Dental abnormalities in permanent dentition in children with submucous cleft palate

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Seventy-three children with submucous cleft palate (38 girls and 35 boys), mean age 8.2 years (range 7.7–9.5), were studied retrospectively from orthopantomograms. Dental abnormalities in permanent dentition were found in 26 patients (36%). Missing teeth, mainly lower 2nd premolars, upper lateral incisors, and upper 2nd premolars, were found in 12 patients (16%). Most of the patients had 1 or 2 missing teeth, 2 had 3 missing teeth. In 5 patients hypodontia was associated with another dental abnormality. Other dental abnormalities included peg-shaped lateral incisors in 7 patients (10%), ectopic eruption of upper 1st molars in 6 patients (8%), transposition of upper canines and 1st premolars in 3 patients (4%), supernumerary teeth in 2 patients (3%), and palatally displaced upper canines in 1 patient (1%). As children with submucous cleft palate have a tendency towards increased frequency of missing teeth and other dental abnormalities, the need for thorough clinical and radiological dental examination is emphasized. ☐ *Dentition; ectopic eruption; hypodontia; peg-shaped lateral incisors; submucous cleft palate*

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Classic submucous cleft palate (SMCP) consists of bifid uvula, notching of the posterior border of the bony palate, and palatal muscle diastasis (1). Occult SMCP consists only of an abnormal levator muscle insertion into the posterior border of the palate (2). The classic SMCP may be diagnosed on thorough oral examination, whereas the occult variant is recognizable on nasopharyngoscopy. The estimated incidence of SMCP is roughly 1:1000, but perhaps only approximately 10% of the patients are symptomatic for velopharyngeal insufficiency (VPI) (3, 4). In the absence of VPI, submucous clefts often remain undetected. The surgical procedures for treating VPI that results from SMCP include palatal repair, pharyngeal flap with or without pushback, and intravelar veloplasty (2, 3, 5, 6).

Children with clefts have a higher incidence of dental abnormalities than children without clefts. Anomalies in the number of teeth (missing or supernumerary), in the size and shape of teeth, and in the eruption of teeth have been observed (7–9). The occurrence of dental abnormalities is higher in the permanent dentition than in the deciduous dentition. The incidence of hypodontia outside the cleft region increases with the severity of cleft. In Finland, the prevalence of hypodontia ranges from 10% to 68% in different cleft types, being 10% in cleft lip, 33% in cleft palate, 49% in unilateral, and 68% in bilateral cleft lip and palate (9).

As dental abnormalities have been reported to occur frequently in patients with isolated cleft palate (7–12) it is plausible that the dentition of children with SMCP is also affected. The purpose of this retrospective study was to evaluate the incidence of dental abnormalities in permanent dentition (missing teeth, supernumerary teeth, malformed teeth, and abnormal eruption) in children with submucous cleft palate.

Materials and methods

The patients comprised 73 Caucasian children (38 girls and 35 boys) with SMCP who had attended the Cleft Center, Department of Plastic Surgery, Helsinki University Central Hospital during 1980–95. The mean age of the children was 8.2 years (range 7.7–9.5). In all patients, diagnoses of SMCP were verified in the Cleft Center either clinically or by nasopharyngoscopy. Patients with syndromes (van der Woude or Catch 22) or combined clefts (cleft lip and submucous cleft palate) were excluded.

SMCP had been operated on in 65 of the 73 patients mainly because of VPI, and only rarely because of persistent problems with ears or feeding. The surgical treatment consisted of palatal repair ($n = 10$), pharyngeal flap surgery ($n = 25$), or a combination of two or more techniques consisting of pharyngeal flap, palatal repair, and/or intravelar veloplasty ($n = 30$). Secondary operations included closure of fistula in one patient.

The dentition was studied on orthopantomograms taken at the mean age of 8.2 years (range 7.7–9.5). The orthopantomograms were studied twice by the same orthodontist. A tooth positioned mesially or inclined mesially more than 15 degrees from the vertical plane was classified as ectopic (11). The Tooth Status Index described by Brattström & McWilliam (13) was used to assess the incidence of peg-shaped lateral incisors. Cases

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with ectopic eruption and/or peg-shaped lateral incisors were further evaluated from the orthopantomograms taken at 6 years of age and dental casts taken at 6 and 8 years of age. The chi-squared test was used in the statistical analysis.

Results

Dental abnormalities were found in 26 patients (36%) (15 boys and 11 girls). Boys had a tendency to more dental abnormalities than girls, but the difference was not statistically significant ($\chi^2 = 1.54$, d.f. = 1). Four of the boys and one girl had more than one type of dental abnormality.

Altogether 21 missing teeth were found in 12 patients (16%) (7 boys and 5 girls). All but one of the missing teeth were lower 2nd premolars ($n = 13$), upper lateral incisors ($n = 4$), and upper 2nd premolars ($n = 3$). Five of the patients had 1 missing tooth, 5 had 2, and 2 had 3 missing teeth. The numbers of patient according to type of dental abnormality are given in Table 1 and the distribution of missing permanent teeth in Table 2.

Other dental abnormalities included peg-shaped lateral incisors in 7 patients (10%, 3 bilateral), ectopic eruption of upper 1st molars in 6 patients (8%, usually unilateral but bilateral in one patient), transposition of upper canines and 1st premolars in 3 patients (4%, two bilateral), and supernumerary teeth in the upper central incisor region in 2 patients (3%). In one case, palatally erupting upper canines were found. The crowns of the canines were lying on the mesial roots of the upper central incisors.

