Hypodontia Involving Only Mandibular Permanent Canines: Report of Six Cases

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ABSTRACT

Agenesis of mandibular permanent canines is uncommon. The occurrence of such an anomaly in patients with all other permanent teeth present, except third molars, is even more rare. The purpose of this case report was to summarize the radiographic findings in 6 Chinese children with hypodontia involving only mandibular permanent canines. The etiology of such an anomaly is not known, but both genetic and environmental factors may play a role. (*J Dent Child*. 2004;71:197-200)

KEYWORDS: HYPODONTIA, PERMANENT CANINES

Hypodontia is the congenital absence of 1 or more teeth. When third molars are excluded, the most commonly affected teeth in the permanent dentition are second premolars and maxillary lateral incisors.[1-4] Agenesis of mandibular permanent canines is rare and has only been reported infrequently.[5-8] Muller et al studied the prevalence of hypodontia in 13,459 American white children and found only 2 cases of agenesis of mandibular permanent canines—with 1 and more than 6 missing teeth, respectively. In a recent study of 9,532 18-year-old Norwegians, only 1 patient—who was diagnosed with severe hypodontia with agenesis of 6 permanent teeth—was found to have a missing mandibular permanent canine.[1] The purpose of this case report was to summarize the radiographic findings in 6 Chinese children with hypodontia involving only mandibular permanent canines.

CASE REPORT

All cases in this report were of Chinese ethnicity. The male-to-female ratio was 1:1, and the age of diagnosis ranged from 9 to 13. A summary of the radiographic findings in the 6 cases is presented in Table 1. Of the 6 cases, 2 were unilateral on the left (Figures 1 and 2) and 2 were unilateral on the right (Figures 3 and 4). The remaining 2 were bilateral (Figures 5 and 6). All cases had the mandibular permanent canines as the only missing tooth when third molars were excluded.

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Detailed dental history was obtained from the parents to rule out any possibility of the missing canines having been extracted. The parents were also questioned about a family history of congenitally missing teeth, and they reported that there were no other family members (parents or siblings) affected with this anomaly.

The orthopantomograms of all 6 patients were examined for other developmental anomalies. Two patients showed delayed development or agenesis of 1 to 2 third molars, while the remaining 4 had all third molars developing. There were a total of 8 missing mandibular permanent canines in the 6 cases. Three of the corresponding primary canines had exfoliated, and the predecessors of the remaining 5 missing permanent canines were examined for the degree of root resorption.

As accurate assessment of root length was not feasible with orthopantomograms, the degree of root resorption was classified as: (1) little/no; (2) less than half; or (3) more than half root length. According to this classification, one of the corresponding primary canines showed advanced resorption of more than half root length, and the remaining 4 showed little/no resorption.

DISCUSSION

In patients with mild to moderate hypodontia, the most frequently missing teeth are found to be second premolars and maxillary lateral incisors.[4,9] Agenesis of mandibular permanent canines has occasionally been found in patients with severe hypodontia, but is rarely seen in patients with only 1 or 2 missing teeth.[9-11] This concurs with the Butler's Field Theory, which states that the:

1. most mesial tooth is the most stable in each morphological class;
2. canine, being the sole tooth in its developmental field, is expected to be more stable and rarely missing.[12]

Table 1. Radiographic Findings of 6 Cases Diagnosed With Hypodontia Involving Only Mandibular Permanent Canines

Case no.	Gender	Presenting age	Missing teeth	Resorption of corresponding primary canines	Other developmental dental anomalies
1	M	9	22	M=exfoliated	
2	M	12	22	M=exfoliated	
3	F	13	27	R=exfoliated	No sign of tooth 1
4	F	11	27	R=>50% root resorbed	
5	M	11	22, 27	M and R=little/no resorption	No sign of teeth 1 and 16 (17 and 32 just started calcification)
6	F	11	22, 27	M and R=little/no resorption	

