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LOCAL FACTORS IN IMPACTION OF MAXILLARY CANINES

by
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INTRODUCTION

Of the various definitions of 'impacted tooth' that have been proposed the one chosen in this study is »a tooth whose eruption is considerably delayed and for which there is clinical or radiographic evidence that further eruption may not take place». After the third molars the canines are the teeth that are most frequently impacted (*Mead*, 1930; *Dachi & Howell*, 1961).

The incidence of this anomaly has received scant attention in the literature. It has been supposed that there are certain differences between races and between present-day and ancient man. *Cramer* (1929) and *Mead* (1930) recorded incidences of 1.4 and 1.57 per cent for impacted upper canines among white Americans. For an American group, the racial composition of which was not given, *Dachi & Howell* (1961) reported 0.92 per cent, while *Montelius* (1932) found incidences of 1.7 per cent for Chinese and 5.9 per cent for Caucasians. In a material consisting of 4927 old crania of various races *Mead* (1930) did not find a single impacted upper canine. The high incidence of 6.7 per cent reported by *Pedersen & Moesgaard* (1940) for a Danish group is probably due to the fact that the series consisted of orthodontic patients.

Dachi & Howell (1961) found a definitive tendency for unilateral retention of the maxillary canines, but whether on the right or left is not clear from their report. *Rohrer* (1929) gave the left side as the more common. Impacted maxillary canines were found in both sexes, more often in girls (*Rohrer*, 1929; *Dachi & Howell*, 1961). A palatine impaction of these teeth was three times more frequent than a buccal one (*Rohrer* 1929).

Impaction of the upper canines has often been ascribed to lack of space, such as might be due to early loss of deciduous molars (*Hitchin*, 1956; *Fastlicht*, 1954). *Dewel* (1949) pointed out that the impacted canine is often located in the palatal bone, which is less responsive to dental eruptive processes than the alveolar bone. This theory was supported by *Vergopoulos* (1958).

Other factors that have been mentioned as contributory causes of retention of the upper canines are follicular cysts, persistence of deciduous canines, odontomas and supernumary teeth that may displace the permanent canine, thus causing impaction. Follicular cysts are fairly often discovered in cases of impacted canines; *Trauner* (1948) found that 30 per cent of surgically removed impacted canines were accompanied by a follicular cyst. Though it might seem that periapical inflammation of a deciduous canine would cause productive processes in the bone that might inhibit eruption of the permanent canine, a persistent deciduous tooth is usually considered to be a consequence, rather than a cause, of impaction.

Among the more general factors that have been discussed as being possible causes of impaction are heredity, certain hypovitaminoses and nutritional and endocrine disturbances. That retention of the upper canine might be due to retardation of dental maturation has been suggested by *Newcomb* (1959).

A number of more or less plausible factors causing impaction of maxillary canines have thus been proposed. All the previous studies of this problem have been of the cross-sectional type, and it appeared that a longitudinal approach might throw more light on the significance of various local factors for impaction of upper canines.

Thus a fairly large series of children was followed from the time before normal eruption until the average time of eruption was considerably exceeded, and the maxillary canine could be regarded as impacted.

MATERIAL AND METHOD

This study was begun in September 1960, when all the children in the fifth classes in Umeå schools, numbering 192 boys and 192 girls (mean age 11.5 years), were examined.

At the first examination casts and radiographs were taken of all subjects to measure the relative spacing in the upper arch. The children with at least one unerupted canine were also examined by means of stereoradiography of the relevant arch segment.

The children with unerupted canines were then examined at intervals of 6—8 months up to January 1967, by means of casts and stereoradiography. Obviously, the group diminished with each successive examination.

Stereoradiography was used to obtain accurate information on the location of the canines, and then to follow the eruption of the unerupted ones closely. Identical exposures were aimed at. The method, which was checked by the Department of Photogrammetry at The Royal Institute of Technology, was found to be satisfactory for further analysis of the paths of eruption.

For comparison casts and stereoradiographs were obtained from a group of 27 women and 12 men, aged 22—36 years, and referred to this Department of Orthodontics during the Spring Term of 1961 for impacted maxillary canines.

RESULTS

Frequency

At the first examination ($\bar{x}$ = 11.5 years) both canines had erupted in 68.8 per cent of the girls and 57.3 per cent of the boys (Table I). At the next examinations, too, the girls had more erupted canines; this is fully consistent with the sex differences for the eruption of the permanent teeth (*Hurme*, 1949). At the last examination ($\bar{x}$ = 17.8 years) 4 boys and 3 girls were still lacking one or two canines — that is 2.1 and 1.6 per cent (total 1.8 per cent) of the original series.

The distribution of the unerupted canines with respect to side at the various examinations is shown in Table II. There would seem to have been a certain tendency for eruption of these teeth to occur later on the right side.

In the younger series as a whole, the frequency of unerupted canines of the total number present of course decreased at successive examinations. It follows that for each examination the frequency from this standpoint is different from the percentage of subjects with impacted canines. At the last examination the frequency of impacted upper canines of total present was 1.6 for the boys and 1.0 per cent for the girls (total 1.3 per cent) (Table III) these are slightly lower figures than those obtained on the basis of the number of subjects with canine impaction.

Persistent deciduous canines

The high percentage of persistent deciduous canines at the first controls is not surprising in view of the age of the children and the mean time of erup-

Table I.

Distribution of the children with respect of time of eruption of the maxillary canines

Examination		BOYS (n = 192)								GIRLS (n = 192)							
		Two erupted				< 2 erupted				Two erupted				< 2 erupted			
				Age (years)				Age (years)				Age (years)				Age (years)	
		n	%	$\bar{x}$	Range	n	%	$\bar{x}$	Range	n	%	$\bar{x}$	Range	n	%	$\bar{x}$	Range
1	(60 Sept.)	110	57.3	11.5	10.9—12.1	82	42.7	11.6	10.8—12.8	132	68.8	11.5	10.8—12.0	60	32.2	11.4	10.7—12.6
2	(61 May)	127	66.1	12.2	11.6—13.1	65	33.9	12.3	11.4—13.5	152	79.2	12.2	11.5—12.7	40	20.8	12.1	11.3—13.3
3	(62 Jan.)	161	83.9	12.9	12.3—13.8	31	16.1	12.9	12.2—14.2	171	89.1	12.8	12.0—13.3	21	10.9	12.8	12.2—13.9
4	(62 Aug.)	167	87.0	13.4	12.8—14.3	25	13.0	13.4	12.7—14.7	175	91.1	13.3	12.5—13.8	17	8.9	13.3	12.7—14.4
5	(63 Feb.)	175	91.1	14.0	13.4—14.9	17	8.9	14.0	13.3—15.3	183	95.3	13.9	13.1—15.0	9	4.7	13.9	13.4—14.4
6	(63 Sept.)	181	94.3	14.6	14.0—15.5	11	5.7	14.6	13.8—15.8	187	97.4	14.5	13.7—15.6	5	2.6	14.5	14.2—15.0
7	(64 May)	185	96.4	15.2	14.4—16.4	7	3.6	15.1	14.8—15.3	188	97.9	15.2	14.2—16.2	4	2.1	15.2	14.9—15.6
8	(65 Jan.)	187	97.4	15.8	15.0—17.0	5	2.6	15.6	15.4—15.8	189	98.4	15.8	14.8—16.8	3	1.6	15.8	15.5—16.2
9	(66 Jan.)	188	97.9	16.8	16.0—18.0	4	2.1	16.7	16.4—16,8	189	98.4	16.8	15.8—17.8	3	1.6	16.8	16.5—17.2
10	(67 Jan.)	188	97.9	17.8	17.0—19.0	4	2.1	17.7	17.4—17.8	189	98.4	17.8	16.8—18.8	3	1.6	17.8	17.5—18.2

Table II.

