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Prevalence of septal deviations in school-aged children*

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SUMMARY

A total of 687 school children, aged 6-15 years, were examined for nasal septal deviations with anterior rhinoscopy and maxillary sinus radiography. Septum deviations were divided into four different categories and the final evaluation included the clinically significant deviation, based on purely morphological findings. Columella deviation was an exceptional condition in 0.7% of children, septum spurs were found in 3.8%, bending of the quadrilateral cartilage was present in 13.4%, and premaxillary luxation in 28.7%. A clinical diagnosis of septum deviation was made in 9.5% of children. The occipitomental projection of the maxillary sinus X-ray was a good diagnostic tool in evaluating the clinical significance of septum deviation.

Key words: nasal septum, children, adolescence, prevalence, radiograph

INTRODUCTION

Approximately 80% of humans have some kind of nasal septal deformity (McKenzie, 1880). Gray (1978) investigated 2,112 adult skulls and only 21% of the septa appeared to be straight. The incidence of nasal deformities in newborn infants has been reported to vary from 1.45% to 6.3% (Jeppesen and Winfeld 1972; Alpini et al., 1986; Kent et al., 1988; Sorri et al., 1990). Gray (1983) and Sorri et al. (1990) have stated that a neonatal mid-septal deformity will not straighten spontaneously, while caudal deviations have a high spontaneous healing rate. Gray et al. (1982) have also argued that most deformities will become worse with subsequent growth of the nose. Contrary to several studies on the prevalence of newborn septal deviations, there are only few reports concerning the occurrence of septal deformities in older children.

In comprehensive American surveys of school-aged children, Eagles et al. (1963) found septal deviation in 1.2% of children aged 5-14 years, and Roberts and Federico (1972) described septal deviation in 2.6% of children aged 6-11 years. Van Cauwenberge and Derycke (1983) reported that nasal septal deformity was present in 12.4% of children aged 2.5-6 years. However, these studies do not give much information about the incidence of septal deviations during childhood.

The purpose of the present population study was purely to study the occurrence of minor and also more conspicuous (i.e., clinically significant) septal deviations in three age groups of school-aged (6-15 years) children, and this by means of anterior rhinoscopy and maxillary sinus radiography, interpreted and graded by an ENT-specialist.

MATERIAL AND METHODS

The source population in the elementary schools of a town of 20,000 inhabitants in southwestern Finland consisted of 2,381 pupils, of whom 692 were eligible for the study and fulfilling the criteria of school grades (I, IV and VIII) and residence. The only drop-outs were five children who did not want to participate in the study. The final sample size consisted of 687 pupils and the rate of participation was 99.3%. The present study is part of a comprehensive epidemiological study of school-aged children carried out between August 1983 and January 1985.

The mean age of the whole study population was 10.5±3.0 years. In the first grade the mean age was 7.0±0.3 years (range: 6–9 years), in the fourth grade 10.2±0.4 years (range: 10–12 years), and in the eighth grade 13.8±0.4 years (range: 13–15 years; cf. Table 1). Although there was some variation in the age of the children, over 90% in each grade represented the same age group and were born in the same year: 233 (96.3%) children in the first grade were born in 1976, 175 (95.1%) in the fourth grade in 1973, and 244 (93.5%) in the eighth grade in 1970. Thus, each school grade is highly representative of the age group concerned.

A comprehensive and thorough ENT examination was performed for every child by one of the investigators (JH). Septal deviations of the nose were divided into four classes. The

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Table 1. The percentages of septum pathologies in different age groups according to sex. Statistical significances are given for sex differences in each grade and in the entire study group.

	grade I (n=242) mean 7 years				grade IV (n=184) mean 10.2 years				grade VIII (n=261) mean 13.8 years				total (n=687) mean 10.5 years			
septum deviations	boys	girls	total	p	boys	girls	total	p	boys	girls	total	p	boys	girls	total	p
caudal deviation	0.8	0.0	0.4		0.0	1.0	0.5		1.8	0.7	1.1	0.42	0.9	0.6	0.7	0.67
septal crest	1.6	3.5	2.5	0.35	0.0	2.0	1.1		7.0	6.8	6.9	0.95	3.1	4.4	3.8	0.37
curved septal cartilage deviation	19.0	22.6	20.7	0.50	19.5	15.8	17.5	0.52	7.0	1.4	3.8	0.02	14.9	12.1	13.4	0.29
premaxillary luxation	34.1	28.7	31.5	0.36	38.6	18.8	27.7	0.003	29.8	24.5	26.8	0.33	33.7	24.2	28.7	0.006
clinical diagnosis of septum deviation	6.3	1.7	4.1	0.11	6.0	3.0	4.3	0.4	22.8	14.3	18.0	0.10	12.1	7.2	9.5	0.04

classification was exclusively clinical, and made by the authors. Anterior cartilage deviation was classified as caudal deviation caused by vertical septal fracture. A kinking or spur deformity at the vomer-ethmoid junction in the posterior part of the nasal cavity was considered septal crest. "C-" or "S"-shaped bending of the quadrilateral cartilage was considered curved septal cartilage deviation. The septum bowed into one nasal cavity or there was a double buckling with an "S"-shaped deformity affecting both sides of the septum. The deviation was localized in area II according to Cottle. Dislocation of the cartilage to one or other side of the maxillary spine or the premaxilla was called premaxillary luxation. In evaluating separate septum pathology also minor deviations were taken into account. A clinical diagnosis of septum deviation was made by the authors according to those findings that were definitely conspicuous and were regarded possibly as clinically significant without any information about nasal symptoms and prior to functional tests.

