JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH

How to cite this article:
BYAHATTI S M. THE CONCOMITANT OCCURRENCE OF HYPODONTIA AND MICRODONTIA IN A SINGLE CASE. Journal of Clinical and Diagnostic Research [serial online] 2010 December [cited: 2010 December 10]; 4:3632-3638.

Available from
http://www.jcdr.in/article_fulltext.asp?issn=0973-709x&year=2010&volume=4&issue=6&page=3627-3638&issn=0973-709x&id=822

CASE REPORT

The Concomitant Occurrence Of Hypodontia And Microdontia In A Single Case

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ABSTRACT

Developmentally missing teeth may also be the result of numerous independent pathological mechanisms that can affect the orderly formation of the dental lamina, failure of a tooth germ to develop at the optimal time, the lack of necessary space imposed by a malformed jaw, and a genetically determined disproportion between the tooth mass and the jaw size. Clinically, hypodontia in the permanent dentition, excluding the third molars, is found in 3-10% of the population. Hypodontia is more frequently found in Asians and Native Americans. One of the commonest forms of localized microdontia is that which affects the maxillary lateral incisor, a condition called Peg laterals. The next tooth which can be affected is the third molars. Few cases of microdontia in canines have been reported. The following article throws light on the Concomitant occurrence of hypodontia and microdontia in a single case.

Key words: Anodontia, Microdontia, Hypodontia

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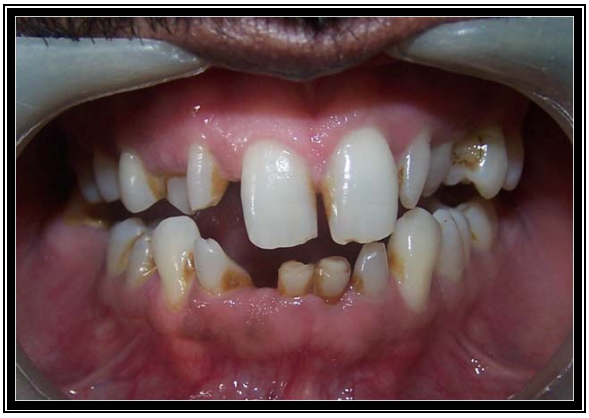
Introduction

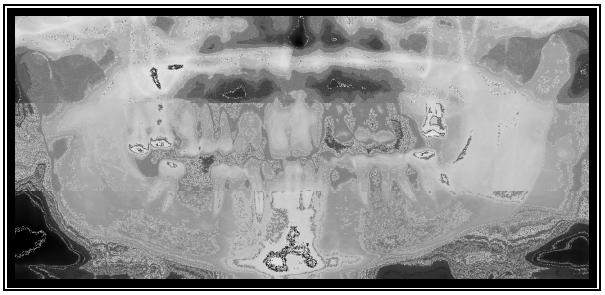
Microdontia is a condition where the teeth are smaller than the normal size, which may involve all the teeth or be limited to a single tooth or a group of teeth. Often the lateral incisors and third molars may be small [1]. Generalized microdontia is extremely rare, although it does occur in some patients with dwarfism[2]. Supernumerary teeth may also be microdonts. Hypodontia refers to the developmentally missing single or multiple teeth [1]. Many have reported these anamolies individually, but very few cases where combinations of these anomalies together have been mentioned. One such concomitant occurrence has been reported and discussed below.

Case History

A 32 year old apparently healthy male patient visited our department with a chief complaint of decayed teeth. The patient was moderately built, with no other clinical signs or symptoms. There was no relevant family/medical history or local lymph node enlargement. On intraoral examination, the entire mucosa appeared apparently normal. The upper anterior quadrant showed microdontic lateral and canines on both the right and the left sides. The lower anterior quadrant showed retained central incisors and canines [Table/Fig 1]. OPG showed the same anomalies in a wider range, with the missing permanent tooth buds with respect to the lower anteriors [Table/Fig 2]. As per the above findings, the diagnosis of hypodontia with microdontia was made.



[Table/Fig 1].Clinical photograph show microdontic 12,13,22,23 and Lower anterior quadrant with retained 31,32,41,42.



[Table/Fig 2] OPG showing missing permanent tooth buds with 31,32,41,42.

Discussion

The expression of developmentally missing teeth may range from the absence of one or a few teeth (hypodontia), to the absence of numerous teeth (oligodontia) and to the failure of all teeth which are to develop (Anodontia) [1]. Developmentally missing teeth may also be the result of numerous independent pathological mechanisms that can affect the orderly formation of the dental lamina, the failure of a tooth germ to develop at the optimal time, the lack of necessary space imposed by a malformed jaw, and a genetically determined disproportion between the tooth mass and the jaw size [2].

