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Congenital Bilateral Missing of Permanent Mandibular Second Molars in a 10-Year-Old Child: A Case Report

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ABSTRACT

Hypodontia is the most common dental developmental disorder. Several underlying mechanisms have been proposed to be involved in its pathogenesis. Occurrence of hypodontia as an isolated trait due to genetic mutations has also been reported. Hypodontia most commonly involves the mandibular premolars, maxillary lateral incisors and second premolars. However, hypodontia of permanent second molars is a rare occurrence. To the best of the author's knowledge, only two studies on orthodontic patients have reported hypodontia of permanent second molars in Iran.

This case report describes non-syndromic bilateral missing of permanent mandibular second molars in a 10-year-old child. Clinical examination revealed no systemic underlying condition, and no clinical evidence of any syndrome, or hereditary or familial pattern. Due to the potential impact of hypodontia on the function of dentition, prompt management of hypodontia is imperative. Furthermore, due to the possible mutations associated with hypodontia, additional screening for cancer susceptibility may be recommended.

Keywords: Hypodontia; Molar; Mandible; Prevalence

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INTRODUCTION

Hypodontia or congenital missing of one or more teeth is the most common dental developmental disorder that results from the disturbances in both the initiation and proliferation stages of tooth development, and may occur in both the primary and permanent dentition [1,2].

The known causes of hypodontia include a familial inheritance pattern, trauma, infection (rubella, osteomyelitis), systemic diseases (rickets, polio and syphilis), radiotherapy, chemotherapy, and hormonal imbalance. Hypodontia may also be a manifestation of some syndromes such as ectodermal dysplasia, chondroectodermal dysplasia, achondroplasia, Down syndrome, and cleft lip or palate. Race may also play a role in the occurrence of hypodontia [1,3]. In some patients, hypodontia occurs independently without an underlying cause, which may be due to genetic mutations [1,3]. Alternatively, it may occur due to evolutionary reduction in jaw size as a result of consumption of soft foods [4].

The prevalence and type of hypodontia in different countries have been the topic of many previous investigations [5]. The reported prevalence of hypodontia ranges from 2.9% to 7.8% [5,6]. Higher prevalence rates ranging from 19% to 36% have also been reported in some communities with diverse racial patterns and also in different geographical locations [5]. Hypodontia most commonly involves the mandibular premolars, maxillary lateral incisors, and maxillary second premolars [5]. However, missing of permanent second molars is a rare occurrence with a very low prevalence rate [5]. To the best of the authors' knowledge, only two studies have reported hypodontia of permanent second molars in orthodontic patients in Iran [7,8]. This case report describes non-syndromic bilateral missing of permanent mandibular second molars in a 10-year-old child.

CASE REPORT

A10-year-old girl with the chief complaint of dental pain presented to the Pediatric Dentistry Department of the Faculty of Dentistry of Tehran University of Medical Sciences. She had no previous history of dental visits. Her medical history revealed no history of cardiovascular systemic diseases, metabolic diseases, syndromic disorders, chemotherapy, hormonal therapy, or severe trauma to the head or face. Clinical examination showed no symptoms of any physical problem in the limbs, skin or hair, no hearing or vision problems, and no impairment in her cognitive performance.

Intra-oral examination revealed no evidence of oral ulcers or lesions, gingival inflammation, or dental infection. The patient was in the late mixed dentition period. The occlusal relationship of her maxillary and mandibular permanent first molars revealed a Class I occlusion on both sides with normal overjet and overbite of incisors. Dental examination revealed a severely carious mandibular left permanent first molar probably requiring pulp therapy, which was responsible for the chief complaint of pain.

A panoramic radiograph was requested (Fig. 1) which revealed bilateral absence of permanent mandibular second molar tooth buds (neither in dental sac nor in calcification stage). In the maxilla, however, permanent second molar tooth buds were detected in the mineralization stage. The permanent third molar tooth buds were not seen in any of the mandibular or maxillary quadrants. Other permanent teeth were detected to be in their appropriate developmental stage.

The parents were questioned about any congenital missing of teeth in the child's first-degree relatives and family members, but there was no history of tooth missing in her family.

Due to the absence of permanent second molar tooth buds, prompt treatment and preservation of permanent first molars were imperative. Accordingly, Cvek pulpotomy and amalgam restoration were performed for the carious permanent first molar. Maxillary permanent first molars underwent preventive resin restoration, and the residual roots and severely carious primary teeth were extracted. All permanent molars were in the active eruption phase but some of them did not have sufficient space for eruption. Thus, the patient was referred to the Orthodontics Department for orthodontic consultation and a thorough examination of potential occlusion. Her orthodontic treatment plan included regular annual dental appointments to control the eruption of maxillary permanent second molars and prevent their super eruption. A possible treatment plan of dental implant placement was considered for her in the upcoming years.

