

Congenital absence of the permanent canines: a clinico-statistical study

Yohko Fukuta[§], Morio Totsuka[§], Yasunori Takeda[†]
and Hirotsugu Yamamoto[‡]

Departments of [§]Oral Diagnosis and [†]Oral Pathology, School of Dentistry,
Iwate Medical University, Morioka, Iwate, Japan

[‡]Department of Pathology, Nihon University School of Dentistry at Matsudo,
Matsudo, Chiba, Japan

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Abstract: We report here a clinico-statistical study of congenital absence of the permanent canines (CAPC). Sixty-five cases (22 men and 43 women) of CAPC were found in the files of 35,927 outpatients, an incidence of 0.18%. Thirty-seven cases had single absence of the canine and 28 cases had multiple absences. There were 42 cases in the maxilla, 17 in the mandible, and 6 in both the maxilla and the mandible. In the single absence cases, there was a tendency of occurrence at the left side in the maxilla, and the right side in the mandible. There were 39 CAPC cases without absence of other permanent teeth. Several complicated dental anomalies were seen such as persistence of deciduous teeth, congenital absence of other permanent teeth, microdontia, malposition, and complete or incomplete impaction (excluding the third molars). The complication rate of other permanent tooth absences was higher in the cases with CAPC in the maxilla than in the mandible. (*J. Oral Sci.* 46, 247-252, 2004)

Key words: congenital absence; canine; permanent dentition; human.

frequently found in certain teeth, i.e. the upper lateral incisor, lower central incisor, second premolar, and third molar (1-3). On the other hand, it is thought that congenital absence of so-called key teeth, such as the upper central incisor, canine and first molar, is extremely rare (4). However, patients with single or symmetrical congenital absences of the permanent canines (CAPC) are occasionally found in routine dental examinations, despite the fact that congenital absences of the upper central incisors and the first molars are seldom found. Previously, some authors described cases of CAPC (5-17), but the details of CAPC have not been clinically analyzed. We performed a clinico-statistical analysis of CAPC with a literature review.

Materials and Methods

The cases without a history of canine extraction or impacted canines revealed by radiographs were selected from outpatient files of the Department of Oral Diagnosis, School of Dentistry, Iwate Medical University from 1983 to 2000. In each case, the number and location of absent teeth, as well as complicated oro-dental anomalies, were investigated. Statistical examination of the location of the absent canines were made using a χ^2 test.

Introduction

Congenital absence of the permanent teeth is more

Results

Of 35,927 cases, 65 had congenital absences of the permanent canines (CAPC), with an overall incidence of 0.18 %. These cases had neither systemic diseases nor hereditary disorders which influenced tooth formation or eruption.

There were 22 men and 43 women with CAPC, with a male-to-female ratio of approximately 1:2, although the

Correspondence to Dr. Yohko Fukuta, Department of Oral Diagnosis, School of Dentistry, Iwate Medical University, 1-3-27 Chuo-dori, Morioka, Iwate 020-8508, Japan

Tel: +81-19-651-5111 Ext. 4211

Fax: +81-19-652-4131

E-mail: yfukuta@iwate-med.ac.jp

Table 1 Cases of congenital absence of the permanent canines

	Men	Women	Total
Maxilla	16	26	42
Mandible	2	15	17
Maxilla and mandible	4	2	6
Total	22	43	65

Total patients examined, 14,371 men and 21,566 women, men to women ratio=2:3 statistical significance noted between the maxilla and the mandible by the χ^2 test with 0.01

CAPC was 0.13% in the maxilla and 0.06% in the mandible, and statistical significance was noted between them by the χ^2 test with $P < 0.01$. There were 37 cases of single absences (Fig. 1) (12 men and 25 women, 56.9% of all cases) and 28 cases of multiple absences (Fig. 2-4) (10 men and 18 women, 43.1% of all cases). Multiple absences, except for 2 cases, were symmetric. There was a predominance of absences at the left of the maxilla (χ^2 test, $P < 0.01$) and at the right mandible (χ^2 test, $P < 0.05$) (Table 2).