Distribution of the unerupted maxillary canines with respect to side at the various examinations; child and adult groups

		No. of subjects	3+	+3	3+3
		BOYS			
Examination	1	82	7	6	69
	2	65	9	6	50
	3	31	6	4	21
	4	25	9	4	12
	5	17	7	5	5
	6	11	3	4	4
	7	7	3	2	2
	8	5	2	1	2
	9	4	1	1	2
	10	4	1	1	2
		GIRLS			
Examination	1	60	7	8	45
	2	40	9	5	26
	3	21	8	2	11
	4	17	10	1	6
	5	9	8	0	1
	6	5	4	0	1
	7	4	3	0	1
	8	3	2	0	1
	9	3	2	0	1
	10	3	2	0	1
		ADULTS			
	Men	12	7	3	2
	Women	27	11	8	8

tion of the permanent canine (Table IV). At the last examination, by which time 99.2 per cent of all the deciduous canines had exfoliated, there were persistent deciduous teeth in 6 of the 10 canines that had still not erupted; this gives the apparently high incidence of 60 per cent — which is not much different from those recorded at the earlier examinations. Incidentally, the prevalence was high also for the adult group (46.9 per cent).

Table III.

Proportion of unerupted canines: total 384 (2 n) for both boys and girls

		Unerupted canines			
		n	%	n	%
		BOYS		GIRLS	
Examination	1	151	39.3	105	27.5
	2	115	29.9	67	17.4
	3	52	13.5	32	8.3
	4	37	9.6	23	6.0
	5	22	5.7	10	2.6
	6	15	3.9	6	1.6
	7	9	2.3	5	1.3
	8	7	1.8	4	1.0
	9	6	1.6	4	1.0
	10	6	1.6	4	1.0

Enlarged follicular space

As the diagnosis of follicular cyst must be based on a histologic examination a diagnosis of enlargement of the follicular space has been preferred in the present connection, where radiologic criteria were relied upon. The follicular space was considered to be enlarged if it was found on the radiographs to exceed 2 mm, as measured from the cusp tip of the tooth to the periphery. Widening of the follicular space was fairly common in the case of unerupted canines, the frequency varying from one check to another (Table V). There was, however, no marked difference in prevalence between unerupted canines with and without enlarged follicular space. Of the total of 103 unerupted canines with a widened follicular space at the first examination, 96 (93.3 per cent) had erupted at the last check, when this feature was recorded in 7 out of the 10 unerupted canines; this gives the apparently high frequency of 70 per cent. The adult group likewise revealed a high figure (61.4 per cent).

Position of the unerupted canine

Practically all the canines erupted at the first examination were situated in the dental arch (Table VI a). Only a few were buccally located and none palatally.

Most of the unerupted canines were also situated in the dental arch at the same examination. At the first registration only two out of 151 unerupted

Table IV.

Prevalence of persistent deciduous canines: school children and adults

		No. of unerupted canines	Not erupted		Persistent		Persistent deciduous canines		
			3+	+3	03+	+03	No.	%	
					BOYS				
Examination	1	151	76	75	50	49	99	65.6	
	2	115	59	56	36	35	71	61.7	
	3	52	27	25	20	16	36	69.2	
	4	37	21	16	13	10	23	62.2	
	5	22	12	10	5	6	11	50.0	
	6	15	7	8	4	3	7	46.7	
	7	9	5	4	4	2	6	66.7	
	8	7	4	3	3	2	5	71.4	
	9	6	3	3	2	2	4	66.7	
	10	6	3	3	2	2	4	66.7	
					GIRLS				
Examination	1	105	52	53	36	35	71	67.6	
	2	67	35	32	21	19	40	59.7	
	3	32	19	13	14	9	23	71.9	
	4	23	16	7	10	4	14	60.9	
	5	10	9	1	6	0	6	60.0	
	6	6	5	1	2	0	2	33.3	
	7	5	4	1	2	0	2	40.0	
	8	4	3	1	2	0	2	50.0	
	9	4	3	1	2	0	2	50.0	
	10	4	3	1	2	0	2	50.0	
					ADULTS				
	Men	14	9	5	7	2	9	64.3	46.9
	Women	35	19	16	7	7	14	40.0	

canines of the boys and five out of 105 of the girls were registered palatally (Table VI b). Only two of these (registered as »slightly palatal situated») had erupted at the last examination — not in the palate but in the alveolar process in an inverted intermaxillary position. The other five were still impacted palatally. At the last examination only two out of the total 208 unerupted canines (1.0 per cent) situated in the arch and three of the 41 canines situated buccally (7.3 per cent) were still unerupted. The canines with a deflected path of eruption would seem to erupt slowly, a tendency that was most marked for the palatally located teeth. This would account for the

Table V.

Prevalence of enlarged follicular space for the unerupted canine, associated with persistent and exfoliated deciduous canines: school children and adults

		No. of unerupted canines	Enlarged follicular space No.	%	Not enlarged follicular space No.	%
			BOYS			
Examination	1	151	65	43.0	86	57.0
	2	115	40	34.8	75	65.2
	3	52	21	40.4	31	59.6
	4	37	16	43.2	21	56.8
	5	22	5	22.7	17	77.3
	6	15	5	33.3	10	66.7
	7	9	5	55.6	4	44.4
	8	7	4	57.1	3	42.9
	9	6	4	66.7	2	33.3
	10	6	4	66.7	2	33.3
			GIRLS			
Examination	1	105	38	36.2	67	63.8
	2	67	23	34.3	44	65.7
	3	32	11	34.4	21	65.6
	4	23	5	21.7	18	78.3
	5	10	4	40.0	6	60.0
	6	6	4	66.7	2	33.3
	7	5	4	80.0	1	20.0
	8	4	3	75.0	1	25.0
	9	4	3	75.0	1	25.0
	10	4	3	75.0	1	25.0
			ADULTS			
	Men	14	10	71.4	4	28.6
	Women	35	18	51.4	17	48.6

Table VI a.

Position of canines at the first examination

		Total teeth	In the arch No.	%	Buccally No.	%	Palatally No.	%
Erupted	Boys	233	214	91.8	19	8.2	0	0
	Girls	279	259	92.8	20	7.2	0	0
Unerupted	Boys	151	123	81.5	26	17.2	2	1.3
	Girls	105	85	81.0	15	14.3	5	4.7

Table VI b.

