

Clinical outcome of fetal uropathy

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SUMMARY Thirty seven infants (27 boys and 10 girls) whose uropathy had been diagnosed antenatally were reviewed at a mean age of 24.4 months. Antenatal ultrasonography was found to be an accurate detector of renal disease, as uropathy was subsequently confirmed in 33 of the 37 infants (89%). A smaller proportion of patients required operations than in other series reported. Shortly after birth the kidney undergoes physiological adjustments and investigation may be carried out too soon. It should be delayed, especially if the infant is well. The timing of postnatal ultrasonography is important and the advice of a paediatric urologist should be sought before investigations are carried out.

More fetal anomalies are being discovered as a result of routine antenatal ultrasonography. The normal urinary tract can be seen as early as the fifteenth week of gestation, and up to 95% of fetal kidneys can be identified by the twenty second week.¹ In recently published series the reported incidence of fetal uropathy diagnosed by antenatal ultrasonography was between 0.14% and 0.39%.²⁻⁷

The management of uropathy diagnosed antenatally remains a matter of debate; in the series reported there has been a variable but high incidence of surgical intervention (46-80%).⁶⁻⁸

Patients and methods

Over a six year period (1981-7) 37 infants (27 boys and 10 girls) in whom an antenatal diagnosis of uropathy was made were referred to this centre, which serves south and mid Wales. During the first two years of the study only one infant was referred; the referral rate at the time of writing had increased to one infant every three weeks, which represents about 0.1% of live births. This is almost certainly an underestimate because antenatal ultrasonography is not routinely performed in the whole of our catchment area.

In all the infants the diagnosis was made in the third trimester when ultrasonography was performed for obstetric indications. One infant was delivered at 38 weeks' gestation by emergency caesarean section performed for fetal distress; all other infants were delivered normally.

The infants were referred after postnatal ultrasonography. Some of them had had other investiga-

tions including intravenous urography, isotope renography, or micturating cystourethrography, performed before referral. Postnatal ultrasonography was performed at this centre using a real time mechanical sector scanner (Technicare Autosector MCU) with a 5 or 7.5 MHz transducer.

Results

The 37 infants can be divided into two groups according to the antenatal diagnosis—unilateral uropathy (n=25) and bilateral uropathy (n=12) (tables 1 and 2). Oligohydramnios was not reported on any of the scans.

In 33 infants the presence of uropathy was confirmed, in two there was a non-renal lesion that had produced confusing ultrasonographic signs (unilateral suprarenal haematoma in one infant and duodenal diaphragm in the other), and in only two infants was there no lesion. An accurate diagnosis was therefore made in 89% of cases. Thirteen of the 33 infants required operations.

Pyeloplasty was indicated in three of the 15 infants with obstruction of the pelviureteric junction. There was objective evidence of deterioration (unremitting gross hydronephrosis and worsening differential function on isotope renography). Operations were performed at a mean age of 16.7 months. Improving function was the indication for continued conservative management in the other 12 infants.

Of the seven infants with obstruction of the vesicoureteric junction two required reimplantation of the ureters; one underwent reimplantation and contralateral removal of a cystic dysplastic kidney

Table 1 Postnatal diagnoses and treatment in 25 patients in whom antenatal ultrasonography had shown unilateral uropathy

Postnatal diagnosis	No	No needing operation
Unilateral obstruction of pelviureteric junction	11	Pyeloplasty (2)
Bilateral duplex kidneys, unilateral hydronephrotic upper moiety, and ureterocele	1	Ureteroplasty (1)
Unilateral duplex kidney with dilated lower moiety	1	None
Bilateral vesicoureteric reflux	1	None
Unilateral obstruction of vesicoureteric junction	2	None
Bilateral obstruction of vesicoureteric junction	1	None
Cystic dysplasia	6	Nephrectomy (6)
Normal kidneys and duodenal diaphragm	1	None
Normal kidneys and unilateral adrenal haematoma	1	None

Table 2 Postnatal diagnoses and treatment in 12 patients in whom antenatal ultrasonography had shown bilateral uropathy

Postnatal diagnosis	No	No needing operation
Bilateral obstruction of pelviureteric junction	4	Unilateral pyeloplasty (1)
Bilateral vesicoureteric reflux	1	None
Bilateral obstruction of vesicoureteric junction	3	Bilateral reimplantation of ureters (1)
Cystic dysplastic kidney with contralateral obstruction of vesicoureteric junction	1	Unilateral nephrectomy and reimplantation of ureter (1)
Bilateral ureteroceles	1	Bilateral ureteric meatotomy (1)
Normal kidneys	2	None

at the age of 2 months, and the other had bilateral reimplantation of the ureters at the age of 6 months. Function improved in the remaining five patients. Both patients with bilateral vesicoureteric reflux were treated conservatively. Nephrectomy was performed in seven patients with cystic dysplastic kidneys at a mean age of 10 months.

