

## Summary

6487 newborns, the products of consecutive deliveries, were specifically examined in the present study for congenital abnormalities. 44 of them presented hypoplasia of the depressor anguli oris muscle (DAOM). Associated congenital malformations were compared to those observed in the general neonatal population. The frequency of congenital anomalies among infants with hypoplasia of DAOM was 20%, as compared to 2.7% in the control group of the same period. These figures indicate an eightfold increase of associated anomalies in the presence of the hypoplastic DAOM. Cardiovascular anomalies were found in 6.8% of the affected newborns, as compared to 0.45% in the control group. Newborns with hypoplasia of the DAOM should be examined for other congenital anomalies, particularly of the cardiovascular system, since these tend to occur at a significantly higher frequency.

## REFERENCES

- Cayler, G. G., Blumenfeld, C. M., and Anderson, R. L. (1971). Further studies of patients with the cardiofacial syndrome. *Chest*, **60**, 161.
- Craig, W. S. (1969). *Care of the Newly Born Infant*, 4th ed., p. 285. Williams and Wilkins, Baltimore.
- Fuchs, T., and Gutensohn, G. (1967). Wert und Grenzen des Nitrit Tests bei der Diagnostik einer Pyelonephritis. *Deutsches Medizinisches*, **18**, 343.
- Gellis, S. (1975). (Editorial comment). *Year Book of Pediatrics*, p. 324. Year Book Medical Publishers, Chicago.
- McIntosh, R., Merritt, K. K., Richards, M. R., Samuels, M. H., and Bellows, M. T. (1954). The incidence of congenital malformations: a study of 5964 pregnancies. *Pediatrics*, **14**, 505.
- Malpas, P. (1937). The incidence of human malformations and the significance of changes in the maternal environment in their causation. *Journal of Obstetrics and Gynaecology of the British Empire*, **44**, 434.
- Marden, P. M., Smith, D. M., and McDonald, M. J. (1964). Congenital anomalies in the newborn infant, including minor variations. *Journal of Pediatrics*, **64**, 357.
- Pantelakis, S. W., Karageorga-Labama, M., and Bartsocas, C. S. (1973). Incidence of malformations in Greece. *IV International Conference on Birth Defects*. Ed. by A. G. Motulsky. International Congress Series No. 297. Excerpta Medica, Amsterdam.
- Papadatos, K., Alexiou, D., Nicolopoulos, D., Mikropoulos, H., and Hadigeorgiou, E. (1974). Congenital hypoplasia of depressor anguli oris muscle. A genetically determined condition? *Archives of Disease in Childhood*, **49**, 927.
- Pape, K. E., and Pickering, D. (1972). Asymmetric crying facies: an index of other congenital anomalies. *Journal of Pediatrics*, **81**, 21.
- Perlman, M., and Reisner, S. H. (1973). Asymmetric crying facies and congenital anomalies. *Archives of Disease in Childhood*, **48**, 627.
- Stevenson, S. S., Worcester, J., and Rice, R. G. (1960). 677 congenital malformed infants and associated gestational characteristics. I. General considerations. *Pediatrics*, **6**, 37.
- D. ALEXIOU,\* C. MANOLIDIS, G. PAPAETHANGELLOU, D. NICOLOPOULOS, and C. PAPADATOS**  
*Second Department of Paediatrics, Athens University and Neonatal Department of Alexandra Maternity Hospital, Athens, Greece.*

\*Correspondence to Dr. D. Alexiou, Aglaia Kyriakou Children's Hospital, Athens 608, Greece.

## Value of cystography in urinary tract infections

It is customary in paediatric practice to investigate the urinary tract radiologically by means of an intravenous urogram (IVU), and a micturating cystogram when a child is first diagnosed as having a urinary tract infection (UTI) whether symptomatic (Smellie, 1969; Rolleston, Shannon, and Utley, 1970) or asymptomatic (Davies *et al.*, 1974; McLachlan *et al.*, 1975). However, cystography may be associated with numerous complications. 13 are listed by McAlister, Cacciarelli, and Shackelford (1974), and after one of our patients required a general anaesthetic for removal of a catheter, we decided to see whether in patients with a normal IVU, cystography added any useful information.

## Patients and methods

X-rays of all the children with a bacteriologically proven UTI, who had had both an IVU and a micturating cystogram over a 2-year period, were reviewed. The diagnosis of UTI was made if a fresh specimen of urine contained a single organism with a quantitative count of 100 000 organisms/ml or more. For the IVU, after a plain film of the whole abdomen had been taken, an injection of Urovison (sodium and methyglucamine salts) 1.0 ml/kg body weight was given. No abdominal compression was used.

The first film was taken at 5 minutes (3 minutes in very young children). If the 5-minute film showed two kidneys filling well, a bottle of cold Pepsi-Cola was given through a straw with the child lying down. This distended the stomach and showed the kidneys through a gas filled stomach. At 15 minutes a complete renal tract film was taken. This was occasionally supplemented with an oblique film to show, if necessary, a kidney partially obliterated by overlying bowel shadow, and to bring it into the area of the clear gas-filled stomach. If an adequate film of the bladder was obtained, a further renal tract film was taken after micturition to assess bladder emptying. Tomography was not used in any of these patients.