Clinically, hypodontia in the permanent dentition, excluding the third molars, is found in 3-10% of the population. Hypodontia is more frequently found in Asians and Native Americans. Although missing primary teeth are relatively uncommon, when one tooth is missing, it is usually a maxillary incisor. The most common missing teeth are the third molars, the second premolars and the maxillary and the mandibular central and lateral incisors [1]. The absence may be either unilateral or bilateral. Children who have developmentally missing teeth tend to have more than one tooth absent and more than one morphological group (Incisors, premolars and molars) involved. However, it must be kept in mind that the development of teeth may vary markedly among the patients. The eruption of some teeth may be developmentally delayed by a number of years after the established time. The differential diagnosis for hypodontia includes ectodermal dysplasia which is a inherited disorder and it results in the absence of teeth [1] .

Although the aetiology of single missing teeth is unknown, a familial tendency for this defect is present in many instances. Graber [2], while reviewing the congenital absence of teeth, reported the accumulating evidence, that it is actually the result of one or more point mutations in a closely linked polygenic system. It is most often transmitted in an autosomal dominant pattern with incomplete penetrance and variable expressivity.

Reports on the etiology, prevalence, severity and the location of hypodontia within families have found out the roles of genetic and environmental factors, by investigating the relationship between the severity and the distribution of hypodontia between family members, and any discernable effect on maternal health during pregnancy and birth weight [3]. 117 first degree relatives of 41 index patients were examined clinically and radiographically to identify the presence, severity and the location of hypodontia. The number and the location of the missing teeth of the patients were not related to the number and location of the missing teeth in their parents or siblings. The expression of hypodontia within a family was not affected by maternal health during pregnancy. The variation which was found in the expression of hypodontia within families, suggests that its

occurrence is not solely determined by genetic factors, but that epigenetic and environmental factors also are probably important. This finding is consistent with a multifactorial aetiology for this condition.
The concepts for the treatment [4] of adolescent patients with missing permanent teeth, where the condition of missing permanent teeth was observed with syndromes or was frequently hereditarily propagated in families rather than normal individuals.

The aesthetic and functional rehabilitation [5] of a patient with nonsyndromic oligodontia was reported from China, where Oligodontia (severe partial anodontia) was reffered to as a developmental dental anomaly. It is either an isolated trait or part of a syndrome. Oligodontia is characterized by the congenital absence of more than six permanent teeth except the third molars. Treatment involved would be surgical techniques, but less severe cases can be treated conventionally in a normally equipped dental office.

The prevalence of hypodontia [6] and developmental malformation of permanent teeth in Saudi Arabian schoolchildren has shown that congenital malformations were more in the permanent teeth of Saudi Arabian male children. Five-hundred schoolchildren were investigated after being selected randomly from Riyadh city. The age group of the examined sample ranged from 13 years and 6 months to 14 years and 6 months. Clinical and radiographical examinations were performed. The findings indicated that hypodontia was present in about 4 per cent of the children; the most frequently affected teeth were the mandibular second premolars, the maxillary laterals, and the maxillary second premolars. Tooth malformations, mainly peg-shaped upper lateral incisors, were also observed in about 4 per cent of the sample.

A retrospective literature review [7] was carried out to determine the prevalence of hypodontia and the current knowledge of the associated aetiological factors. The reported studies vary widely in their reports of prevalence and the reported rates were found to vary from 2.6% to 11.3%. Racial differences have been determined. Studies on Caucasians showed that the mandibular second premolars and the maxillary lateral incisors were the most frequently recorded absent teeth and in Asian studies, the mandibular incisor was the most frequently recorded absent tooth. The prevalence rates were higher in females as compared to the males (3:2, respectively). The association of hypodontia with other systemic conditions and dental anomalies is widely reported. Recent developments in molecular genetics have established the importance of the muscle specific homeobox genes (MSX1 AND MSX2) in dental development. Specific genes that are responsible for the more severe types of hypodontia, including ectodermal dysplasia, have been identified by linkage analysis. However, a variable expression of the trait suggests a polygenic mode of inheritance with the interaction of epistatic genes and environmental factors.

Idiopathic oligodontia [8] of the primary dentition is very rare. A case was reported of a 2 year and 6 month old boy, who presented with fourteen missing primary teeth. Tooth agenesis [9] may originate from either genetic or environmental factors. Genetically determined hypodontic disorders appear as isolated features or as part of a syndrome. MSX1, PAX9, AND AXIN2 are involved in non-syndromic hypodontia, while genes such as SHH, PITX2, IRF6, AND P63 are considered to participate in syndromic genetic disorders, which include tooth agenesis. In dentistry, artificial tooth implants represent a common solution to tooth loss problems; however, molecular dentistry offers promising solutions for the future.

