Indian Journal of Dental Education
Volume 6 Number 1, January - March 2013

Agenesis of the Permanent First Molars and Premolars: A Rare Case Report

Sidhi Passi, MDS*, Harkirat Sethi**

Abstract

Congenital absence of the teeth is the most commonly known developmental anomaly in humans. Hypodontia is congenital absence of one or a few teeth only, with a prevalence of 2.3% to 10.1% in the permanent dentition. Agenesis of the first permanent molars has the least frequency of all types and when present usually occurs in association with oligodontia or anodontia. It is easy to diagnose the agenesis of the permanent first molar retrospectively, based on the clinical morphology and x-ray photographic features of the permanent second molars features. In this case report we discuss about the agenesis of the permanent first molars and second premolars and encompass a comprehensive review of the literature on missing permanent first molars and second premolars.

Keywords: Hypodontia; Missing teeth; Permanent first molar; Second premolar.

Introduction

A tooth may be considered to be congenitally missing when it cannot be discerned clinically or radiographically and there exists no history of its extraction.Agenesis one or more teeth is one of the most common of human developmental anomalies. Hypodontia is the term used to describe the developmental absence of one or more primary or permanent teeth excluding the third molars . Oligodontia is used to describe a condition where there is absence of more than six teeth (excluding the third molars), while anodontia is the complete absence of teeth.[1] Females are effected more than the males 3:2.[2] Prevalence of hypodontia is strongly influenced by race and ethnicity and has been estimated to be between 2.3% to 10.1% in permanent dentition and 0.5 to 0.9% in the primary dentition.[3,4,5] Most commonly missing teeth are the third molars (9-37%); followed by mandibular 2nd premolars (2.8%), maxillary lateral incisors (1.6%) and maxillary 2nd premolars and mandibular incisors (0.23%-0.08%).[6,7,8] The congenital absence of teeth has a multifactorial etiology combining both genetic and environmental factors. Hereditary or familial distribution has been suggested as the primary cause. According to Graber "Congenital partial anodontia appears to be the result of one or more point mutations in a closely linked polygenic system, most often transmitted in an autosomal dominant pattern with incomplete penetrance and variable expressivity."[9] The condition does not occur in isolation. It is frequently accompanied by other odontogenic anomalies like, microdontia, supernumerary teeth, Talons cusp, etc. Hypodontia is also associated with syndromes like ectodermal dysplasia, Pierre Robin Syndrome, Down's syndrome, Ehler Danlos Syndrome, Rieger syndrome, Limb mammary syndrome, Kabuki syndrome, ADULT syndrome, Diastrophic dysplasia, pycnodysostosis, hemifacial microsomia, recessive incisor hypodontia, isolated and syndromic clefts.[10,11] The environmental factors effecting the development of the tooth germ are physical obstruction or disruption in the dental lamina,

Author's Affilation: *Sr Lecturer, Dept. of Pedodontics, Dr. HSJ Institute of Dental Sciences and Research Center, PU Dental College, Sector 25, Chandigarh (INDIA), **Lecturer, Dept of Oral Surgery, Dr. HSJ Institue of Dental Sciences and Research, Chandigarh (INDIA).

Reprints Requests: Sidhi Passi, MDS, H. No-119, Sector 21/A, Chandigarh.

Email: sidhi.passi@gmail.com

(Recieved on 04.12.2012, Accepted on 14.03.2013)

space limitation, functional abnormalities of the dental epithelium or failure in initiation of the underlying mesenchyme.[12] The congenital absence of teeth can impair the masticatory ability, speech development and most important, can emotionally upset an individual especially during the turbulent years of adolescence. There is much to be gained from a multidisciplinary management of young children presenting with hypodontia. The aim of the dental team should be to maintain the existing dentition, improve esthetics and speech, allow proper mastication, and promote emotional and psychological well-being of the child. We report a rare case of missing permanent first molars and second premolars.

Case report

A 17 year old female reported to the department of Pedododontics with the chief complaint of blackening of the front teeth and spacing between them . Medical history was non- contributory. An intraoral examination was carried out that revealed the maxillary central incisors were carious and left maxillary lateral incisor was microdont and the right maxillary lateral incisor was conical in shape and it also revealed the presence of the rertained deciduous teeth and absence of some permanent teeth The missing teeth were second premolars, the permanent first molars and the third molars. Queries revealed that missing teeth were not extracted, were absent since childhood (Fig 1, 2).

Diagnostic records were made which included orthopantomogram (OPG), lateral cephalogram and study models. OPG showed missing second premolars, permanent first molars, mandibular third molars and maxillary right third molar (Fig 3). All the decayed teeth were restored and the case was refered to the department of orthodontics for the alignment and closure of the spaces present between the teeth.