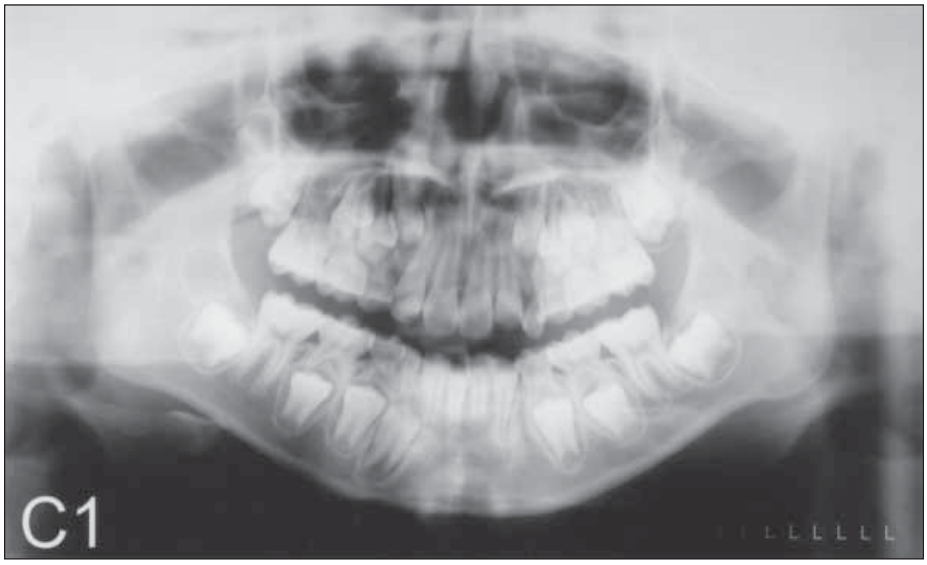

Figure 1. Case 1 orthopantomogram showing agenesis of tooth 22.

Figure 2. Case 2 orthopantomogram showing agenesis of tooth 22.

Studies on prenatal development have also shown that:

1. mandibular teeth in different morphological classes were supplied by different nerve branches with unrelated origins and different timing in outgrowth from the central nervous system;
2. teeth located near the endings of the peripheral nerve branching were more often affected by agenesis.[13,14]

These findings helped to explain why the pattern of tooth agenesis appeared to be genetically predetermined in many cases. On the other hand, tooth agenesis can occur locally in a pattern not resembling the so-called "normal" patterns of agenesis, as in this report's cases. Four of this report's cases actually have all the third molars developing, which is rather unexpected as third molars are considered the least stable teeth in development.[3] It has been suggested that abnormalities of oral epithelium and supporting tissues were possible pathogenesis for these "atypical" cases.[13] The final pattern of hypodontia might, therefore, rely on the interaction of the predetermined stability of certain tooth types with other perturbing factors which could be genetic, environmental, or both acting together.[15,16]

All 6 patients in the case report are Chinese. The pattern of hypodontia has been shown to be different between Chinese and Caucasian children, where agenesis of mandibular incisors was the most common in the former population.[17] It is not known if a racial difference exists in the prevalence of agenesis of mandibular permanent canines. Davis studied the prevalence of hypodontia among 1,093 12-year-old Chinese students and not find a single case of missing mandibular permanent canines.[17] The sample size in her study, however, was relatively too small to allow meaningful comparison with the studies mentioned earlier.[1,4]

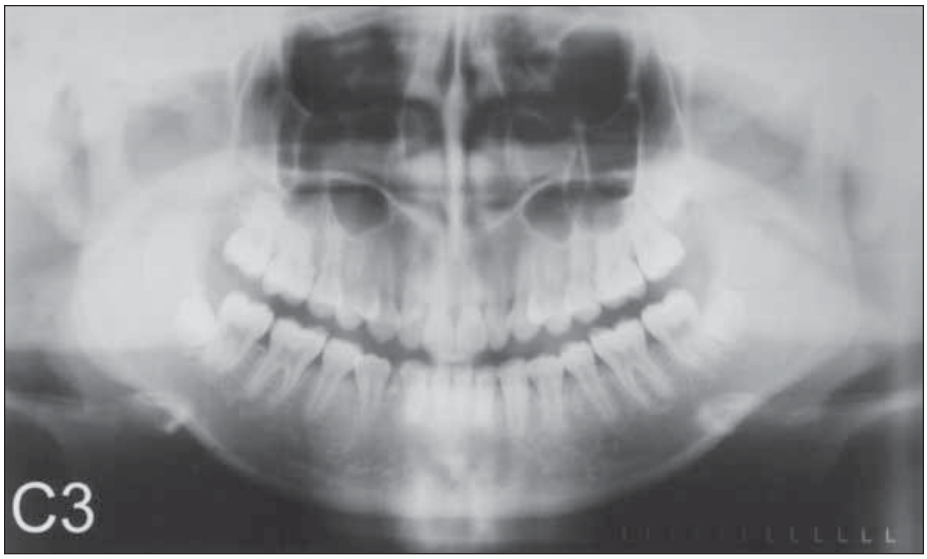

Figure 3. Case 3 orthopantomogram showing agenesis of tooth 27.