Radiographic and ultrasound examinations of the paranasal sinuses were carried out in 663 and 687 children, respectively. Septum pathology was evaluated from 661 occipitomental pictures of the maxillary sinuses.

The statistical analysis was performed using ordinary Pearson's Chi-square or Fisher's exact tests.

RESULTS

Conspicuous external deformity of the nasal pyramid was present in three boys. One boy in the fourth grade had a flattened and wide nasal vault associated with toe anomaly. One boy in the eighth grade was found to have bony pyramid and septal deviations, and one girl in the same grade had nasal hump formation. The nose of a 15-year-old boy had been operated because of deviations of the osseous pyramid and of the septum related to a treated palatal cleft.

Of 687 school children studied, 392 (57.1%) were not found to have any noticeable septum deviation. The percentage of children with no visible septal deviation increased with age: 50.4%, 57.6%, and 62.8% in grades I, IV, and VIII, respectively. The difference was statistically significant (p=0.005) between the first and the eighth grade, and it was mainly due to the difference in the occurrence of curved septal cartilage deviation. In calculating the numbers of school children with either one, two, three or four of a total of four types of septal deviations, the following distributions could be obtained: 39.0%, 3.8%, 0%, and 0%, respectively.

Caudal deviation was by far the most exceptional finding in the present material (Table 1). It was found in five children only, of whom three were in the oldest age group. The septal crest was most frequently present in children of the oldest age group (p=0.02; grade I versus grade VIII), and as the only finding in 3.4%. A gently-curved "C-" or "S"-shaped deviation of the septal cartilage was very usual in younger children. The occurrences were 20.7%, 17.5%, and 3.8% in the first, fourth, and eighth grade, respectively (p <0.0001; grades I or IV versus grade VIII). In the fourth and eighth grades it occurred more frequently in boys. As the only septal deviation finding it was present in 10.2%. The most common finding in all age groups was premaxillary luxation. It occurred in 28.7% of the entire material, and as the only finding in 25.0%. There were no statistical differences between age groups, unlike between sexes (boys versus girls; p=0.006). The clinical diagnosis of septum deviation was significantly more common in children of the oldest age group (n=47) compared to those of grade I (n=10; p=0.0004) or grade IV (n=8; p=0.003). It was also more often present in boys than in girls (p=0.04).

Septum deviation was found in 140 (21.2%) of 661 radiographs. The distribution according to grades I, IV, and VIII was 22.4%, 22.9%, and 18.8%, respectively. Septal crests were found in 46% in occipitomental projection of the maxillary sinus X-rays, curved septal cartilage deviation in 41%, and premaxillary luxation in 44%. However, when the clinical diagnosis of septum deviation was made, a radiographically-confirmed septum deviation could be found in 70%. Radiographically-confirmed septum deviation was statistically highly significantly (p <0.001) associated with curved septal cartilage deviation, septal crest and premaxillary luxation discovered by inspection, and the clinical diagnosis of septum deviation, whereas no association could be found with radiographic or ultrasonographic pathological changes of the maxillary sinuses.

DISCUSSION

In the present work, we only examined the prevalence of different septal deviations, and not the aetiology of septum deformities nor the function of the nose.

In clinical practice, the discovery of septal deviation is to some

extent individual and is at least partly based on the clinician's subjective determination of what kind of deviation is significant or non-significant. In the present work, one of four types of septal deviations was present when a septal deformity, significant or not, could be found in normal routine examination of the nose. The deviation was defined as marked when the authors were of the opinion that the finding had some clinical significance and a clinical diagnosis of septum deviation was made. The severity of symptoms of septum deviation, particularly nasal stuffiness experienced by patients in addition to rhinomanometric examinations, contribute decisively to making the diagnosis of septum deviation and to judging the need of nasal surgery. However, the present study was purely morphological and the aetiology of septal deviations, nasal history or functional tests were not examined. Thus, the clinical diagnosis of septum deviation was only based on the clinical examination of the nose. Individual, minor septal deviations were found most frequently in children of the first grade and in boys of the fourth grade. However, clinical diagnosis of septum deviation was statistically significantly more common in children of the eighth grade as compared to the others. There are several reasons for this difference: (1) the nasal septum undergoes changes during childhood, due to growth (Takahashi, 1988; Blaugrund 1989); (2) nasal trauma is more common in older children; and (3) the examination of the nose is easier in older children. A clinically significant septum deviation was found in 4% of children in the first and fourth grades, and in 18% of children in the eighth grade. The results concerning clinical diagnosis of septum deviation were in agreement with those of earlier works on school-aged children (Eagles et al., 1963; Roberts and Federico, 1972; Roberts and Ahuja, 1975). Blaugrund (1989) reports in his review article that septal deformity occurs in over 20% of the population and that it is more frequent in adults than in children.

Premaxillary luxation and clinical diagnosis of septum deviation were found more frequently in boys than in girls. Perhaps the only reason is that boys are more prone to nasal trauma than girls. The occurrence of individual septal deviations varied from 0.7% of caudal deviation to 28.7% of premaxillary luxation but, unfortunately, as far as the authors know, there are no previous studies on this topic among school children. It is also obvious that the comparison with other studies is not so unambiguous owing to possibly different classifications of septal deviations. The present study also suggests that it is possible to discover a great part of clinically significant septal deviations from the occipitomental projection of the maxillary sinus X-ray.

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