Position of unerupted canines at the series of examinations: school children and adults

		Number of unerupted canines							
		Total		In the arch		Buccally		Palatally	
		♂	♀	♂	♀	♂	♀	♂	♀
Examination	1	151	105	123	85	26	15	2	5
	2	115	67	90	49	23	13	2	5
	3	52	32	34	20	16	7	2	5
	4	37	23	25	16	10	3	2	4
	5	22	10	14	3	6	3	2	4
	6	15	6	9	0	4	2	2	4
	7	9	5	4	0	3	2	2	3
	8	7	4	3	0	2	1	2	3
	9	6	4	2	0	2	1	2	3
	10	6	4	2	0	2	1	2	3
Adults		14	35	2	14	3	5	9	16

apparently high prevalence of palatally impacted canines (50 per cent). For the adult group there was a high percentage of palatally impacted canines, too (51 per cent). On the other hand, those situated in the arch were considerably more numerous than the buccally impacted ones (32.7 and 16.3 per cent, resp.).

Relative spacing

The relative spacing was measured on casts and calculated for each quadrant (*Lundström*, 1943). In the case of extractions or aplasia the space was determined in relation to the number of remaining teeth. In the case of unerupted teeth the tooth width were measured on radiographs. These values were corrected with respect to the degree of enlargement by recording on all the radiographs the width of the erupted teeth, the true width of which could be measured on the casts.

There was crowding in 15 per cent of the total quadrants with canines erupted at the first examination; there was excess space in 18.7 per cent (Table VII a). In only a few cases was the crowding located at the canine, which was rotated or buccally situated. Most often the second premolar was situated palatally or the lateral incisor was inverted. Finally, in some cases

Table VII a.

Relative spacing in each quadrant at the first examination

		No. of canines	Relative spacing (mm)					
			±0		⩽−1		⩾+1	
			n	%	n	%	n	%
Erupted	Boys	233	152	65.2	37	15.9	44	18.9
	Girls	279	188	67.4	39	14.0	52	18.6
Unerupted	Boys	151	95	62.9	47	31.1	9	6.0
	Girls	105	64	61.0	38	36.2	3	2.8

Table VII b.

Relative spacing in the relevant quadrant; canines not erupted; school children and adults

		No. of unerupted canines		Relative spacing (mm)					
				± 0		⩽ −1		⩾ +1	
		♂	♀	♂	♀	♂	♀	♂	♀
Examination	1	151	105	95	64	47	38	9	3
	2	115	67	71	37	35	26	9	4
	3	52	32	24	15	26	16	2	1
	4	37	23	15	11	20	12	2	0
	5	22	10	7	3	14	7	1	0
	6	15	6	6	1	8	5	1	0
	7	9	5	4	0	5	5	0	0
	8	7	4	2	0	5	4	0	0
	9	6	4	1	0	5	4	0	0
	10	6	4	1	0	5	4	0	0
Adults		14	35	6	5	7	23	2	6

the crowding was localized in the anterior segment. In most of the arches in which there was spacing the first premolars or the first molars had been extracted, or the lateral incisors were congenitally absent.

In the quadrants with unerupted canines there was crowding in 31.1 per cent of the boys and 36.2 per cent of the girls at the first examination and excess space in 6.0 and 2.8 per cent, respectively (Table VII a). In all cases the spacing was due to extraction of a premolar or congenital absence of the lateral incisor. At the last examination (Table VII b) all the canines had

Table VII c.

Relative spacing at the various examinations

		Canines erupted since previous examination	Rel. space per quadrant (mm)		No. of unerupted canines	Rel. space per quadrant (mm)	
			$\bar{x}$	Range		$\bar{x}$	Range
				BOYS			
Examination	1	233	+0.23	+4 to —3	151	—1.08	+3 to —12
	2	36	—0.36	+2 to —4	115	—1.42	+3 to —12
	3	63	—0.54	+3 to —5	52	—1.83	+2 to —12
	4	15	—1.20	+3 to —7	37	—2.00	+2 to —12
	5	15	—1.22	+2 to —7	22	—2.50	+1 to —12
	6	7	—3.0	—2 to —5	15	—2.67	+1 to —12
	7	6	—0.5	+1 to —3	9	—3.33	0 to —12
	8	2	±0	—	7	—4.29	0 to —12
	9	1	±0	—	6	—5.00	—1 to —12
	10	—	—	—	6	—5.00	—1 to —12
				GIRLS			
Examination	1	279	+0.16	+3 to —3	105	—1.45	+2 to —8
	2	38	—1.15	+2 to —7	67	—1.71	0 to —8
	3	35	—1.77	0 to —5	32	—1.81	0 to —8
	4	9	—2.00	0 to —8	23	—1.74	0 to —8
	5	13	—0.62	0 to —4	10	—3.10	0 to —8
	6	4	—1.75	0 to —4	6	—4.33	0 to —8
	7	1	±0	—	5	—5.20	—1 to —8
	8	1	—5.00	—	4	—4.75	—1 to —8
	9	1	—5.00	—	4	—4.75	—1 to —8
	10	—	—	—	4	—4.75	—1 to —8

erupted where there had originally been overspacing, and all but one where the relative spacing had been ±0 mm. In the cases of crowding 76 out of 85 had erupted, so that there was not enough space for 90 per cent of the impacted canines.

In cases of the canines erupting since the first examination the crowding was situated at the second premolar (33 teeth), in the anterior segment (12 cases), and at the site of a buccally erupted canine (31 teeth). In the case of all 9 impacted canines the crowding was localized at the site of the canine.

The crowding tended in general to be associated with delayed eruption of the canine (Table VII c).

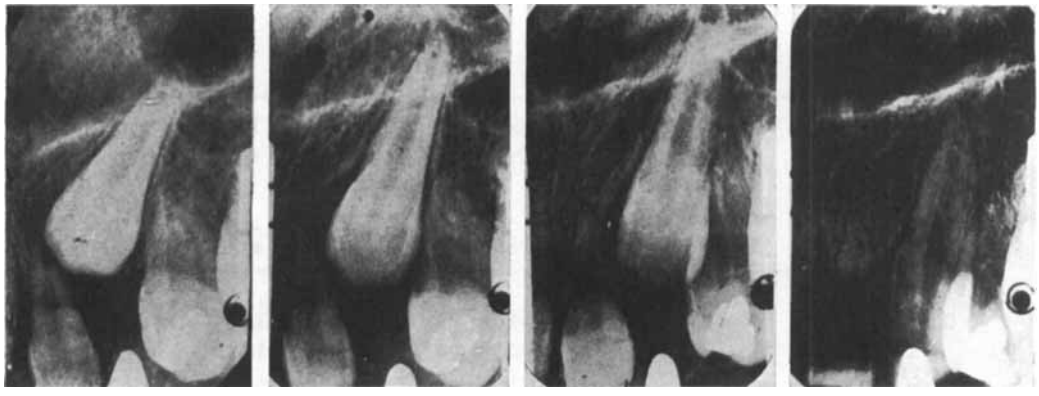


Fig. 1. An upper canine (3+) that gave rise to resorption of the lateral incisor. Because of deviation of the path of eruption the canine erupted, and the resorption healed.

