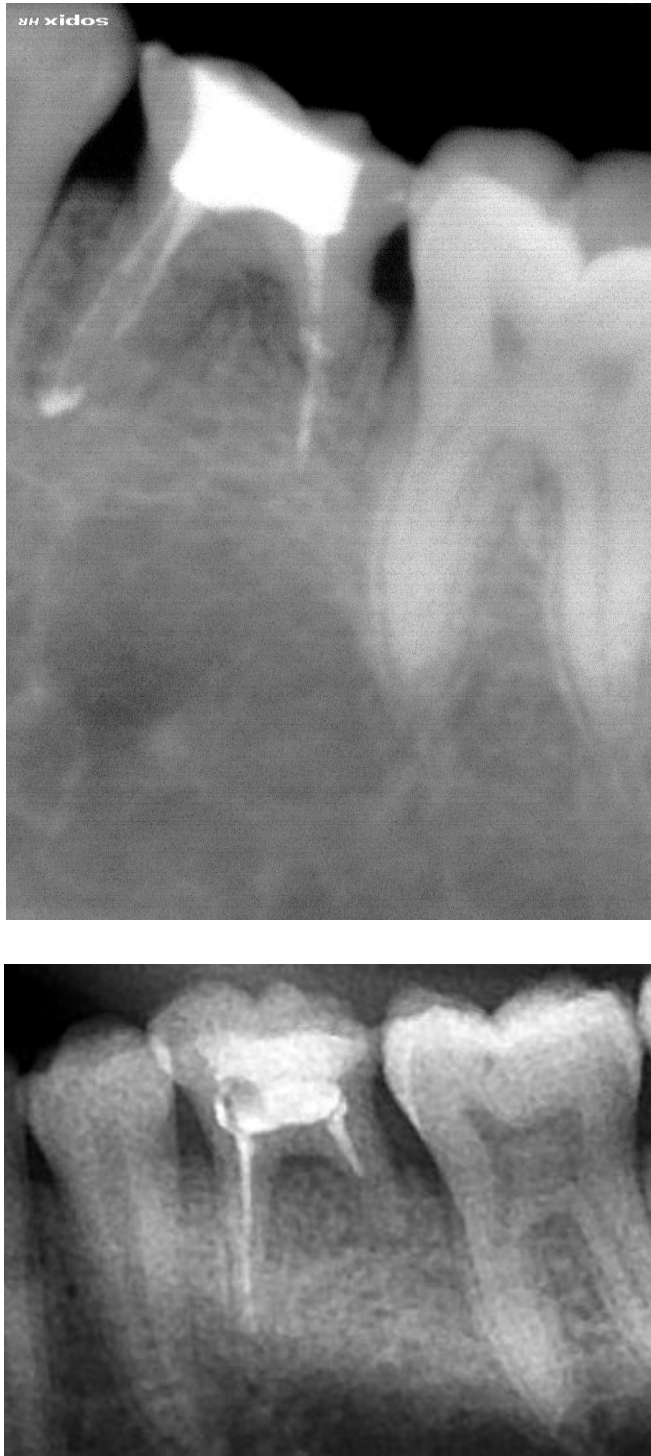


Figure 2 & 3 - Orthopantomograph showing agenesis of four second premolars in all the four quadrants with pulctomised three primary second molars.

Discussion

Etiology

Hypodontia is a complex phenotype with difference in expressivity that affects various number of teeth in different regions [10]. The most common mode of inheritance is Autosomal Dominant, but it may also occur as autosomal recessive, X-linked and polygenic or multifactorial models of inheritance. The exact molecular basis of agenesis is unknown, but mutations in *MSX1* and *PAX9* genes are considered [11].