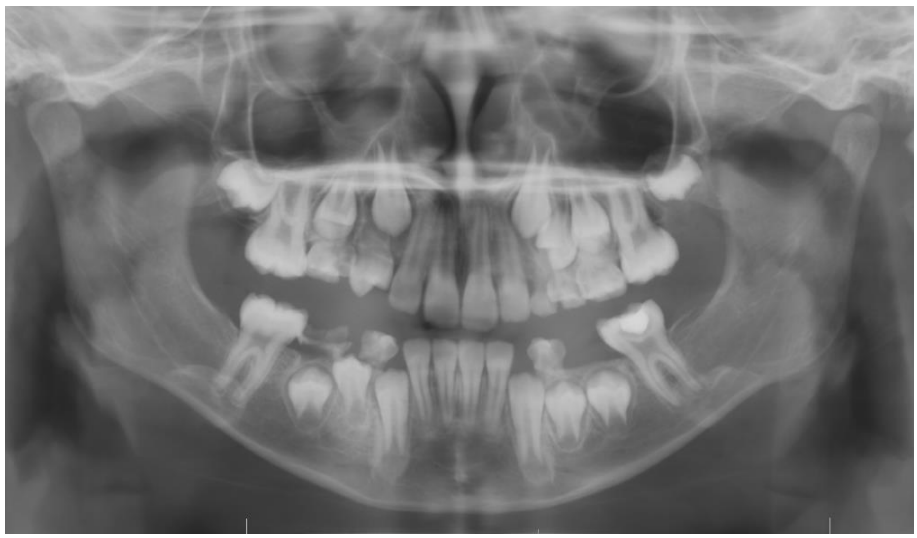

Fig. 1: Panoramic radiograph showing bilateral missing of permanent mandibular second molars

DISCUSSION

Hypodontia due to missing of teeth is an important condition that needs to be detected early for proper management and to prevent its adverse effects on occlusion. Distinguishing between definite missing of a tooth and its delayed calcification is an important parameter to detect absence of permanent tooth buds. Congenital missing of a tooth is confirmed when (I) it is not seen in the dental arch in clinical oral examination, (II) the tooth bud does not exist in any of the developmental stages on the radiograph and uniform bone trabeculation is seen instead of a dental sac, and (III) no history of tooth extraction is reported [1,3].

According to the American Academy of Pediatric Dentistry, calcification of permanent second molar tooth begins at the age of 2.5-3 years while its crown mineralization is completed at about 7-8 years of age [2]. Therefore, it appears that dental radiographic examination of children from 4.5 to 5 years of age could be helpful in detection of hypodontia except for third molars. A meta-analysis suggested that since calcification of all permanent teeth begins at the age 7, the results of studies regarding hypodontia in older individuals are reliable [6]. This statement further confirms the diagnosis of hypodontia of permanent mandibular second molars in the present case.

In congenital hypodontia, the missing tooth is generally the last tooth of a group of similar teeth. Tooth buds are often more sensitive to environmental factors in areas with later innervation. More mesial teeth in each dental series are more genetically stable and are rarely affected by hypodontia. Thus, among the molar teeth, third molars, among the premolar teeth, second premolars, and among the incisors, lateral incisors are more likely to be affected by hypodontia. Finally, hypodontia of second molars and canine teeth has been rarely reported [7]. Therefore, in cases with no underlying environmental factors, hypodontia may be attributed to mutations in the autosomal dominant genes such as PAX9, MSX1, EDA, AXIN2 and WNT10A which show a more sporadic pattern [1,3]; although, it needs to be confirmed by genetic tests. Another possible reason is the evolutionary reduction in jaw size due to lifestyle changes and more frequent consumption of cooked and soft foods, which may lead to some changes in development of teeth and a reduction in their number in future generations [4].

In the present study, the child had no systemic condition or clinical symptom associated with any syndrome. Her parents did not report any congenital missing of teeth in their first-degree relatives. Therefore, her hypodontia did not seem to be related to any syndrome or inheritance pattern. Hypodontia of second molars is very rare, and has been reported in only two studies in Iran [7,8]. Also, there is no detailed information about the prevalence of this condition, or a specific treatment protocol for it.

The present case report described bilateral missing of mandibular permanent second molars, which was consistent with the reports regarding higher prevalence of hypodontia in the mandible, than in the maxilla [9]. Hypodontia reportedly has a slightly higher prevalence in the right quadrant, although this predilection is not statistically significant. Moreover, it is reportedly more common (1.5 times) in females than males [3,9] Bilateral hypodontia of permanent second molars in both the maxilla and mandible has also been reported [10].

Functionally, hypodontia can lead to (I) an increase in bite (deep bite), (II) movement of teeth, (III) development of non-functional spaces and subsequent formation of an inappropriate gingival contour, and (IV) super eruption of the opposite tooth. Therefore, early diagnosis followed by an appropriate treatment plan based on (I) patient's occlusion, (II) patient's facial growth pattern, and (III) dental arch space is essential. Management of hypodontia often requires a multi-disciplinary approach involving pedodontists, orthodontists, implant specialists, and prosthodontists.

Finally, it has been suggested that the genes associated with hypodontia could be involved in some other pathological conditions such as colorectal or ovarian cancer as well. Therefore, due to the mutations associated with hypodontia, it is recommended that patients with hypodontia undergo early screening for susceptibility to some specific cancer types due to the potentially higher incidence of some cancers associated with these genes [5].

CONCLUSION

Bilateral missing of mandibular permanent second molars is a rare occurrence. If no underlying etiology is detected, it is probably an isolated trait caused by genetic mutations. Early diagnosis and timely management can prevent malocclusions. Furthermore, due to the mutations associated with hypodontia, additional screening for susceptibility to some certain cancer types may be recommended.

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