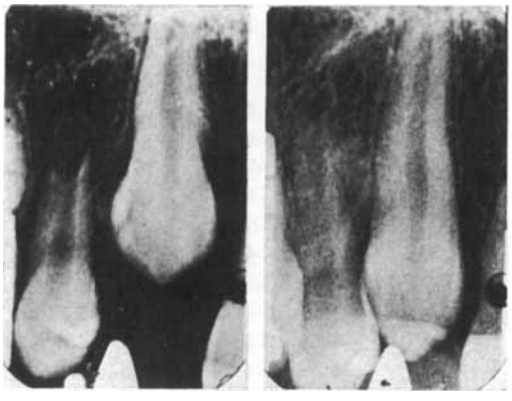


Fig. 2. Supernumerary fragment that appears to have delayed the eruption of the canine.

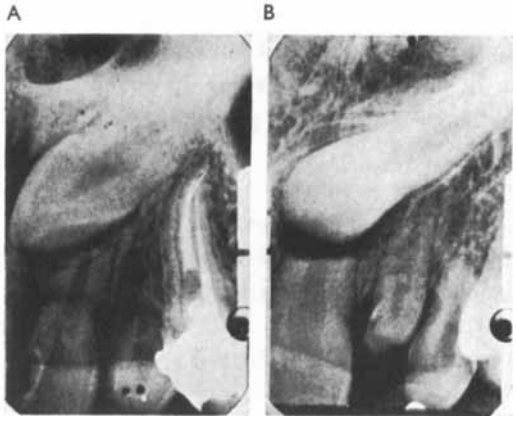


Fig. 3. Resorption of lateral (A) and central incisor (B) in 2 subjects of the adult group with impacted canines situated in the arch.



Fig. 4. A subject of the adult group with an impacted canine situated in the arch with a root fragment.

In the adult group crowding was found in 63.3 per cent of the subjects (Table VII b), and was always located at the site of the impacted canine. Excess space in this group was found in 8 quadrants where the lateral incisor or first premolar was missing due to aplasia or extraction.

Other findings

In the cases in which both canines had erupted at the first examination there were no remarkable findings as regards these teeth. For the unerupted canines the following observations were made at the first examination:

(i) Transposition of the canine (3+) of one girl (erupted between 5+ and 4+ at the fourth examination, 13.3 years).

(ii) Resorption of the lateral incisor (2+) of one girl in connection with crowding in the region of the 3+ (erupted at the sixth examination, 14.0 years) (Fig. 1).

(iii) Supernumary tooth germ or fragment (+3) of a boy (erupted at the seventh examination, 16.4 years) (Fig. 2).

(iv) Unfavourable inclination of the canine 3+ (45° in relation to the normal inclination of the canine) of a girl (erupted at the fifth examination, 15.0 years).

As regards the adult group an inclination of the canine exceeding 45° was recorded in 5 of the 49 impacted canines; resorption of the 2+ or 1+ in two cases (Fig. 3) and a root fragment or supernumary in the region 3+ in two cases (Fig. 4).

DISCUSSION

According to *Hurme* (1949) the eruption of the upper canine is late after 12.3 years for girls and after 13.1 years for boys. By this time both upper canines had erupted in some 80 per cent of the boys and girls of the present series. The eruption may be regarded as very late after 13.9 years for girls and after 14.6 years for boys since by these times both canines have erupted in 95 per cent of the population. Thereafter the risk of impaction would thus be great.

The proportion of the series with impacted canines displayed no sex difference — as would be expected in view of the fact that the series consisted of only 384 children, and that the prevalence was as low as 1.8 per cent. In the adult group the number of women was almost twice than that of the men; this is probably due to chance as this series was strongly selected, consisting as it did of referred patients.

