The Journal of Laryngology and Otology
June 1991, Vol. **105**, pp. 424–427

The Relationship of nasal septal deformity and palatal symmetry in neonates

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Abstract
Results are reported of a study to evaluate possible associations between nasal septal deformity and palatal symmetry in neonates.

Five hundred babies, born consecutively, were examined within three days of birth. Prenatal and delivery data were recorded for each baby and the nose was examined to determine airway patency and possible septal deformity. When a deviation of the septum was discovered an alginate impression of the palate was taken along with photographs of the nostrils. A matched control was then selected for each study group baby and similar records were obtained.

Only 14 cases of septal deformity were found, an incidence of 2.8 per cent. No evidence of palatal asymmetry was found. The theory that moulding pressures during delivery may be a major cause of nasal septal deformity was not supported.

Introduction

Otolaryngologists are aware of the fact that many adults have a deviated nasal septum. Over a 100 years ago Mackenzie (1880) studied more than 2000 skulls to find that the nasal septum was straight in only 23 per cent.

A higher incidence was reported by Gray (1974) who found septal deviation in up to 60 per cent of neonates. He suggested that a major cause was compression of the skull and facial bones by moulding pressures during the late stages of pregnancy and during delivery.

Other authors have not confirmed the high incidence found by Gray. For example, Jeppesen and Windfield (1972) found septal deviation in only 3.2 per cent of babies. This is more in line with previous experience of the present authors (Kent *et al.*, 1988).

Since neonates are obligate nasal respirors, it has been suggested that a deviated septum may cause cyanotic attacks, feeding difficulty, and epiphora due to obstruction of the nasolacrimal duct (Gray, 1980). The same author (Gray, 1974) suggested that unequal pressures on the maxilla during birth may cause elevation and asymmetry of the hard palate which in turn could distort the vomer and septal cartilage. The present study was designed to test the theory of Gray by measuring the symmetry of the hard palate in neonates with septal deviation and comparing results with matched controls.

Materials and methods

Five hundred babies, born consecutively over a three month period in a major obstetric unit, were examined within three days of birth. First, the nasal bridge was checked for visible deformity. Then a cold metal tongue depressor was placed below the nostrils to observe the extent of misting which occurred during expiration. Misting was recorded on a three-point scale for each nostril. Each nasal cavity was then examined with an auriscope for visible signs of septal deviation. Possible nasal obstruction was investigated further by passing 6×2 mm silicone rubber struts into each nasal cavity as described by Gray (1974). The depth of any obstruction was recorded in millimetres.

When the foregoing examination revealed the presence of septal deviation the nostrils were photographed in plan view (Fig. 1) and details of the pregnancy and delivery were recorded. Finally, an alginate impression of the hard palate was taken, using a specially made impression tray of the type used in dentistry. From these impressions, plaster models were cast.

Once each deviated septum baby had been recorded a control child was selected, matched closely for ethnic origin, sex, parity, pregnancy history, presentation, labour, delivery and birthweight. Controls were selected from amongst babies born within the next few days following the birth of the septal deviated child. Palatal impressions and photographs were obtained for the controls as for the study group.

Measurements were obtained from each plaster model and photograph as follows. Using the labial fraenum attachment and the nasopalatine foramina, the

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Work carried out at The Maternity Hospital, Coventry and The Dental School, Birmingham.
Accepted for publication: 22 February 1991.