MSX1 and *PAX9* are transcription factors necessary for normal development. *MSX1* is a member of the muscle segment homeobox family, members of which act repetitively during organogenesis. *PAX9* belongs to the paired box domain gene family that is named according to the presence of a DNA-binding "paired" domain. During embryonic patterning, organogenesis and post natal life *Pax9* has a regulator role in cellular pluripotency and differentiating. During development of tooth, both *MSX1* and *PAX9* interact especially in the tooth-bud-to-cap transition phase. They have an overlapping action as *pax9* activates transcription of *msx1*, during bud stage. Recently, it has been shown that both molecules may dimerism and synergistically activate *Bmp4* transcription [12]. In the mouse, in the absence of either *MSX1* or *PAX9*, tooth development is arrested at the bud stage.

Higher prevalence rates for hypodontia in females with a ratio of 3:2 reported in the literature [2]. This finding is inconsistent with our case. As already stated, single second premolar agenesis is common where as the absence of four premolars is a rare entity. Nirmala *et al.* reported a case of agenesis of single premolar associated with supernumerary tooth [13]. In the present case there is no supernumerary tooth.

The mechanism for the occurrence of congenitally missing teeth may be due to the expression or misexpression of certain genes at certain times in the development of a tooth germ. In some cases the developing tooth germ may be initiated normally, however, abnormal apoptosis leads to involution of the developing tooth. Certain genes promoting the progression of tooth morphogenesis are not expressed for the process to proceed. Alternatively, the genes that cause programmed cell death are inadvertently expressed causing the body to start resorbing the developing tooth germ [3].

Treatment Considerations

Congenial absence of mandibular second premolars leads to many problems. Proper planning should be made at appropriate time to manage the edentulous space [14]. In the past either conventional bridges or resin bonded bridges were used to fill edentulous space. However full coverage conventional bridges in young patients can result in devitalisation of the pulp and require root canal therapy where survival rate is questionable [15]. In the present generation, the ideal approach for restoration of the space is the placement of implant [16].

In case if primary teeth are present, the better option is to maintain them until the placement of implant. The appropriate age for the implant placement is determined by the cessation of vertical growth. When we compare serial cephalometric radiographs to assess the growth of ramus which in turn determines the vertical growth of the face [14]. Fudalej *et al.* showed that on average girls facial growth continues until about 17 years of ages whereas the average boy's facial vertical growth is complete at about 21 years of age [17].

An additional alternative for treating the patient who is congenitally missing the mandibular second premolars is to simply close the space [1]. Another method of closing the edentulous space is to hemisection of the primary second molar at an early age and allows the permanent molar to erupt in a mesial direction without affecting the position of the mandibular incisors. This approach would be appropriate when the child at an early age consult an orthodontist and to monitor regularly then after [18]. Another advantageous possibility is during the orthodontic treatment phase, if the patient is undergoing orthodontic therapy. The implant can be placed in the first premolar region by pushing the first premolar into second primary molar position there by creating space [19].

Most of the clinicians have doubt in indication of space maintainers to preserve the space and further treatment like placement of implant. Decision should be taken keeping in mind the age of the patient. Generally space maintainer can be placed to prevent mesial migration of first permanent molar and distal migration of 1st premolar and collapse of the space which would necessitate further orthodontic treatment for regaining space. If the space is regained after closure, as the roots of adjacent teeth move away from one other, they deposit bone behind that equal the width of the premolar and molar and will produce an excellent ridge in which to place the implant which is known as orthodontic implant site development.

In the present case, the above mentioned treatment options were explained to the parents. The patient was willing only for the pulpectomy of lower left primary second premolar for time being. Implants are planned for the future treatment when he can able to get it done which is in accordance with ADA council on scientific affairs (2004) [20].

Conclusion

Management of agenesis space should be performed early in the mixed dentition period which forms key to success. Numerous temporary and permanent approaches are present for treating the space developed due to agenesis. Ideally, the treatment should be aimed in maintaining adequate space and alveolar ridge form for future prosthetic replacement. If the space is to be closed orthodontically the clinician must take care to prevent detrimental changes to the occlusion and to the facial profile.

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Competing interests

Authors declare that they don't have any competing interest.

Authors' contribution

Dr. Nirmala SVSG had written the manuscript, Dr. Namratha Tharay revised it. Final manuscript is accepted by all authors.