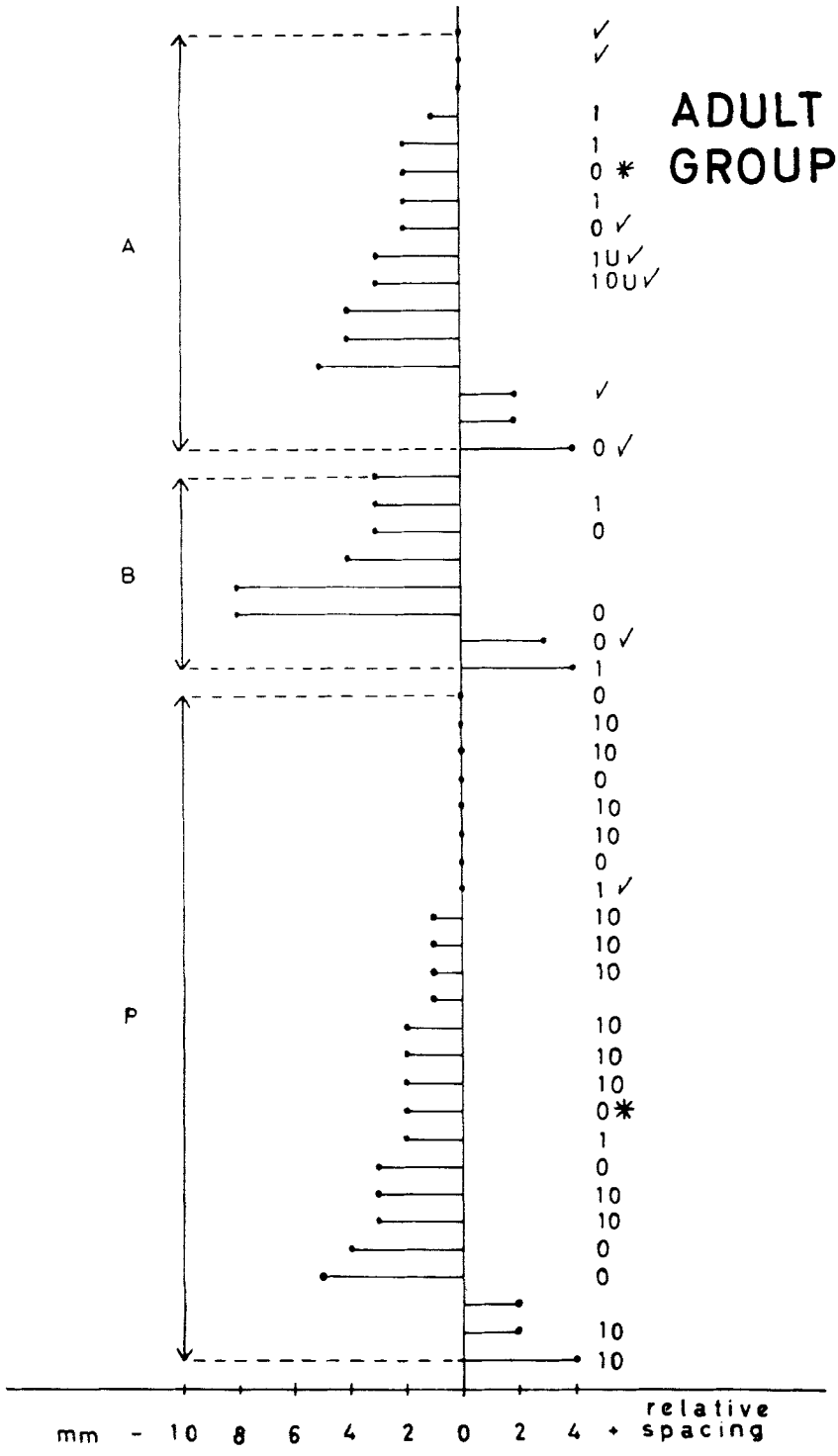
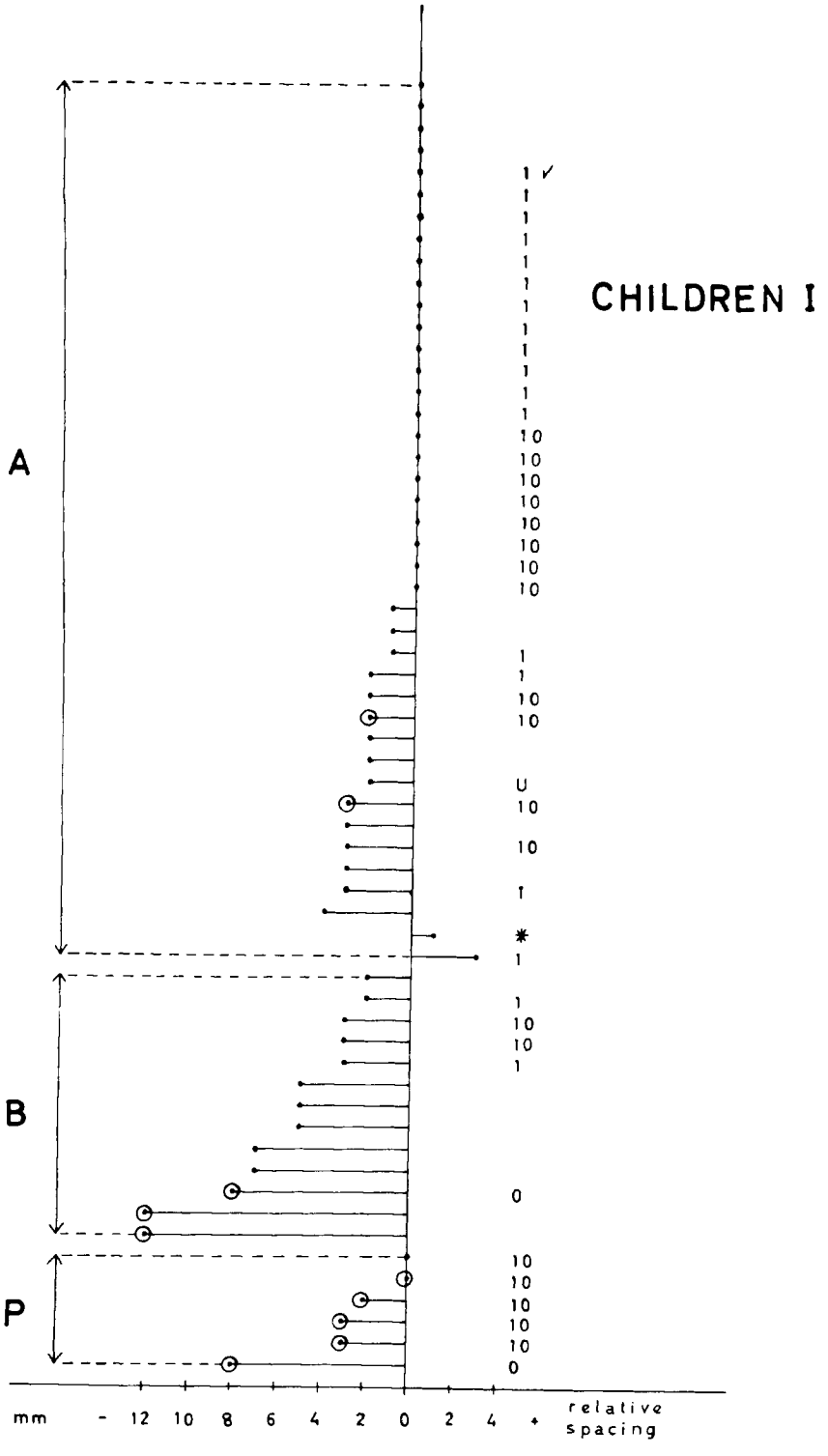


Fig. 5. Local factors associated with the unerupted canines in the adult group.

I indicates persistent deciduous canine
O » enlarged follicular space
U » resorption of an adjacent tooth
* » supernumerary tooth or fragment
√ » unfavourable inclination
A » canines situated in the arch
B » » » buccally
P » » » palatally


