

There is no evidence that sodium nitroprusside had any effect other than, possibly, to cause systemic hypotension. Similarly, the paper by Abbott *et al.* (1978) merely serves to illustrate the importance of correcting acidosis and hypercapnia early in the course of neonatal respiratory distress. Moreover, their case illustrates the ill-advised use of sodium bicarbonate as a buffer in a hypercapnic neonate whose minute ventilation is fixed by mechanical ventilation. Their figure clearly shows a *worsening* of hypercapnia and a *fall* in pH after bicarbonate infusion.

It is clear that the primary aim of therapy in severely hypoxic neonates suffering from RDS should be to attempt to correct those metabolic derangements which promote pulmonary vasoconstriction. It would be dangerous to conclude from the currently available literature that sodium nitroprusside has any value in such patients.

References

- Abbott, T. R., Rees, G. J., Dickinson, D., Reynolds, G., and Lord, D. (1978). Sodium nitroprusside in idiopathic respiratory distress syndrome. *British Medical Journal*, **1**, 1113-1114.
- Rudolph, A. M. (1977). Fetal and neonatal pulmonary circulation. *American Review of Respiratory Diseases*, **115**, 11s-18s.

M. SILVERMAN
*Department of Paediatrics
 and Neonatal Medicine,
 Hammersmith Hospital,
 Du Cane Road,
 London W12 0HS*

Dr Beverley and co-workers comment:

The clinical and radiological appearances in the small preterm baby we described gave us a working diagnosis of RDS, and contrary to Dr Robertson's impression we stated that at 24 hours old the baby still required added oxygen as well as intermittent positive pressure ventilation (IPPV). We accept that birth asphyxia may have contributed to the severity of his illness.

We agree that correction of metabolic derangements which may provoke a rise in pulmonary vascular resistance (PVR) is important in the management of RDS and are sure that increasing P_{aO_2} and tissue oxygenation is of paramount importance in making this correction. In our case correction of arterial pH was unlikely to have been due to bicarbonate infusion, as <1 mmol bicarbonate had been infused by 12 hours of age when the baby's arterial pH was 7.4. We agree that injudicious use of bicarbonate may be detrimental. Hypercapnia was not a significant contributory factor to the acidosis nor was the high PVR. P_{aCO_2} in our baby ranged from 3.5 to 6.4 kPa (26.3 to 48 mmHg) during the period of IPPV. Neither was hypovolaemia or hypotension before the use of nitroprusside suggested by continuous measurement (via the umbilical artery catheter) of arterial blood pressure, by the small core-peripheral temperature gradient, or by the failure to improve after the initial 20 ml transfusion at 4 to 5 hours old. The subsequent transfusions were given over

a 5-hour period in response to downward trends in arterial blood pressure and widening core-peripheral temperature gradients after starting nitroprusside.

We wish to emphasise that the ventilator settings at the start of the nitroprusside infusion were those which produced the maximum P_{aO_2} and that subsequent changes were made in response to improvements in the infant's condition and were not the cause of them.

We accept that it is advantageous when studying the effects of a drug to keep other factors in the treatment constant, but this may not be possible when the drug is being infused over a period of time and may indeed be contraindicated.

Our original letter drew attention to the possible toxic effects of nitroprusside and stressed the need for careful biochemical and blood pressure monitoring during its use. Since then we have used nitroprusside in 5 other infants with severe RDS with beneficial effects in all cases and feel that further study of its use in this condition is warranted.

D. W. BEVERLEY, C. A. HUGHES, D. P. DAVIES,
 M. J. HARRAN, AND D. A. DUCKER
*Neonatal Unit,
 Leicester Royal Infirmary Maternity Hospital,
 Leicester LE1 5WW*

Role of gastrin in pyloric stenosis in infants

Sir,

The careful clinical study by Hambourg *et al.* (*Archives*, 1979, **54**, 208) evaluating serum gastrin levels in infants with hypertrophic pyloric stenosis adds further evidence minimising the role of gastrin in the production of this disorder. Although Hambourg *et al.* quite properly indicate that there is controversy about preoperative fasting gastrin levels in infants with hypertrophic pyloric stenosis when compared with controls, most authors have agreed that there is no significant increase of this hormone. Two major questions remain unanswered: (1) Is there excessive *in utero* exposure to gastrin in these infants? (2) Is there a possibility of excessive postprandial hypergastrinaemia in these infants? The first question has been addressed by a study (Werlin *et al.*, 1978) in which levels of circulating gastrin were measured in umbilical venous blood and maternal venous blood obtained at delivery in 40 infants who subsequently developed hypertrophic pyloric stenosis. In this comparison, there was no significant difference between the mean cord and maternal gastrin concentrations of infants subsequently developing pyloric stenosis, and normal infants. The possibility of excessive postprandial hypergastrinaemia in these infants was addressed in a recent clinical study from our institution (Moazam *et al.*, 1978), and has been confirmed by Hambourg's work. In our study, 11 patients with congenital hypertrophic pyloric stenosis were evaluated with sequential pre- and postprandial serum gastrin levels immediately before pyloromyotomy and 2 to 10 weeks later. When compared with an age-matched control, the