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References

1. Fines CD, Rebellato J, Saiar M. Congenitally missing mandibular second premolar treatment outcome with orthodontic space closure. *Am J Orthod Dentofacial Orthop* 2003; 123(6):672-82.
2. Josefsson E, Brattstrom V, Tegsjö U, Valerius-Olsson H. Treatment of lower second premolar agenesis by autotransplantation: four year evaluation of eighty patients. *Acta Odontol Scand* 1999; 57(2):111-5.
3. Stritzel F, Symons AL, Gage JP. Agenesis of second premolar in males and females: distribution, number and sites affected. *J Clin Pediatr Dent*. 1990; 15(1):30-41.

4. Albashaireh ZS, Khader YS. The prevalence and pattern of hypodontia of the permanent teeth and crown size and shape deformity affecting upper lateral incisors in a sample of Jordanian dental patients. *Community Dent Health* 2006; 23(4):239-43.
5. Goren S, Tsoizner R, Dinbar A, Levin L, BreznaikN. Prevalence of congenitally missing teeth in Israeli recruits. *Refuat HapehVehashinayim*. 2005;22(2):49-53, 87.
6. Maatouk F, Baaziz A, Ghnima S, Masmoudi F, Ghedira H. Survey on hypodontia in Sayda, Tunisia. *Quintessence Int*. 2008;39(3):115-20.
7. Cholitgul W, Drummond BK. Jaw and tooth abnormalities detected on panoramic radiographs in New Zealand children aged 10-15 years. *N Z Dent J*. 2000; 96(423):10-3.
8. Stewart RE, Barber TK, Troutman KC. The dentition and anomalies of tooth size form structure and eruption. In *Pediatric Dentistry*. Ed. St. Louis, the CV Mosby 91, 1982
9. Polder BJ, Van't Hof MA, Van der Linden FP, Kuijpers-Jagtman AM. A meta-analysis of the prevalence of dental agenesis of permanent teeth. *Community Dent Oral Epidemiol* 2004; 32(3):217-26.
10. Suarez BK, Spence MA. The genetics of hypodontia. *J Dent Res* 1974; 53(4):781-5.
11. Kapadia H, Mues G, D'Souza R. Genes affecting tooth morphogenesis. *Orthod Craniofac Res*. 2007;10(3):237-44.
12. Ogawa T, Kapadia H, Wang B, D'Souza RN. Studies on Pax9-Msx1 protein interactions. *Arch Oral Biol* 2005; 50(2):141-5.
13. Nirmala SVSG, Sandeep C, Sivakumar N, Babu MS, Lalitha V. Agenesis of premolar associated with submerged primary molar and supernumerary premolar: An usual case report. *Cont clin. Dent* 2012; 3(suppl1):S99-S102.
14. Spear F, Mathews D, Kokich V. Interdisciplinary management of single tooth implants. *SeminOrthod* 1997; 3(1):45-72.
15. Habsha E. The incidence of pulpal complications and loss of vitality subsequent to full crown restorations. *Ont Dent*. 1998; 75(1):19-21.
16. Ketabi A, Kaus T, Herdach F. Thirteen year follow up study of resin bonded fixed partial dentures. *Quintessence Int* 2004; 35(5):407-10.
17. Fudalej P, Kokich V, Leroux B. Determining the cessation of facial growth to facilitate placement of single tooth implants. *Am J OrthodDentofacialorthop* 2007;131(4 Suppl):S59-67.
18. North way W. The nuts and bolts of hemisection treatment: managing congenitally missing mandibular second premolars. *Am J Ortod Dentofacial Orthop*. 2005; 127(5):606-10.
19. Hom B, Turley P. The effect of space closure of the mandibular first molar area in adults. *Am J Ortod*. 1984; 85(6):457-69.
20. ADA council on Scientific Affairs. Dental endosseous implants: an update. *J Am Dent Assoc* 2004; 135(1):92-7.