Various complications of dental anomalies associated with CAPC were found, i.e. 34 cases of persistent deciduous

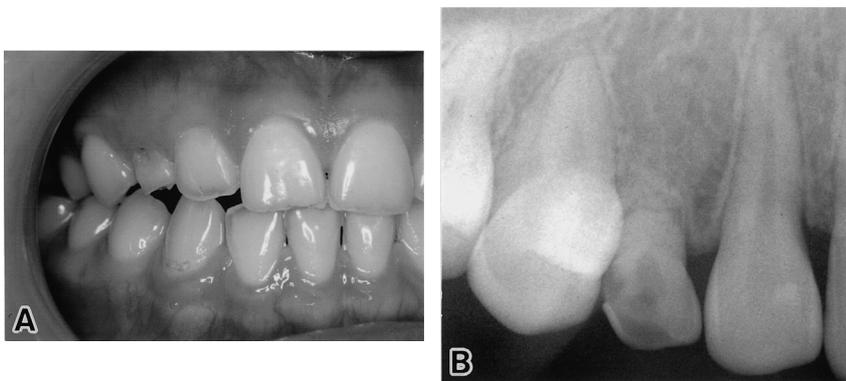


Fig. 1 A 17-year-old woman: A: Congenital absence of the right upper canine with persistent deciduous canine; B: Intraoral radiograph showing root absorption of persistent deciduous canine.



Fig. 2 Panoramic radiograph of an 18-year-old man. Congenital absence of bilateral upper canines and persistent deciduous canines without root absorption.



Fig. 3 A 26-year-old man. Congenital absence of bilateral upper and left lower canines, bilateral upper and left lower second premolar, and right lower lateral incisor. Persistence of 3 deciduous canines and 4 deciduous second molars. A: Intraoral view of the maxillary arch; B: Intraoral view of the mandibular arch; C: Panoramic radiograph showing absence of the 3 canines (13, 23,33) and impaction of the right lower second premolar.

sex ratio of all examined cases was 2:3. Congenital absence of the permanent canines was found in the maxilla of 42 cases, in the mandible of 17 cases, and in both the maxilla and the mandible of 6 cases (Table 1). The incidence of

teeth, 26 cases of congenital absences of other permanent teeth excluding the third molars, 13 cases of microdontia, 10 cases of malposition of the teeth, 8 cases of complete or incomplete tooth-impaction excluding the third molars,

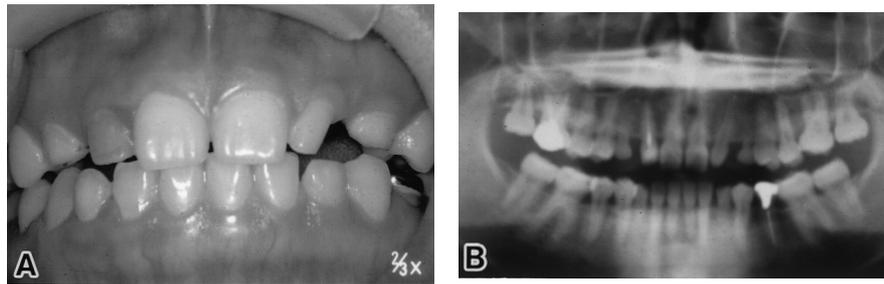


Fig. 4 A 29-year-old woman. Congenital absence of all the canines and 4 persistent deciduous canines. A: Intraoral view; B: Panoramic radiograph showing no root absorption of four deciduous canines.