At the time of writing all 37 patients are well and thriving at a mean age of 24.4 months (range 5–90 months).

Discussion

In the presence of normal volumes of amniotic fluid, renal and pulmonary function is usually normal, whereas in the presence of oligohydramnios the prognosis is poor.⁹ Because renal dysplasia is well

advanced by the time of the first ultrasound scan (which is usually performed at 12–16 weeks' gestation) the argument for treatment by antenatal drainage is untenable.¹⁰ The role of antenatal drainage is still a matter for debate, but it may have a role in the management of infravesical obstruction in the presence of a normal volume of amniotic fluid.

The fetus with bilateral hydronephrosis who presents with oligohydramnios before the twentieth week of gestation is likely to have poor renal function.⁹

Bilateral hydronephrosis in the presence of a normal volume of amniotic fluid should be followed up by serial ultrasonography for the remainder of the pregnancy. It may be appropriate to induce labour early if there seems to be progressive deterioration of fetal renal function (which remains difficult to assess). The volume of amniotic fluid provides an indirect assessment of fetal renal function.

Measurement of the fetal transverse thoracic diameter provides evidence of impaired renal and pulmonary function.¹¹ The fetal bladder volume can be measured after administration of intravenous frusemide to the mother (frusemide stimulation test).¹²

No action is necessary for a unilateral lesion and a normal contralateral kidney. Pelvicalyceal dilatation may be transient and subsequent postnatal investigations may be entirely normal.¹¹

The natural history of obstruction to the pelviureteric and vesicoureteric junctions is unknown, and investigation showed continuing improvement and regression of abnormal signs in most cases; early operation is only indicated in a few. Careful follow up enables us to justify our conservative policy.

In the series reported by Smith *et al*, 12 of 15 patients (80%) required operations for uropathy within the first year of life.⁶ In that reported by Thon *et al*, 16 of 35 patients (46%) required operations during infancy.⁷ Turnock *et al* reported 20 of 29 patients (69%) who required operations, 14 of them during the first month of life.⁸ Of our 33 patients only 13 (39%) have required operations over a longer period (to a mean age of 25.6 months).

The kidneys start to excrete urine by the tenth week of gestation but fluid balance is primarily regulated by the placenta. Immediately after birth the neonate is comparatively dehydrated because of a reduced intake of fluid and inability to concentrate urine. Lowered perfusion pressure and high vascular resistance result in a low glomerular filtration rate. In the first 12 hours of life the glomerular filtration rate is approximately 15% of the adult, and doubles to 30% by the age of two weeks. The lowered

glomerular filtration rate and comparative dehydration may result in diminished filling of a dilated pelvicalyceal system. Ultrasonography performed within a few hours of birth may therefore fail to confirm the antenatal diagnosis of pelvicalyceal dilatation.¹³ For this reason postnatal ultrasonography should be delayed until the neonate is at least 24 hours of age. As a result of the lowered glomerular filtration rate, intravenous urography and isotope renography performed within a few days of birth are often unsatisfactory and of little diagnostic help.

Antenatal ultrasonography is a good detector of uropathy but is comparatively bad at providing the exact diagnosis of specific lesions. Operation is indicated in only a few of these infants, and appropriate postnatal investigation enables them to be identified. We believe that the infants in this study would not have presented at birth if antenatal ultrasonography had not been performed. Antenatal ultrasonography seems to have been most beneficial to two groups, infants with obstructive lesions who required operations and infants with vesicoureteric reflux. In both groups postnatal renal damage was minimised because the uropathy had been identified by antenatal ultrasonography resulting in appropriate postnatal investigation and management.

We recommend that all cases of infravesical obstruction be discussed with a paediatric urologist when the antenatal diagnosis is made and certainly before delivery. Others should have postnatal scans after the age of 24 hours and should then be referred.

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