Discussion

The definitive aetiology of hypodontia has not yet been determined and a multifactorial model has been proposed.[12] Several hypothesis have been promulgated to explain the etiology of hypodontia with evolutionary and anatomic models, such as Butler's field theory, odontogenic polarity[13], Sofare's model of compensatory tooth size interactions, Svinhufvud's anatomic model(area of embryonic fusion)[14] and Kjaer's neuro osteological developmental fields in the jaw (incisor field, canine/premolar and molar field).[15] Several hypotheses have been proposed to explain the missing tooth type and the consensus opinion is that the permanent first molars are always present and never missing, except in those patients whose

Figure 1

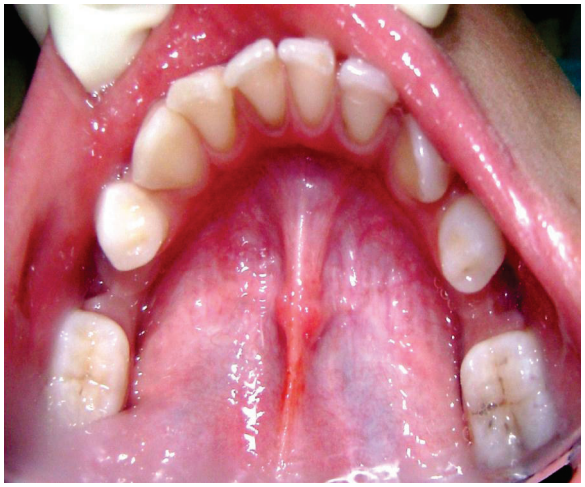


Figure 2

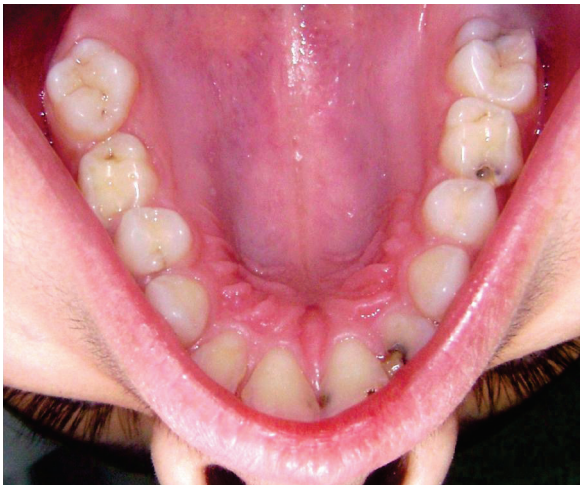
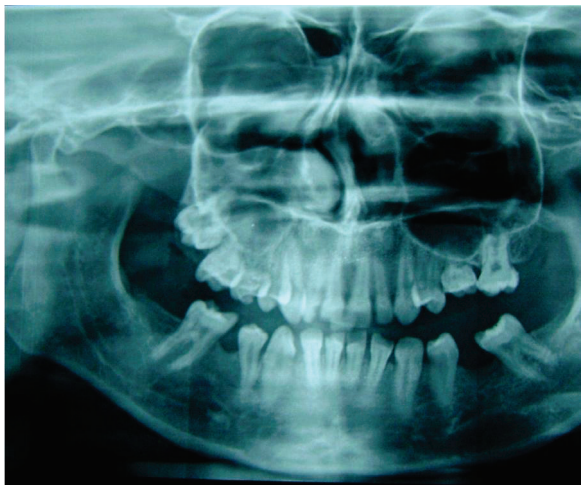


Figure 3



complete molar tooth series are absent as seen in severe oligodontia or anodontia.

The origin and the development of the first permanent molars differs from the other permanent teeth in that they do not have any preceding primary teeth and are the only permanent teeth whose enamel organ arises directly from the dental lamina in the same way as that of the primary teeth. Tooth agenesis is one of the most prevalent dental anomalies seen in human beings. It may be partial or complete. Partial absence of teeth may manifest as hypodontia or oligodontia. Both environmental and genetic factors have been proposed to explain the etiology. The various causes can be broadly classified into syndromic and non-syndromic. A genetic basis has been proposed for both thel syndromic as well as non-syndromic tooth agenesis. The genes implicated in the syndromic agenesis of teeth include Eda, Edar, Edaradd, Irf6, Msx1, Nemo, P63, Pitx2 and Shh. The ones involved in nonsyndromic tooth agenesis are Msx1, Pax9 and Axin2.[16] The non-syndromic causes include use of thalidomide by the mother during pregnancy.[17] The various environmental causes are trauma, radiotherapy and chemotherapy, osteomyelitis, hormonal and metabolic influences and finally iatrogenic causes like unintended removal of the tooth germ during extraction of a primary tooth.