Table 2 Location of single and multiple absences of the permanent canines

	Site		Men	Women	Total	
Single absence	Maxilla	Right	2	6	8	}
		Left	8	10	18	
	Mandible	Right	1	9	10	}
		Left	1	0	1	
	Total		12	25	37	
Multiple absences	Maxilla		6	10	16	
	Mandible		0	6	6	
	Maxilla and mandible		4	2	6	
	Total		10	18	28	
Total			22	43	65	

*p< 0.01, **p< 0.05 by χ^2 test

Table 3 Complications of dental anomalies with congenital absence of the permanent canines

Clinical findings	Men	Women	Total
Persistent deciduous teeth	16	18	34
Congenital absence of other teeth, excluding 3rd molars	12	14	26
Microdontia	8	5	13
Malposition of the teeth	1	9	10
Complete or incomplete tooth impaction, excluding 3rd molars	2	6	8
Malocclusion	0	3	3
Supernumerary teeth	1	1	2
Odontoma	1	1	2
Others	2	3	5

3 cases of malocclusion, 2 cases of supernumerary teeth, 2 cases of odontoma at the same site as CAPC in the mandible, and 5 cases of other anomalies (Table 3). The other anomalies included 3 cases of tooth malformation, including 1 case of talon cusp, 1 of dentigerous cyst, and a case of bilateral cleft lip, alveolus and palate. Persistent deciduous teeth were predominantly found in patients in their teens and twenties. Complicated congenital absences of other permanent teeth were predominantly lateral incisors and second premolars of both the maxilla and the mandible (Table 4). The complication rate with congenital absences of other permanent teeth was 40.0% (32.4% for

single absence and 50.0% for multiple absences), and was higher in men and in the maxilla (Table 5). Twelve cases with single absences of the canine had 2 to 4 tooth absences including the canines, and 9 cases with absences of the bilateral maxillary canines had 3 to 15 teeth absent including the canines. However, 39 patients (60.0%) had absence of the canines alone. Microdontia of 13 cases were seen in the upper lateral incisors and the second premolars. The impacted teeth seen in 8 cases occurred in the canines and the second premolars.

Congenital absence of the canines in both the maxilla and the mandible occurred in 6 cases; 4 men and 2 women

Table 4 Congenital absence of other permanent teeth associated with absence of the canines

	Site	Tooth number
Maxilla	Central incisor	1
	Lateral incisor	18
	First premolar	9
	Second premolar	19
	First molar	4
	Second molar	6
Mandible	Central incisor	9
	Lateral incisor	12
	First premolar	9
	Second premolar	24
	Second molar	6

Table 5 Complication rate of congenital absences of other permanent teeth associated with the absence of the canines

	Men	Women	Total
Maxilla	8/16 (50.0)	11/26 (42.3)	19/42 (45.2)
Mandible	0/2 (0.0)	2/15 (13.3)	2/17 (11.8)
Maxilla and mandible	4 /4(100.0)	1/2 (50.0)	5 /6(83.3)
Total	12/22 (54.5)	14/43 (32.6)	26/65 (40.0)

Table 6 Cases of congenital absence of the canines in both maxilla and mandible

Case	Age	Sex	Location of congenital absence of the canine	Total number of congenital absence	Number of persistent deciduous teeth	Others
1	16	male	four canines	21	11	spina bifida of the mother and brother by family history
2	18	male	four canines	12	4	
3	26	male	three canines (13,23,33)	8	7	45; impaction
4	41	male	four canines	18	11	persistence of some deciduous teeth in two siblings by family history
5	24	female	three canines (13,23,33)	12	9	34,44; impaction
6	29	female	four canines	4	4	

(Table 6). Cases 3 (Fig. 3) and 5 had congenital absence of 3 canines and the other four cases had congenital absence of all of the canines. Complication with congenital absence of many permanent teeth was shown with the exception of Case 6 (Fig. 4), a 29-year-old woman, who had congenital absence of only the four canines. Case 4 had suspected familial tooth absence.