Anomalies of tooth number [10] may not be isolated conditions, but may have wider associations in the development of the dentition, including tooth size. This study was aimed to examine the links between hypodontia, supernumerary teeth and crown size, considering the effect on the development of the whole dentition and to increase the understanding of the aetiology of these conditions. Further, it has shown that the greater the number of the missing teeth, the smaller the tooth size. The hypodontia

patients also showed higher variability in tooth dimensions than that found in the control group. Patients with supernumerary teeth had larger teeth than seen in the controls, with the greatest differences in the mesiodistal dimensions. In patients both hypodontia and supernumerary conditions, the differences in tooth size were generalized throughout the dentition. In anomalies of tooth number, the size of the teeth was also involved. In patients with hypodontia and supernumerary teeth conditions, the crown size of the whole dentition was affected. These findings are compatible with a multifactorial aetiology of these conditions.
Numerous epidemiological studies [11] of hypodontia have shown the distributions of hypodontia in an adolescent sample of American blacks with a comparable sample of whites. The prevalence of people with missing teeth is significantly lower in blacks than in whites, as is the number of missing teeth per person. Significant sex differences were found only for the third molars (absence more common in females), and the sex differences were greater in whites than in blacks.

The congenital absence of teeth is a complex condition [12] affecting several parameters of oral development. This was the first study which was done to measure tooth crown dimensions by using image analysis in a family with hypodontia, in whom the mutation was identified, and to compare them with a control group. The majority of tooth types throughout the dentition were significantly smaller in the family members with hypodontia than in the control group, for all parameters which were measured. The significantly smaller tooth crown dimensions which were recorded in the affected family members showed that the effect of the PAX9 mutation was seen not only in the congenitally missing teeth, but also in smaller crown sizes throughout the dentition.

The developmental [13] absence of teeth (hypodontia) was reported to be associated with characteristic morphological changes in the teeth, alveolar volume deficiencies, and skeletal jaw malrelationships. The reports [14] on the management of the patient with oligodontia by using adhesive techniques and new restorative materials, represent the current options in the management of the dental rehabilitation of young patients with oligodontia.

In familial human hypodontia [15], the congenital absence of teeth is one of the commonest developmental abnormalities which are seen in human populations. Familial hypodontia or oligodontia represents an absence of the varying numbers of primary and/or secondary teeth as an isolated trait. While much progress has been made in understanding the developmental basis of tooth formation, the knowledge on the aetiological basis of the inherited tooth loss remains poor. The study of mouse genetics has uncovered a large number of candidate genes for this condition, but mutations in only three have been identified in human pedigrees with familial hypodontia or oligodontia: MSX1, PAX9 AND AXIN2. This suggests that these conditions may represent a more complex multifactorial trait, influenced by a combination of gene functions, environmental interactions and developmental timing. Completion of the human genome project has made available the DNA sequence of the collected human chromosomes, thus allowing the localization of all human genes and, ultimately, the determination of their functions.

Treatment

Management[1] of missing teeth, abnormal occlusion, or altered facial appearance may cause psychological distress in some patients. If the extent of hypodontia is mild, the associated changes may likewise be slight and manageable by orthodontics. In more severe cases, restorative implants and prosthetic procedures can be undertaken.

The management may be complex [13], involving several dental specialties, and requires that they ideally work as a close-knit team. Improved diagnostic and treatment technologies continue to evolve, ever widening the management opportunities for these patients.

There are a number of options which are available for the restoration of the space which

is generated [14] by the missing teeth. The dental treatment can vary, depending on the severity of the disease and it generally requires a multidisciplinary approach.

Conclusion

Not all the cases need to undergo treatment, unless there is a requirement. Dental clinicians should keep in mind that there are good possibilities with conventional prosthodontic techniques to help patients with severe dental anomalies. The treatment not only improves speech and masticatory function, but also has psychological implications that may greatly help in regaining self-confidence. Specialist teams with access to traditional and evolving diagnostic and treatment technologies are best able to manage patients with complex treatment needs such as some of those presenting with hypodontia. The loss of teeth in young patients can cause aesthetic, functional, and psychological problems, particularly if the teeth of the anterior region are involved. Proper diagnosis can help in the management of these cases in a sportive way. Anyway, our patient did not have any problem which was related to speech, except the lisping of certain words, with which he was not bothered. The patient was motivated because of this and recalled for follow up.

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