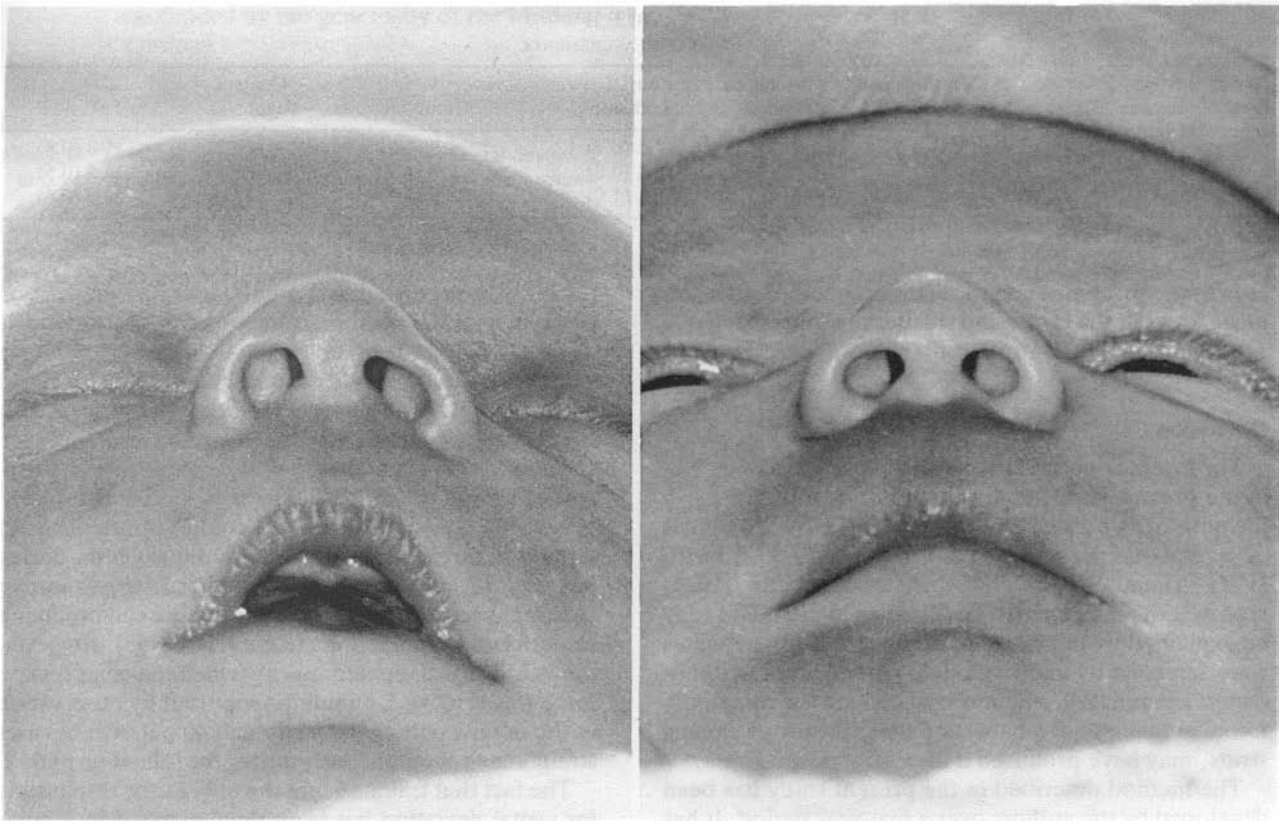

FIG. 1
Nostrils of babies with a deviated septum (left) and a straight septum (right).

midline was marked on the palate and a simple graticule was used to measure the width of each side of the palate at points, 5, 10, 15 and 20 mm, posterior to the crest of the alveolus in the midline. (Fig. 2).

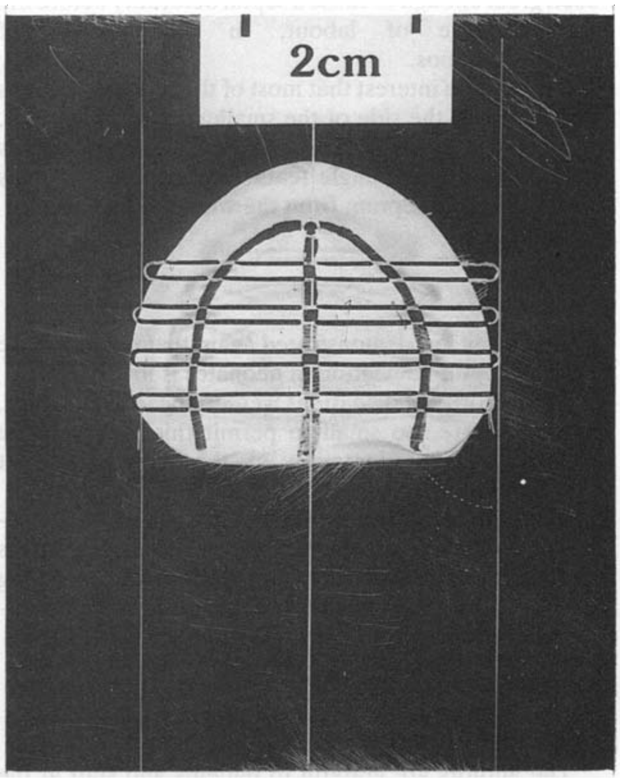

FIG. 2
The measuring device placed over a plaster model.

The area of each nostril was measured by using a multipoint digitizer linked to a computer. Each nostril was measured on three occasions and the mean was then calculated.

Results

Fourteen cases of septal deformity were discovered in 500 consecutive births, an incidence of 2.8 per cent. Basic obstetric data are given in Table I. Twelve of the 14 septal deviations were to the left side.

Measurement of the palatal models revealed no definite asymmetries in either the study or control groups (Table II). Statistical analysis was not attempted due to the small numbers.

Measurement of the areas of the nostrils on photographs revealed that in 11 out of 14 babies the smaller nostril was on the same side as the septal deviation.

