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Effect of posture on gastro-oesophageal reflux in the newborn

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SUMMARY The effect of posture on gastro-oesophageal reflux was studied by giving 72 oro-gastric tube feeds to 18 low birthweight babies. Each infant was studied in each of 4 positions: prone, supine, right, and left lateral. Brilliant blue was added to feeds and reflux was determined by staining of a cotton thread opposite the holes in a feeding tube passing from the nose to the distal oesophagus. A comparison of the prone and supine positions showed that significantly less reflux occurred in the prone position.

The optimum position in which to nurse neonates is controversial, the position adopted by most nurseries being based more on custom than reason. It is well known that regurgitation of gastric contents can result in aspiration pneumonia and death in the newborn. Recently gastro-oesophageal reflux has been incriminated as a cause of apnoea and respiratory distress in the newborn and of 'near miss' and sudden death in infants.¹ Prompted by such hazards the aim of the study was to determine the position associated with least reflux so that a rational choice for nursing infants in our nursery could be made.

Patients and methods

Eighteen healthy low birthweight infants were studied between the 2nd and 31st (mean 10) days. Mean (\pm SE) birthweight was 1.78 ± 0.07 (range 1.25-2.40) kg, and gestation 34.4 ± 0.4 (range 31-37) weeks. As the infants were preterm, all of them required some tube feeds, and informed parental consent was obtained. Approval for the study was obtained from the ethical committee of the Bradford District Hospitals.

The length of each infant was measured with a neonatometer and the distance from the nares to the distal oesophagus determined by the formula: oesophageal length (cm) = $5 + (0.252 \times \text{infant length})$.²

A 6 FG polyvinyl feeding tube containing white crêchet cotton was passed through the nose so that the distal end was calculated to lie just above the stomach. The feeding tube which contained 6 small holes at 2.5 cm intervals along its length was firmly fixed to the face. The infant was placed in the designated position (prone, supine, left, or right lateral) and allowed to settle for a few minutes. A milk feed containing brilliant blue in sufficient quantity to impart a deep blue colour was then

Table Number of refluxed feeds at each height in 4 positions, and reflux score

	Prone	Supine	Right	Left
Reflux height (cm)				
<2.5	5	0	1	1
2.5	2	0	0	4
5	3	1	2	3
7.5	4	10	9	4
10	0	2	3	2
Oral regurgitation	4	5	3	4
Score†	50*	25*	32	40

*Difference between prone and supine significant ($P < 0.05$).

†See text for explanation of scoring system.

given by orogastric tube (8 FG), the tube being withdrawn immediately on completion of the feed. The tube was passed to a length equivalent to the distance between the nasal bridge and the tip of the ensiform cartilage \pm 3–4 cm. Feeds (breast milk or formula) were given according to nursery routine at intervals of 2 or 3 hours by one of us (I B) during a 24-hour period. Volumes ranged from 20 to 60 (mean 40) ml, and were kept constant throughout the study.

After feeds infants were not 'burped' but left undisturbed on a flat surface in the designated position for an hour when the nasal tube was removed. Each infant had one feed in each of the 4 positions, the sequence being varied so as to obtain a balanced distribution. The extent of reflux was gauged by noting the most proximal hole in the tube in which the cotton was stained blue.

Results

The results are shown in the Table. Seven (9.8%) feeds were associated with reflux less than 2.5 cm, 16 (22.2%) feeds were visibly regurgitated from the mouth. The remaining 49 (68%) feeds refluxed to a height ranging from 2.5 to 10 cm. A score was allocated to the results in the following way so that a high score was inversely related to the height of reflux: reflux <2.5 cm five, 2.5 cm four, 5 cm three, 7.5 cm two, 10 cm one, visible regurgitation nil.

The highest score (50) was obtained in the prone position with the lateral positions intermediate (left 40, right 32), while the lowest (25) was in the supine position. A *t* test indicated that the difference between prone and supine positions was statistically significant ($P < 0.05$). When the lateral positions were compared with each other and with the prone and supine positions differences were not significant.

Discussion

This study showed that least reflux occurred in the prone position; this supports the work of Hewitt

who found that infants nursed prone aspirated less milk.³ She studied the number of lipid-filled macrophages in tracheal aspirates of infants nursed prone and supine and found significantly fewer in the prone position. Previous studies in infants of similar age have shown that stomach emptying rate and lower oesophageal sphincter pressure are not affected by posture.^{4,5} Prone placement increases sleep, reduces crying, and diminishes movement,^{6,7} factors associated with a reduction in both intra-abdominal air and pressure. Thus, it could be speculated that reduced abdominal pressure was one reason for less reflux in the prone position. Another more obvious reason is the postural variation in intra-abdominal air-fluid relationship. When supine, fluid accumulates in the fundus, the most dependent part of the stomach. Air in turn rises to the highest part which in this position is the pyloric antrum. In the prone position the situation is reversed by air contained in the highest part, the fundus, effectively forming a barrier between fluid in the pyloric antrum and the lower oesophageal sphincter. Thus, eructation rather than regurgitation is the more likely event after an increase in abdominal pressure or sphincter relaxation.

The method used in this study causes little discomfort and is sensitive and inexpensive. The indications for its use and advantages compared with other methods of assessing reflux have recently been discussed elsewhere.⁸ In conclusion, results of this study together with improved respiratory function in the prone position support a rational choice of prone posture for nursing infants.⁷

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