CHILDREN I
A
B
P
mm
- 12 10 8 6 4 2 0 2 4 +
relative spacing

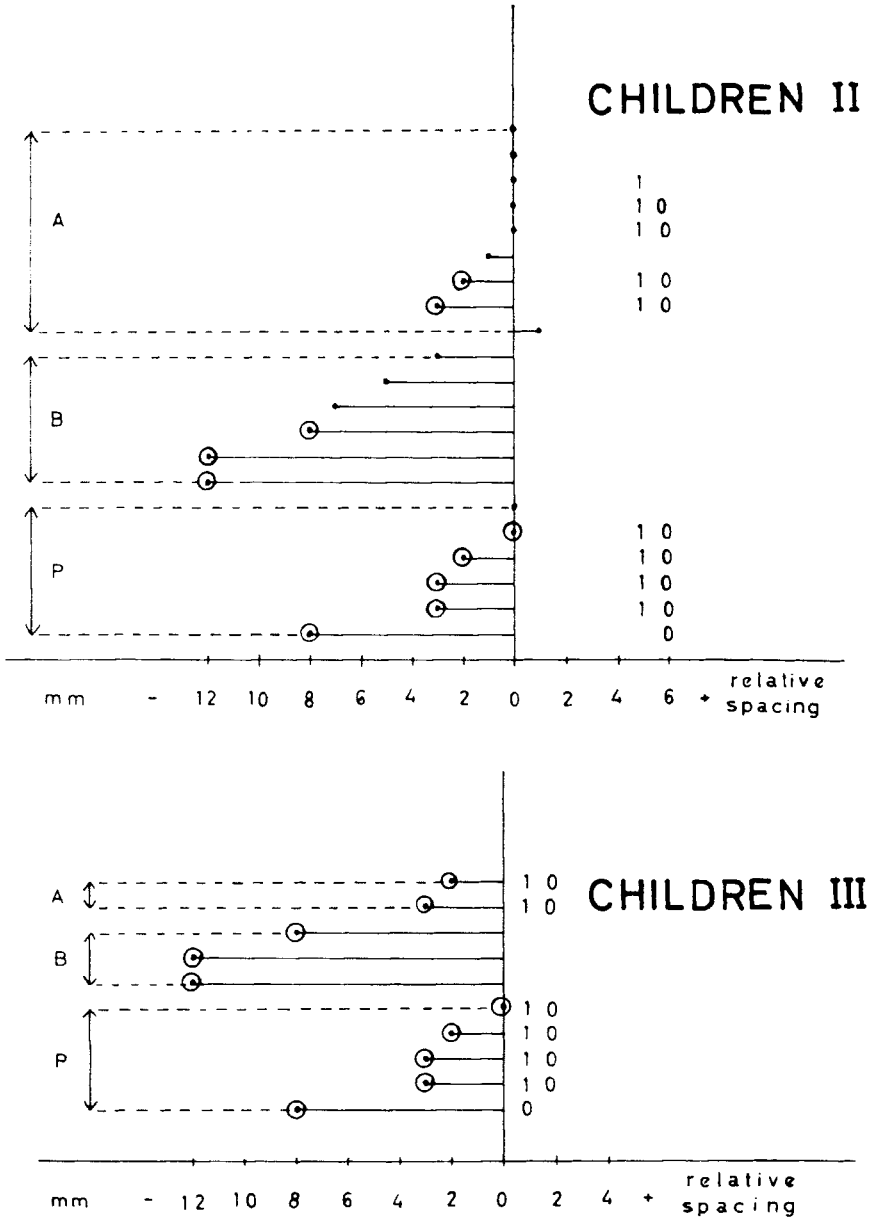


Fig. 6. Local factors associated with the unerupted canines of the children at (I) the fourth, (II) the sixth and, (III) the ninth examinations.
◎ denotes canines impacted at the tenth examination. For other notation see under Fig. 5.

Definitive conclusions as regards the prevalence of uni- and bilateral impaction are not justified. It would be logical to expect unilateral retention to be the more common, there naturally being a greater chance of one than two canines being impacted. From this longitudinal study it would seem that there is a certain tendency for eruption to occur later on the right than on the left side, and hence that the retention would be more common on the right. This supposition is supported by the findings from the adult group. Any such difference may be due to systematic morphologic asymmetry between the two sides (*Lundström*, 1961).

By observing a case series of this size over a long period at fairly short intervals it is possible to follow various factors and to record individual variations. The prime object of this investigation was to examine the prevalence of various local factors that might account for impaction of the upper canines.

So as to be able to ascertain objectively the relative significance of various factors for the occurrence of impaction, a collation was made of all those factors recorded in the adult (Fig. 5) and younger group at the 4th, 6th and 9th examinations (Fig. 6).

Among the local factors that might account for impaction of the upper canines the position of the tooth would seem to be the most important. The least tendency for eruption was found for the palatally situated teeth (Fig. 7). Of these the only ones to erupt were two teeth that had been initially registered as »slightly palatally situated» and erupted in an inverted position in the alveolar process, and not into the palate. Moreover, in the adult group about one-half of the impacted canines were situated palatally (Fig. 8).

Crowding seems to delay eruption of the maxillary canine. The greatest crowding was found at the buccally situated unerupted canines. It is conceivable that severe crowding leads to a change in the path of eruption, and hence forces the canine in the buccal direction, thus resulting in considerable delay in eruption and possibly in impaction (Fig. 9). Crowding might also delay eruption and lead to impaction if the canine is situated in the arch (Fig. 10 A). Several such impacted canines in the adult group, however, displayed little crowding but they were rotated (up to 90°) (Fig. 10 B—D). In one of the two children whose canines were situated in the arch with no appreciable crowding such rotation could be followed longitudinally (Fig. 11). The eruptive force in these cases might be considered to have been expended in the rotary movement.

The prevalence of persistent deciduous canines was high in cases of canine impaction. This was also the case at the earlier examinations. As most of the permanent canines had erupted since the first examination, it would

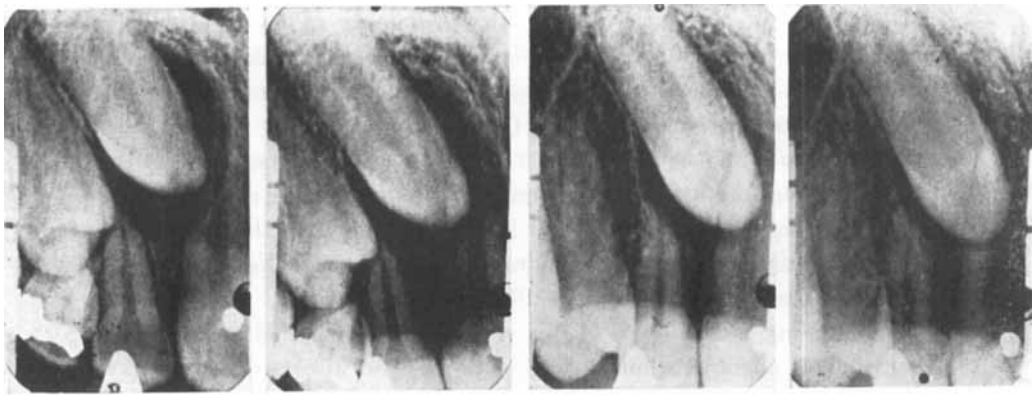


Fig. 7. A boy with palatally situated impacted canine, registered at four examinations.

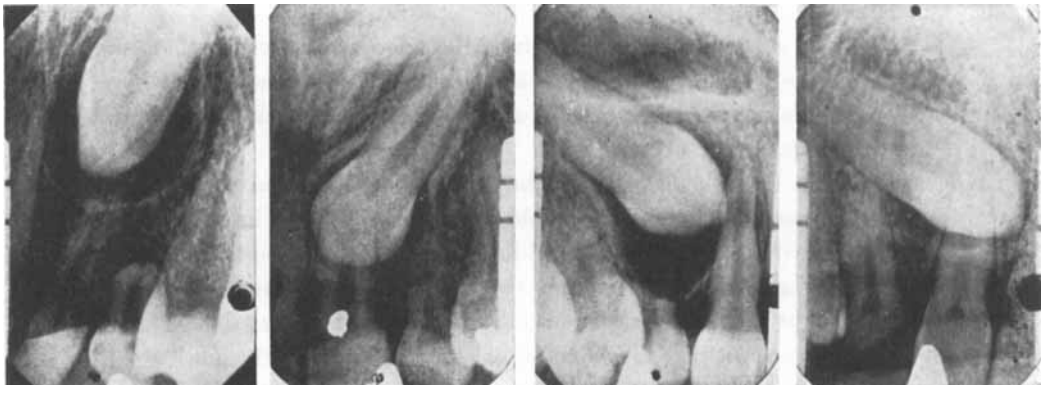


Fig. 8. Four subjects of the adult group with palatally impacted maxillary canine with various inclination.