Cystourethrography was performed on another day. The patient was catheterized with a Foley's catheter (a self-retaining catheter was used as it had been found that some children would extrude a fine polyethylene catheter before adequate bladder filling was obtained). A specimen of urine was sent for culture, but the bladder was not emptied. The subsequent examination was controlled by minimal intermittent screening. The bladder was filled by a 60 ml catheter-tip syringe with half diluted Urovison and sterile water, or if the bladder was very full with an undiluted Urovison. If reflux was seen to occur no further contrast was added, otherwise the bladder was filled to tolerance. The amount of contrast introduced varied between 25 and 75 ml according to bladder volume and the age of the child. No screening films were taken unless reflux was

seen. If reflux occurred a coned anteroposterior and a coned appropriate oblique of the lower ureter were taken to confirm the presence of reflux, and then a localized film of the appropriate kidney to assess the degree and extent of the reflux. In some children visualization of reflux was obtained with screened films, but if no reflux was seen on the screen, and thus no films taken, three films were then taken with an over-couch tube with the child micturating, an anteroposterior, and right and left oblique.

An important part of the examination is giving an adequate explanation and obtaining the co-operation of the child, as this helps to minimize the inevitable anxiety.

The IVU films were examined without knowledge of the results of the cystogram. Ureters, with this high dose technique, were usually seen easily and any dilatation noted. Bladder emptying was assessed on the IVU films as this was felt to be more physiological than after catheterization. On the micturating cystogram reflux was graded according to the criteria of Rolleston *et al.* (1970).

### Results

Fifty-one children with a bacteriologically proven UTI had both an IVU and a micturating cystogram. 16 showed abnormalities in the IVU, the remaining 35 cases forming the basis of the study. Clinical features of these 35 cases are given in Table I.

TABLE I

*Clinical features of 35 children with urinary tract infection and normal IVU*

	No.	Age		First infection	Recurrent infection
		Mean (yr)	Range		
Girls	28	4.3	16 d -9.5 yr	19	9
Boys	7	3.5	10 d -9.5 yr	6	1

Girls outnumbered boys by 4 to 1, with a similar age range from the neonatal period to 9½ years in both sexes. Most children were investigated after their first infection, the remainder had either had infections before being referred to hospital, or had had a further infection while under outpatient supervision.

Cystography was normal in 29 children, and showed ureteric reflux in 6, all girls. Clinical details and the radiological findings in these 6 cases are given in Table II. 3 children had had only one infection, and three recurrent infections. 3 children had grade I reflux, affecting one ureter, and one child had grade II reflux in one ureter.

TABLE II

*Clinical features and findings on cystography in 6 girls with urinary tract infection and normal IVU*

Case no.	Age (yr)	No. of infections	Reflux
1	6	Numerous	Grade I in L ureter
2	8	1st	Grade I in L „
3	3	2nd	Grade I in L „
4	6	6th	Grade II in R „
5	3.9	1st	Grade III in L „
6	5.5	1st	Grade II in R „ Grade III in L „

The fifth child had grade III reflux in one ureter, and the sixth had reflux affecting both ureters, grades II and III. Both the children with grade III reflux were investigated after their first infection, while the child with numerous infections had only mild reflux. In the whole series of 35 patients, 17% showed reflux, unsuspected on IVU, affecting 10% of the ureters at risk.

### Discussion

In this study only a small proportion of children with a normal IVU had reflux shown on cystography, and only 2 children had grade III reflux. Other larger series have had a higher incidence: 25% of the 113 cases reported by Smellie *et al.* (1964), and a similar proportion of the Cardiff-Oxford survey (McLachlan *et al.*, 1975). This difference is hard to explain, as our cases were referred to hospital and might be expected to have a higher incidence of lower urinary tract abnormalities than the asymptomatic cases from the Cardiff-Oxford study.

The importance of diagnosing ureteric reflux is that it predisposes to recurrent infection, and so renal damage, rather than causing renal damage in its own right, for new renal scars 'almost invariably develop' in association with infection (Smellie and Normand, 1975). Therefore it could be argued that, providing the urine is kept sterile, the presence of reflux does not matter, especially as reflux does not normally get worse (Rolleston *et al.*, 1970).

Stansfeld (1975) found that only 50% of children treated for a UTI had a further infection, nearly all within a few months of stopping treatment.

If cystography were deferred until a second infection occurred, providing the IVU was normal, half the children with a UTI would not have this unpleasant investigation, and only a few cases of severe reflux would be missed. It seems unlikely that significant renal damage would occur in a normal kidney with a second infection, at which stage

cystography would be performed, and reflux, if present, could be treated.

Bailey (1973) and MacGregor and Freeman (1975) have proposed that cystography is not necessary in children over 5 years old if the IVU is normal. We would suggest extending this policy and deferring cystography in all children with a UTI until a second infection occurs, providing the IVU is normal.