In all five patients who had more than one type of dental abnormality, permanent teeth were missing. Hypodontia was associated with peg-shaped lateral incisors twice, and once with ectopic eruption, transposition of upper canines and premolars and with mesiodens. All patients who had dental abnormalities had been operated on.

Table 2. Distribution of congenitally missing permanent teeth in 73 children with SMCP (3rd molars excluded). Twenty-one missing teeth were found in 12 patients (7 boys and 5 girls, 16%). Five of the patients had one missing tooth, 5 had 2 and 2 had 3 missing teeth. I 2 = lateral incisor, P 2 = second premolar, M 2 = second molar

	Upper jaw				Lower jaw			
	Right P 2	I 2	Left I 2	P 2	Right P 2	Left P 2	M 2	Total
Boys	0	1	3	1	3	4	0	12
Girls	2	0	0	0	2	4	1	9
Total	2	1	3	1	5	8	1	21

Discussion

According to the present study, submucous cleft palate is associated with a tendency towards increased frequency of missing teeth and other dental abnormalities. In children with SMCP the prevalence of hypodontia, 16% (excluding 3rd molars) is two times higher than the prevalence in the general Fenno-Scandinavian population, 7–8%, (14–16), but lower than in children with isolated cleft palate, 25.5–33% (9–12). On the other hand, it has been shown that children with large palatal clefts have more missing teeth than children with small palatal clefts (11, 12). Eighteen percent of children with small palatal clefts (those with an anteroposterior length of the cleft less than one-third of the hard palate) had missing permanent teeth while 45% of the large palatal clefts (anteroposterior length of the cleft more than one-third of the hard palate) had missing teeth (11).

Children with isolated cleft palate have more missing teeth than children with SMCP, but the distribution of the missing teeth is similar. It has been reported that the most common missing teeth in children with isolated cleft palate are the lower 2nd premolar followed by upper lateral incisor and upper 2nd premolar (11, 17). It may be speculated that in some patients late developing premolars can occur. However, in Scandinavian populations a diagnosis of missing premolars can be made with 97% certainty at about 8 years of age (18).

Several dental anomalies have been shown to occur together with congenitally missing teeth. These include variations in tooth size and eruption. It has long been known that hypodontia is associated with a reduction in the mesiodistal dimensions of tooth crowns (19, 20). Peg-shaped lateral incisors have been found in 0.8% of 7-year-old Swedish children (21). In a study by Larson et al. (11), 23% of children with isolated cleft palate had a mild form of dental hypoplasia, but in children with hypodontia

Table 1. Number of patients according to the type of dental abnormality. Twenty-six patients (15 boys and 11 girls, 36%) had altogether 31 dental abnormalities. In four boys and one girl hypodontia was associated with another dental abnormality

	Boys ($n = 35$)	Girls ($n = 38$)	Total ($n = 73$)	Percentage
Hypodontia	7	5	12	16.4
Peg-shaped lateral incisors	3	4	7	9.6
Ectopic eruption of upper first molars	5	1	6	8.2
Transposition of upper canine and premolar	2	1	3	4.1
Supernumerary teeth	2	0	2	2.7
Palatally displaced upper canines	0	1	1	1.4
Total	19	12	31	42.4

dental hypoplasia was more common (37%). In the present study, the prevalence of peg-shaped lateral incisors was 10%. In 2 of the 7 cases, peg-shaped laterals were associated with hypodontia. It is possible that also other teeth would have been smaller in size, but only peg-shaped lateral incisors were studied as their size could be further evaluated from the dental casts.

Ectopic eruption has been found in 4% of the children without clefts (22, 23), and in 29–38% of the children with isolated cleft palate (11, 24). Ectopic eruption of the upper 1st molar has been reported to be more common in subjects with large palatal clefts (45%) than in those with small palatal clefts (31%) (11). Lekkas et al. (25) suggested that the surgical procedure done to close palatal clefts disrupts the formation of the developing tooth buds. In the present paper, ectopic eruption of 1st maxillary molars was found in 8%. Ectopic eruption and missing upper premolars were observed in patients with palatal surgery and in patients with pharyngeal flap surgery or both. Thus the type of surgery or scarring of the palate did not seem to be associated with the ectopic eruption. The same was true of patients who had malpositioning of maxillary permanent canines. It is interesting that in non-cleft patients palatal displacement of the maxillary canines is more common than transposition of the canine with 1st premolar. In the present study, transposition was more frequent. The timing of eruption was not studied. However, delayed eruption has been observed in children with clefts (9, 26).

The prevalence of supernumerary teeth in children without clefts is 1–2% (14, 15). In children with isolated clefts of the palate, supernumerary teeth are not reported (11, 27), whereas supernumeraries are frequently reported in children with cleft lip and palate or cleft lip (9). Cleft lip is known to occur often with submucous cleft palate (28). Although in this study the patients with combined clefts were excluded, supernumerary teeth were found in two patients (3%).

In conclusion, as children with submucous cleft palate have a tendency towards increased frequency of missing teeth and other dental abnormalities, thorough clinical and radiological dental examination is important.

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