Most frequently a comprehensive and a clinical radiograph will aid in the diagnosis of hypodontia. It is often easy to diagnose agenesis of the permanent first molars retrospectively based on the clinical morphology and x-ray photographic features of the permanent second molars. This approach indicates that the diagnosis of missing permanent first molar can be made only after the second molar erupts into the oral cavity and complete their root formation ie 14-16 years, has erupted and its root formation is complete.

The permanent first molars are considered to be the most important teeth in the permanent dentition:this importance is mainly because of its consequence position in the dental arch. They perform the major portion of mastication and communition of food and are the largest and the strongest teeth, both because of their bulk and the anchorage.

In this case report hypodontia could not be associated with any syndrome as the child was normal in all other aspects and did not suffer from any other abnormality. None of the family members suffered from the congenital abnormality suggesting absence of a hereditary basis to the defect. With regard to the environmental causes, both the prenatal and postnatal history were non contributory as there was no history of trauma, radiotherapy, chemotherapy or medication that the child may have been exposed to.

The case requires appropriate orthodontic and prosthetic intervention both for the alignment and the replacement of the missing teeth.

References

1. Brook AH. Dental anomalies of number, form and size:their prevalence in British school children.*J Int Assoc Dent Child.* 1977; 5: 37-53.
2. Larmour CJ, Mossey PA. Thind Hypodontia-A retrospective review of the prevalenc and etiology. Part 1. *Quintessence Int.* 2005; 36: 263-270.
3. Vastardis H. The genetics of human tooth agenesis: new discoveries for understanding dental anomalies. *American J Orthodont and*

Dentofacial Orthopedics. 2000; 117: 650-656.

4. Werther R, Rothenberg F. Anodontia: a review of its etiology with presentation of a case. *American J Orthodontics*. 1939; 25: 61-81.
5. Hunstadbraten K. Hypodontia in the permanent dentition. A clinical and genetic investigation. *ASDC J Dent Child*. 1973; 40: 115-117.
6. Egermark-Eriksson I, Lind V. Congenital numerical variation in the permanent dentition. Sex distribution of hypodontia and hyperdontia. *Odontol Revy*. 1971; 22(3): 309-15.
7. Cameron J, Sampson WJ. Hypodontia of the permanent dentition. Case reports. *Aus Dent J*. 1996; 41: 1-5.
8. Grahen H. Hypodontia in the permanent dentition. Clinical and genetic investigations. Thesis. *Odont Revy*. 1956; 7: 3.
9. Graber L. Congenital absence of teeth: A review with emphasis on inheritance patterns. *J Am Dent Assoc*. 1978; 96: 266-275.
10. McKeown HF *et al*. Tooth dimensions in hypodontia patients, their unaffected relatives and a control group measured by a new age analysis system. *European Journal of Orthodontics*. 2002; 24: 131-141.
11. Schalk-van der Weide Y, Steen WH, Bosman F. Taurodontism and length of teeth in patients with oligodontia. *J Oral Rehabil*. 1993; 20: 401-412.
12. Arte S, Nieminen P, Pirinen S, Theleff I, Peltonen L. Gene defect in hypodontia: exclusion of EGF, EGFR, and FGF-3 as candidate genes. *J Dent Res*. 1996; 75(6): 1346-52.
13. Butler PM. Studies of mammalian dentition-differentiation postcanine dentition. *Proc Zool Soc Lon*. 1939; 109: 1-36.
14. Svinhufvud's E, Myallrniemi, Sand Norio'R. Dominant inheritance of tooth malposition and their relation to malposition. *Clin Genet*. 1988; 34: 373-381.
15. Kjaer I. Can the locationof tooth agenesis and thelocation of initial bone loss in juvenile periodontitis be explained by the neural developmental fields in the jaw? *Acta Odontol Scan*. 1997; 55: 70-72.
16. Matalova E, Fleischmannva J, Sharpe PT, Tucker AS. Tooth Agenesis: from molecular genetics to molecular dentistry. *J Dent Res*. 2008; 87(7): 617-623.
17. Axrup K, D' Avignon M, Hellgren K, Herikson CO, Juhlin IM, Larsson KS. Children with thalidomide embryopathy: odontological observation and aspects. *Acta Odontol Scand*. 1966; 24: 3-21.