### Summary

Fifty-one children with a bacteriologically proven urinary tract infection had both an intravenous urogram (IVU) and a micturating cystogram. The IVU was normal in 35. Only 6 of these children showed reflux in the cystogram, affecting 7 of the 70 ureters at risk. Since reflux on its own does not cause renal damage, which occurs only with super-added infection, detection of reflux is not important providing the urine is kept sterile. We suggest that cystography be deferred providing the IVU is normal until recurrent infections occur while under hospital care, and, with this policy this unpleasant and sometimes hazardous investigation could be avoided in many children with a single urinary tract infection.

### REFERENCES

- Bailey, R. R. (1973). The relationship of vesico-ureteric reflux to urinary tract infection and chronic pyelonephritis—reflux nephropathy. *Clinical Nephrology*, **1**, 132.
- Davies, J. M., Gibson, G. L., Littlewood, J. M., and Meadow, S. R. (1974). Prevalence of bacteriuria in infants and preschool children. *Lancet*, **2**, 7.
- McAlister, W. H., Cacciarelli, A., and Shackelford, G. D. (1974). Complications associated with cystography in children. *Radiology*, **111**, 167.
- MacGregor, M. E., and Freeman, P. (1975). Childhood urinary infection associated with vesico-ureteric reflux. *Quarterly Journal of Medicine*, **44**, 481.
- McLachlan, M. S. F., Meller, S. T., Verrier Jones, E. R., Asscher, A. W., Fletcher, E. W. L., Mayon-White, R. T., Ledingham, J. G. G., Smith, J. C., and Johnston, H. H. (1975). Urinary tract in schoolgirls with covert bacteriuria. *Archives of Disease in Childhood*, **50**, 253.
- Rolleston, G. L., Shannon, F. T., and Utley, W. L. F. (1970). Relationship of infantile vesico-ureteric reflux to renal damage. *British Medical Journal*, **1**, 460.
- Smellie, J. M. (1970). Acute urinary tract infection in children. *British Medical Journal*, **4**, 97.
- Smellie, J. M., and Normand, I. C. S. (1975). Bacteriuria, reflux, and renal scarring. *Archives of Disease in Childhood*, **50**, 581.
- Smellie, J. M., Hodson, C. J., Edwards, D., and Normand, I. C. S. (1964). Clinical and radiological features of urinary infection in childhood. *British Medical Journal*, **2**, 1222.
- Stansfeld, J. M. (1975). Duration of treatment for urinary tract infections in children. *British Medical Journal*, **3**, 65.

M. W. MONCRIEFF\* and ROSE WHITELAW  
Derbyshire Children's Hospital, Derby.

\*Correspondence to Dr. M. Moncrieff, Department of Paediatrics, Radcliffe Infirmary, Oxford OX2 6HE.

## Percutaneous angiocardiology for diagnosis of persistent ductus arteriosus in the preterm infant

The diagnosis or exclusion of a haemodynamically significant persistent ductus arteriosus (PDA) in preterm infants with respiratory distress syndrome, by single film aortogram via an umbilical arterial catheter, has been described by Thibeault *et al.* (1975). Difficulty arises, however, where there is no umbilical arterial catheter in the aorta, as small preterm infants may not develop signs of a PDA until long after the umbilical arterial catheter has been removed after the respiratory distress syndrome (RDS). We describe a successful percutaneous angiocardiology technique used in this situation on an infant weighing 2 kg.

### Case report

A male infant born at 28 weeks' gestation, birthweight 1400 g, required intubation and intermittent positive pressure ventilation (IPPV) for birth asphyxia. Spontaneous respiratory effort was poor and he required 10 days IPPV by Drager ventilator using oxygen concentrations of up to 95%. He also was treated for metabolic acidosis, hypercapnia, and pulmonary infection. At 2 months he developed cardiac failure, and a loud systolic murmur appeared at the upper left sternal border which was thought to be due to a persistent ductus arteriosus. He responded to digoxin, diuretics, and ventilation in a Drager Negative Pressure Box ventilator.

At 4 months he rapidly deteriorated with a return of cardiac failure, and a loud systolic murmur reappeared at the upper left sternal border. His chest x-ray showed an enlarged heart and gross pulmonary parenchymal changes. Electrocardiogram showed sinus rhythm, right axis deviation, and right ventricular hypertrophy. As he was critically ill it was felt that cardiac catheterization should be carried out in order to exclude a persistent ductus arteriosus which might have been contributing to his poor lung function.

**Cardiac catheterization.** A modified percutaneous technique was used. A number 18 G short bevel, thin wall, disposable needle on a 5 ml syringe was inserted into the femoral artery at the right groin over the point of maximal pulsation. The needle was passed through the artery, and slowly withdrawn and adjusted until a free flow of arterial blood into the syringe was obtained. The syringe was then disconnected and an 0.032 'Cordis' guide wire, soft end foremost, was passed up the femoral artery and aorta to the diaphragm in order to confirm that it was in the arterial system. The needle was then removed, and the skin incision slightly enlarged by opening the points of a pair of fine mosquito forceps inserted alongside the wire. A number 5 Gensini catheter was passed over the wire, and into the artery, being rotated constantly as it was inserted.