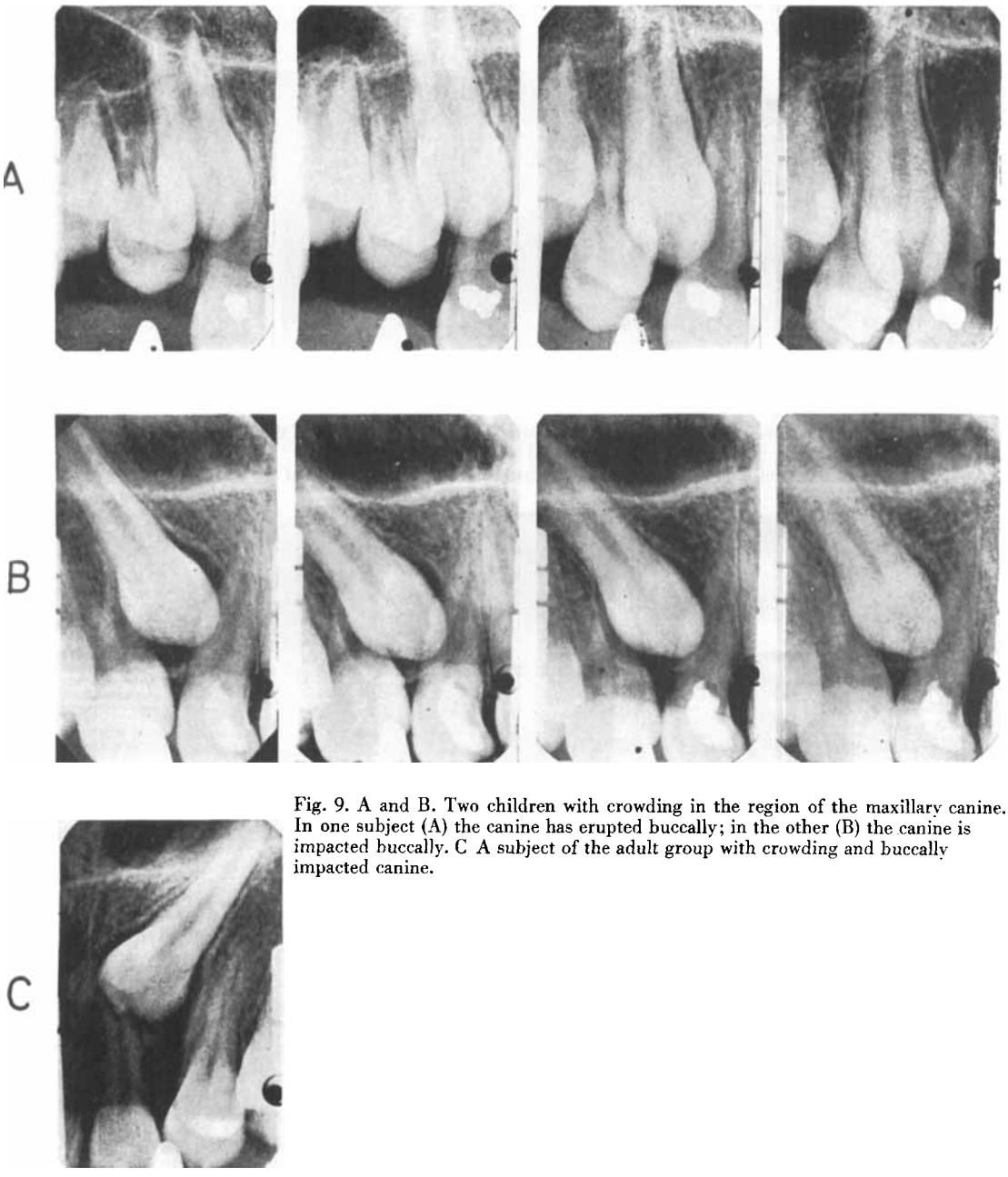


Fig. 9. A and B. Two children with crowding in the region of the maxillary canine. In one subject (A) the canine has erupted buccally; in the other (B) the canine is impacted buccally. C A subject of the adult group with crowding and buccally impacted canine.

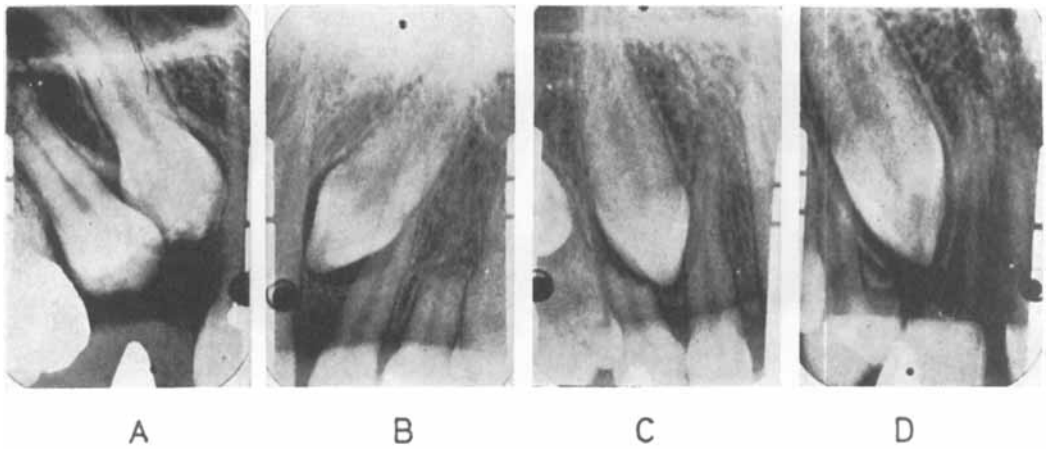


Fig. 10 A. Crowding in one subject of the adult group with impaction of the maxillary canine located in the arch.
B-D. Rotated impacted canines located in the arch in three subjects of the adult group.

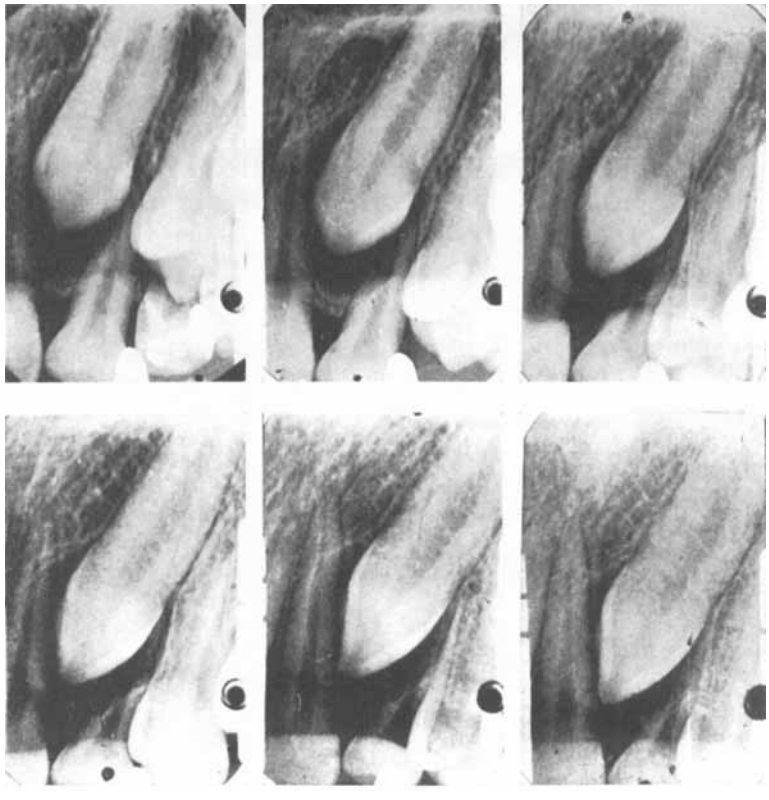


Fig. 11. Rotation of an impacted maxillary canine located in the arch in one of the boys. Not rotated in the first examination; rotated 90 degrees in the last examination.