Discussion

It has been thought that the incidence of congenital tooth absence (hypodontia) ranged from 2.3 to 9.6%, excluding the third molars (1). Congenital absence of the canines in the permanent dentition is very rare, with the incidence reported to be 0.06% by Dolder in 1937 (18), 0.23 % by Bergström in 1977 (19), and 0.45% by Davis in 1987 (20). In the present study, the incidence of congenital absence of the permanent

Canines (CAPC) was 0.18%. Previously, the prevalence of congenital absence was reported to be greater in women (1,19-21), but in the Japanese literature, a predominance

of women was not found (22-24). In the present study, it is suspected that women were more affected by CAPC than men. Muller (25) reported that congenital tooth absence affected the maxillary arch more than the mandible. In previous reports, the incidence of CAPC was higher in the maxilla than in the mandible, at 0.06% in the maxilla and 0% in the mandible (Dolder, 1937) (18), and 0.10% in the maxilla and 0.02% in the mandible (Rose, 1966) (21). In Japanese reports (22-24), CAPC predominantly occurred in the maxilla, and the incidence was higher in the maxilla (0.13% in the maxilla and 0.06% in the mandible) in our series (Table 7).

In the present study, the occurrence of CAPC on the left side was predominant in the maxilla. In general, patients with cleft lip and alveolus, which more affected the left maxilla, are sometimes associated with tooth anomalies (3,26). We suspected that CAPC was predominant on the left side of the maxilla for a reason similar to above. However, this can not explain why CAPC was predominantly in the right side in the mandible.

Table 7 Comparison with previous reports in incidence of congenital absence of the permanent canines

authors	maxilla		mandible		total		
	n	%	n	%	N	n	%
Dolder ¹⁸⁾	6	0.06	0	0	10,000	6	0.06
Rose ²¹⁾	6	0.10	1	0.02	6,000	7	0.12
Begeström ¹⁹⁾	4	0.15	2	0.08	2,589	6	0.23
Davis ²⁰⁾	6	0.45	0	0	1,093	5	0.45
Hokari, et al ²⁴⁾	6	0.20	1	0.07	1,524	4	0.26
Fukuta, et al	48*	0.13	23**	0.06	35,927	65	0.18

*, **including 6 cases of congenital missing of the permanent canines occurred in both maxilla and mandible

In the present study, single canine absence was higher than multiple absences. Thirty-nine cases (60.0%) had solitary CAPC without other permanent tooth absences. We suspect that the permanent canines have a tendency to be solitarily absent, too. Complication with congenital absences of other permanent teeth predominantly occurred in cases of congenitally absent maxillary canines. In the mandible, the canines tended to be solitarily absent and to occur in women. A close relationship between the fusion or congenital absence of deciduous teeth and congenital absence of succeeding permanent teeth was reported (27,28). The lower anterior region is an area of preference for fused teeth. Further studies will be required to disclose the relationship between congenital absences and fused teeth.

Congenital absence of the permanent canines in both the maxilla and the mandible is very rare. In the present series, 2 cases of 3 canine absences and 4 cases of 4 canine absences were found. Generally, these cases were complicated with congenital absences of many other permanent teeth (5,11). In our series, only 1 case (29-year-old woman) had an absence of only 4 canines without complication of other permanent tooth absences, which is extremely rare. Only a few cases of absence of only 4 canines were reported previously (29,30).

The cause of congenital absence of the teeth is variable. A small number of absences are suspected to be due to phylogenetic reduction, heredity, localized disturbance, e.g., association with cleft lip or palate, radiological disturbance, and Down's syndrome. Also, a large number of absences are suspected to be due to hereditary disorders, such as ectodermal dysplasia, incontinentia pigmenti, and Rieger's syndrome, endocrine disturbances, and fetal infections (1-3). Familial cases of CAPC were also reported (5,15,30).

In the present study, only 1 case was suspected to be familial according to an interview with the patient. One case, which had bilateral absence of the upper canines, was associated with bilateral cleft lip, alveolus and palate. One case was associated with a talon cusp. Talon cusps tend to be associated with other dental abnormalities (Mader, 1981) (31). Two cases were associated with odontoma, which were suspected to have developed from the tooth germ of the canine. However, the cause of CAPC was obscure in most cases.

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