fasting gastrin levels in our patients (125 ng/l) were identical with the control (128 ng/l). The gastrin responses to a Sustagen meal (providing 1.7 g/kg protein) were likewise similar. The finding of a somewhat flattened postprandial gastrin curve in Hambourg's infants after pyloromyotomy is most likely explained by residual antral stasis. As these authors properly point out, radiological evidence of impaired gastric emptying frequently persists in the immediate postoperative period in these patients. We would agree with the conclusions of these authors that there is no evidence to support the hypothesis that patients with pyloric stenosis have an abnormal gastrin mechanism.

References

- Moazam, F., Rodgers, B. M., Talbert, J. L., and McGuigan, J. E. (1978). Fasting and postprandial serum gastrin levels in infants with congenital hypertrophic pyloric stenosis. *Annals of Surgery*, **188**, 623–625.
- Werlin, S. L., Grand, R. J., and Drum, D. E. (1978). Congenital hypertrophic pyloric stenosis—the role of gastrin re-evaluated. *Pediatrics*, **61**, 883–885.

BRADLEY M. RODGERS AND FARHAT MOZAM
*Division of Pediatric Surgery,
 University of Florida,
 College of Medicine,
 Gainesville,
 Florida 32610, USA*

Dr Hambourg and co-workers comment:

We agree with the conclusions of Dr Rodgers and Dr Moazam although the results of their recent study are not comparable with ours (Moazam *et al.*, 1978). Regarding the curve showing changes in serum gastrin levels after ingestion of a high protein meal (Sustagen, providing 1.7 g/kg protein) these authors obtained a slope that increased more slowly from baseline values. Moreover the peak gastrin values were noted in control infants at 45 min, and in patients with hypertrophic pyloric stenosis at 30 min preoperatively and 45 min postoperatively. Analysis of the decreasing slope was not described. Our study was performed by administering a casein hydrolysate (Amirige, providing 0.7 g/kg protein) containing free amino-acids. In 11 control infants and 10 patients with pyloric stenosis the mean peak gastrin level was noted within the first 10

minutes after the feeding, showing a maximum value at 10 min and a return to basal gastrin levels after 60 and 90 min. The differences may be explained by differences in the two methods. Certainly high protein preparations are capable of producing a gastrin release. However hydrolysed proteins, especially free amino-acids, were found to be more potent gastrin stimulants (Elwin, 1974), thus increasing the accuracy of the test. Our results with the gastrin secretion test show the importance of recording the serum gastrin levels within the first 10 min after feeding and continuing to record it for at least 60 min. In the study by Moazam *et al.* (1978), 11 infants with pyloric stenosis were evaluated with postprandial serum gastrin levels before pyloromyotomy and 2 to 10 weeks after surgery. Interestingly, a gastrin secretion test was performed on patients with untreated hypertrophy of the pylorus. In the postoperative studies a similar rise in serum gastrin concentration was noted in response to protein ingestion, however no significant differences were observed from preoperative studies.

In our patients, increased fasting gastrin levels were noted after pyloromyotomy and were still present 2 weeks after the operation. The postoperative hypergastrinaemia may be explained by a residual antral stasis on the 7th and 15th days after surgical pyloromyotomy, represented by a postprandial gastrin curve with a 'levelling-off' effect between 30 and 60 min, as Dr Rodgers and Dr Moazam clearly point out. Nevertheless, in these two studies test meals did not produce an exaggerated gastrin response, and the results were of the same order as those obtained by the same trial control stimulation. Therefore we agree that there is no evidence that patients with pyloric stenosis have an abnormal gastrin mechanism.

References

- Elwin, C. E. (1974). Gastrin acid responses to antral application of some amino-acids, peptides, and isolated fractions of a protein hydrolysate. *Scandinavian Journal of Gastroenterology*, **9**, 239–247.
- Moazam, F., Rodgers, B. M., Talbert, J. L., and McGuigan, J. E. (1978). Fasting and postprandial serum gastrin levels in infants with congenital hypertrophic pyloric stenosis. *Annals of Surgery*, **188**, 623–625.

MICHAEL HAMBOURG
*Department of Paediatric Surgery,
 Hôpital des Enfants-Malades,
 75015 Paris, France*