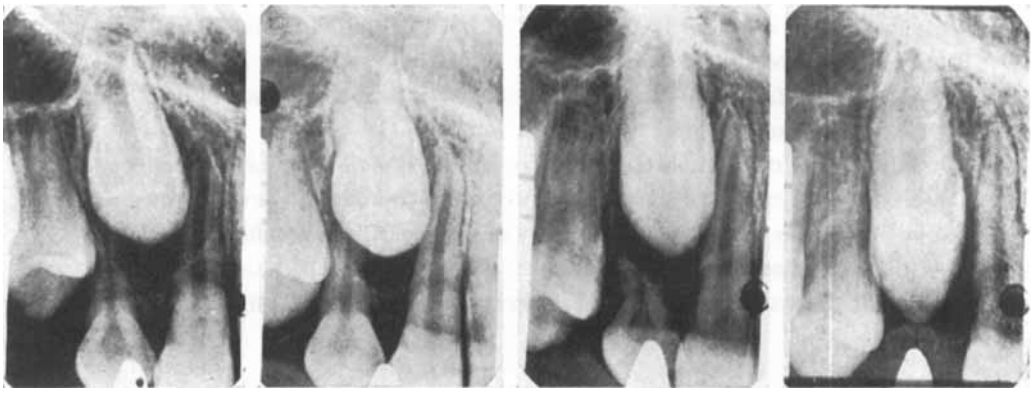


Fig. 12. Normal eruption despite enlarged follicular space.

seem unlikely that persistence of deciduous canines was the cause of the impactions. At the fourth examination most of the persistent deciduous teeth were recorded with canines situated in the dental arch (Fig. 6). Only two of these were impacted at the last examination, while the others were situated palatally. Therefore it is reasonable to deduce that the presence of persistent deciduous canines is the result, rather than a cause, of impaction.

Although at all the examinations widening of the follicular space was fairly commonly associated with failure of the canines to erupt, there is no convincing evidence that this was the cause of the impaction. A greatly enlarged follicular space might presumably interfere with eruption, especially in the presence of a follicular cyst, since internal pressure would be expected to lead to inversed eruption, and hence impaction. At the last examination an enlarged follicular space was found chiefly at palatally situated canines; the same applies to the adult group. In the other positions the canines usually erupted despite the enlarged follicular space (Fig. 12).

Other local factors, such as transposition, supernumaries, and unfavourable inclination of the canine, might also delay the eruption and contribute to impaction.

The rate of eruption is dependent on both dental and somatic maturity. Any retardation might contribute to impaction, especially if it coincides with other unfavourable local conditions, such as the presence of crowding or a supernumary.

Among the most important local factors that themselves might be responsible for impaction are a palatal direction of eruption and severe crowding. For this reason it is important to carry out an early radiographic examination of unerupted canines (preferably at 11 years) so as to be able to introduce suitable treatment without delay in cases where a risk of impaction is predicted.

SUMMARY

A study of the eruption of the upper canines has been performed on all the children in the fifth class at Umeå schools (192 boys and 192 girls, mean age 11.5 years). Follow-up checks were performed at intervals of 6—8 months and unerupted canines were recorded with the aid of casts and stereoradiographs. The frequency of unerupted canines at the series of examinations was recorded, as was persistence of deciduous canines, widening of the follicular space, position of unerupted canines, relative spacing and radiographic observations of particular interest in the relevant area. At the last examination (mean age 17.8 years) there were 4 boys and 3 girls (1.8 per cent) of the total series with unerupted canines.

For the purpose of comparison a group of adults, aged 22—36 years (39 persons), having impaction of one or both canines, was included.

A palatal position of the canine and crowding in the canine region would appear to be the most important local factors involved in the impaction of maxillary canines.

RÉSUMÉ

LES FACTEURS LOCAUX DANS LA RÉTENTION DES CANINES SUPÉRIEURES

Une étude de l'éruption des canines supérieures a été effectuée sur tous les enfants fréquentant les cinquièmes classes des écoles d'Umeå (192 garçons et 192 filles, âge moyen 11,5 ans). Des contrôles suivis ont été effectués à des intervalles de 6—8 mois et les canines n'ayant pas fait leur éruption ont été enregistrées à l'aide de moulages et de stéréoradiographies. On a, au cours de la série d'examens, enregistré la fréquence de la non éruption des canines, ainsi que la persistence des canines temporaires, l'élargissement de l'espace folliculaire, la position des canines n'ayant pas fait leur éruption,

l'espacement relatif et les observations radiographiques présentant un intérêt particulier dans la région en question. Lors du dernier examen (âge moyen 17,8 ans) il restait 4 garçons et 3 filles (1,8%) de toute la série.

A des fins de comparaison, l'étude a compris un groupe d'adultes âgés de 22—36 ans (39 personnes) ayant une canine supérieure ou les deux en rétention.

Il semblerait que la position palatine de la canine et l'encombrement dentaire dans la région canine soient les facteurs locaux les plus importants dans la rétention des canines.

ZUSAMMENFASSUNG

AETIOLOGISCHE FAKTOREN BEI DER ECKZAHNRETENTION IM OBERKIEFER

Alle Kinder der 5ten Schulklasse in der Stadt Umeå (192 Knaben und 192 Mädchen — Durchschnittsalter 11.5 Jahre) wurden im Hinblick auf den Durchbruch der Eckzähne im Oberkiefer untersucht. Die Kontrollen wurden in Intervallen von 6—8 Monaten vorgenommen, wobei nicht-eruptierte Eckzähne mit Modell und Stereoröntgen registriert wurden. Die Frequenz nicht-eruptierter Eckzähne bei den verschiedenen Untersuchungen wurden registriert, ebenso wie persistierende Milcheckzähne, erweiterte Perikoronalräume, die Lage der nicht-eruptierten Eckzähne, die relativen Platzverhältnisse sowie röntgenologische Beobachtungen die für den speziellen Fall von Interesse sind. Bei der letzten Untersuchung, Durchschittsalter 17.8 Jahre, blieben noch 4 Knaben und 3 Mädchen (1. 8 % des totalen Untersuchungsmateriales) übrig.

Über dieses Material hinaus wurde in die Untersuchung noch eine Gruppe, 39 Individuen im Alter von 22—36 Jahre, einbegriffen, bei denen ein oder beide Eckzähne retiniert waren. Die Absicht war, dadurch die beide Gruppen vergleichen zu können.

Es scheint als ob eine Anzahl lokaler Faktoren bei der Eckzahnretention mitwirken können. Von diesen kann vor allem die Palatinallage der Eckzähne und Platzmangel in der Eckzahnregion genannt werden.

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