TABLE I
BASIC OBSTETRIC DATA

a) *The study group*				
Sex	Male	9	Female 5	
Presentation	Occipitoanterior	14		
Delivery	Per vaginam	11	Forceps 2	Caesarian 1
Septal deviation	Left	12	Right 2	
b) A comparison of deviated septum babies and the whole 500				
	Deviated		Whole 500	
Birthweight	3.01 kg		3.2 kg	
Birth order	1.8 (range 1–4)		2.5 (range 1–10)	
Gestation	40 weeks		40 weeks	

https://doi.org/10.1017/S0022215100116202 Published online by Cambridge University Press

TABLE II
PALATAL MEASUREMENTS

Distance from crest of alveolus	Width of palate with deviated septum			Control		
	Complete	Right side	Left side	Complete	Right side	Left side
5 mm	24.3 (0.9)	12.1 (0.7)	12.1 (0.7)	24.2 (1.2)	12.4 (0.7)	11.8 (0.8)
10 mm	29.8 (1.5)	14.7 (1.1)	15.1 (0.8)	29.3 (1.1)	14.8 (0.8)	14.5 (0.5)
15 mm	29.5 (1.6)	14.4 (0.8)	15.1 (1.0)	28.8 (1.5)	14.5 (1.0)	14.5 (0.6)

All figures mean (SD)

However, an almost identical difference between the mean areas of the larger and smaller nostril respectively was found for the control group babies (Table III).

Discussion

The low incidence of neonatal septal deformity found in the present study, under three per cent, agrees with previous work by the authors (Kent *et al.*, 1988) and that of several others (Jeppesen and Windfield, 1972; Jazbi, 1977; Alpini *et al.*, 1986). However, Gray (1974) reported the incidence to be 20 times higher. This may be explained by the fact that in this last study neonates were screened by midwives. It is possible that, without expert examination, the mucosal congestion commonly found in the nose of a baby, and the difficulty of passing struts, may have produced a high false positive rate.

The method described in the present study has been developed by the authors over a five-year period. It has been tested for intra- and inter-observer error and found to give a high degree of accuracy.

The predominant occurrence of left-sided deviations found supports previous work (Jeppesen and Windfield, 1972; Gray 1974). It has been suggested that the side of the deviation may be related to rotation of the baby's head during the second stage of labour (Jazbi, 1977). Thus the more common left occipito-anterior presentation is thought to cause pressure on the left side of the nose as the head rotates during birth and so dislocate the septum to the left at the cartilage-vomerine junction.

In the present study, impression trays were constructed from heat-cured acrylic. The use of cold cured resin was felt to be inappropriate due to the risk that free monomer might cause irritation to the delicate mucosa of the neonate. Before the study began a number of preliminary impressions were taken and trays of different sizes made. With these close-fitting trays impression taking was straightforward and fine details of anatomy were reproduced on the model. The midline was drawn from the frenular attachment on the alveolus to a mid-point between the nasopalatine formina. Measurements using the graticule showed that the palates of both test and control babies were symmetrical to within 1 mm. These findings do not accord with the views of Gray (1978) who suggested that moulding forces may act on both sides of the maxilla to force the palate superiorly and so buckle the septum. By contrast a unilateral force would elevate only half of the palate and in doing so bend the septum. If this were the case there might be a significant palatal asymmetry. The fact that no such asymmetry was found in the present study gives no support to Gray's theory with regard to moulding forces.

TABLE III
AREA OF NOSTRILS

	Study	Control
Mean area of larger nostril	0.37 (0.08)	0.39 (0.14)
Mean area of smaller nostril	0.35 (0.07)	0.36 (0.12)
	Mean (SD)	Mean (SD)
Septum deviation towards larger nostril		11
Septum deviation towards smaller nostril		2
Nostrils equal		1

Another type of pressure that could damage the nasal septum is direct pressure to the nasal skeleton during delivery. *In vitro* compression studies of post-mortem specimens have shown that such pressure can produce a smooth bend in the septum (Kent *et al.*, 1988). However, the deformity dissipated quickly when the compression force was removed, a finding supported by observation in the *in vivo* part of the study that 40 per cent of cases straightened spontaneously during the follow-up period.

The fact that trauma is not the only factor responsible for septal deviation has been demonstrated by studies that found a four per cent incidence of developmental deviation of the septum in 28 week fetuses (Ruano-Gil *et al.*, 1986). There have also been case reports of septal deviation after elective Caesarian section (Harkavy and Scanlon, 1978). It is difficult to believe that intra-uterine pressure on the baby's skull and facial bones would have been great enough to cause a septal deformity before the second stage of labour, in the absence of oligohydraminos.

It is of some interest that most of the septal deviations were towards the side of the smaller nostril. However, numbers are too small to draw firm conclusions from this data. Certainly no single feature set apart the babies with a deviated septum from the whole 500 seen.

Conclusions

This study has demonstrated again that the incidence of nasal septum deviation in neonates is low.

The majority of deviations were to the left. However, numbers were too small to permit this finding to be related to the orientation of the baby's head at presentation.

The main conclusion is that the hard palates were symmetrical in those babies with septal deviation. This is counter to the theory that moulding pressures during birth act through the maxilla to distort the palate and dislocate the septum.

Acknowledgements

The authors are grateful to patients and staff at the Maternity Hospital, Coventry, to Mr F. Tonkinson for technical help and to Miss J. Moses for secretarial work.

The study was funded by the generosity of the Midland Institute of Otology.

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Key words: Nasal septum; Palate