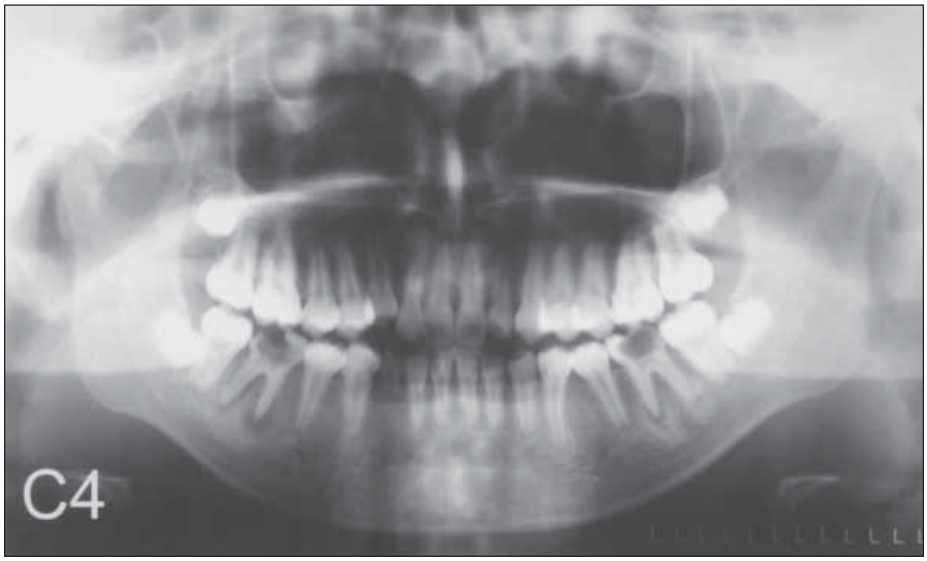

Figure 4. Case 4 orthopantomogram showing agenesis of tooth 27.

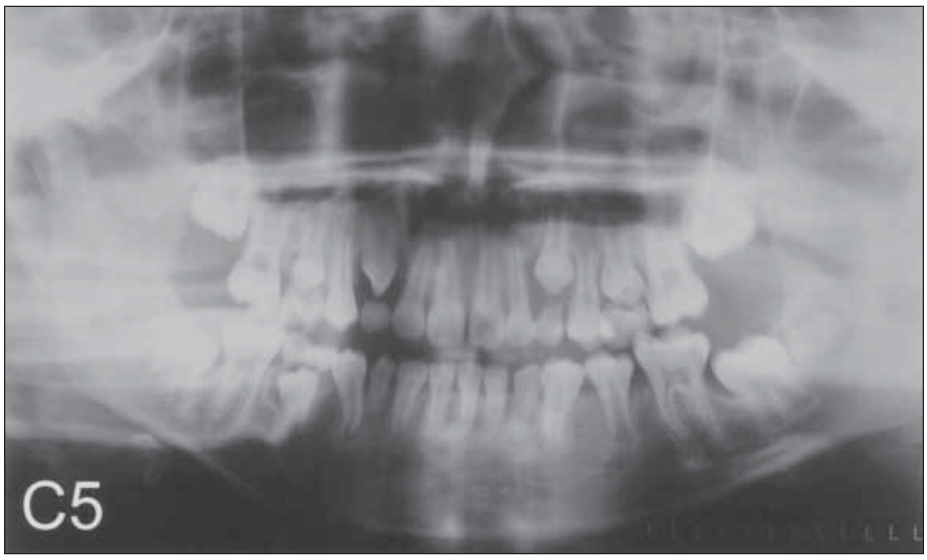

Figure 5. Case 5 orthopantomogram showing agenesis of teeth 22 and 27.

In this case report, 4 of the 8 corresponding mandibular primary canines (50%) showed little or no resorption when the permanent successors were missing. It should be noted, however, that in unilateral cases, 3 of the 4 corresponding primary canines were exfoliated and the remaining one showed advanced root resorption. The prognosis was better in bilateral cases. In the study of root resorption in retained primary canines and molar teeth without permanent successors in 249 severe hypodontia patients, it was shown that the mandibular primary canines had the best predictable lifespan.[18] Up to age 34, more than 80% of the retained primary canines showed no or little root resorption.

Therefore, the predecessors to missing mandibular permanent canines showing little resorption should be retained until they exfoliate naturally. One of the advantages of retaining such teeth is that it helps avoid alveolar bone resorption, which would help leave open future treatment options such as replacement with an implant.

CONCLUSIONS

These case reports are considered uncommon, as agenesis of mandibular permanent canines is rarely seen in patients with mild hypodontia. Further studies to investigate the prevalence of such an anomaly in the ethnic Chinese population would help to answer if there is significant racial difference in its occurrence.

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Figure 6. Case 6 orthopantomogram showing agenesis of teeth 22 and 27.

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