Urological diagnosis in utero

The detection of a fetal anatomical abnormality on a maternal ultrasound scan is an increasingly common event—in district hospitals as well as teaching centres. A wide range of congenital abnormalities have now been identified before birth but anomalies of the urinary tract are particularly well visualised and are relatively common (1 in 1000 to 1 in 2000 live births). How might a paediatrician advise an obstetrician colleague after the discovery of an abnormality of the fetal urinary tract and how is the affected infant best managed after delivery?

Prenatal treatment?

Drainage of the obstructed fetal urinary tract can now be accomplished by the insertion of a suprapubic catheter to drain fetal urine from the bladder into the amniotic fluid. The rationale behind prenatal treatment has been considered in a previous annotation.1 Unfortunately, the possible benefits of intrauterine drainage claimed by some workers have not yet been realised in clinical practice. The results published so far2 3 suggest that renal dysplasia and pulmonary hypoplasia are already severe and irreversible by the time the pathology is first detected on ultrasound scanning (usually between 14 and 18 weeks’ gestation). In addition, there is no good evidence that the renal function of surviving infants has been favourably modified by prenatal treatment. Although there may be a case for continuing research in specialised centres, intrauterine drainage cannot yet be applied to clinical practice.

Termination of pregnancy

It is difficult to argue against offering termination of pregnancy whenever bilateral hydronephrosis is found on repeated ultrasound scans before 20 weeks’ gestation. Oligohydramnios may be difficult to assess at this stage, but, when present, is further evidence of a poor prognosis. Fewer than a quarter of fetuses with bilateral hydronephrosis resulting from bladder outlet obstruction will survive with anything approaching normal renal function. Serious congenital abnormalities of the urinary tract are usually sporadic defects and the chances of further children being affected in this way are minimal.

Early delivery

The advantages of early delivery (for example at 32 to 34 weeks’ gestation) remain theoretical and have to be offset against the increased morbidity of premature birth. Furthermore, ultrasound imaging cannot distinguish dilatation which is the result of an obstruction, where there may be a benefit in early drainage, from non-obstructive dilatation (for example vesico-ureteric reflux, mild prune belly syndrome) where surgical intervention may never be required. In the event of premature labour occurring spontaneously after 34 weeks’ gestation it would, however, be reasonable to allow it to proceed.

In utero transfer

While it may be beneficial for a baby with gastro-schisis or diaphragmatic hernia to be born at the centre where emergency surgery will be undertaken, the advantages of in utero transfer for urinary tract abnormalities are less certain. Most patients can be managed safely by instituting antibiotic prophylaxis in the first day of life and by prompt referral to a paediatric urologist or nephrologist. There is a strong case for coordinating the investigation and initial surgical and medical management of these infants in regional centres which offer specialised imaging as part of a paediatric urological and nephrological service.

Investigation

The first priority is to confirm the antenatal diagnosis, to determine whether both kidneys are present, and to assess their size and the degree of any dilatation of the collecting systems. Turnock and Shawis (pages 962–965 of this issue) found that the original antenatal anatomical diagnosis proved to be incorrect in 13 of 32 cases (although in only three infants was the pathology eventually shown to be outside the urinary tract). Ultrasound examination is therefore the first investigation and should be performed within the first day of life. If unequivocal dilatation is found the next step is to proceed to micturating cystourethrography to investigate bladder outlet obstruction or vesico-ureteric reflux as possible causes. In conjunction with this investigation a plain radiograph of the abdomen and spine should be performed to detect any possible coexistent anomalies such as hemivertebrae or sacral agenesis. In most cases these investigations will enable an early anatomical diagnosis to be made.
with a high degree of accuracy. In neonates whose ultrasound scan shows a seemingly normal urinary tract or only minimal dilatation, no further investigation is indicated at this stage. The further management of these patients is considered below.

Imaging, which is dependent on renal function (intravenous urography and isotopes), is frequently unhelpful or frankly misleading during the period of so-called 'transitional nephrology' when both glomerular and tubular function are poor. If possible, therefore, intravenous urography should be deferred until around three or four weeks of age. Intravenous urography may be helpful in identifying duplex systems (which are not always evident on ultrasound and micturating cystourethrography) and should be undertaken as part of the investigation of any renal mass which appears to be solid on ultrasound. Furthermore, most paediatric urologists would still wish to see an intravenous urogram before embarking on renal surgery. The most commonly used isotopes in this age group are Technicium 99 DTPA and Technicium 99 DMSA. Both are handled abnormally by the neonatal kidney and are subject to the same limitations as intravenous urography. Isotope imaging becomes more reliable at around three to four weeks of age and is then very helpful in planning surgical management. Technicium 99 DTPA is excreted into the urine and is used principally to investigate obstruction. Technicium 99 DMSA is conventionally used to locate functioning renal tissue and to quantify the distribution of renal function between the two kidneys.

**Treatment**

A broad scheme of management can be defined.

**Normal ultrasound examination.** In patients in whom the scan performed in the neonatal period does not confirm the antenatal findings no further investigation need be undertaken, but it would be wise to repeat the ultrasound imaging at three months of age.

**Minor dilatation (bilateral or unilateral).** Some of these children will have vesico-ureteric reflux and if current thinking on the aetiology of renal scarring is correct, the greatest risk from infection is within the first year of life. For these reasons I favour a micturating cystogram in such cases. If reflux is found, antibiotic prophylaxis should be begun, but if reflux is not present the ultrasound study should be repeated at three months of age to reassess the dilatation.

**Bilateral upper tract dilatation.** Bladder outlet obstruction is the most likely cause of this. Urinary tract drainage should be established by the passage of a urethral or suprapubic catheter under antibiotic cover. Surgical treatment (for example resection of urethral valve tissue or the formation of a temporary cutaneous vescostomy) will normally be performed in the first week of life. In cases of bilateral upper tract dilatation without bladder outlet obstruction (for example prune belly syndrome, neuropathic bladder, or bilateral primary vesico-ureteric reflux) surgical intervention will not necessarily be required. Vescostomy may, however, be helpful if recurrent infection is a problem.

**Unilateral hydronephrosis.** The optimal management of infants with pelvi-ureteric junction obstruction is still the subject of discussion, but Ransley and Manzoni (in a paper presented at a meeting of the Urological Section of the Royal Society of Medicine, London, May 18, 1984) who have studied 24 infants with antenatally diagnosed pelvi-ureteric obstruction, have recently suggested that a conservative approach is appropriate in up to two thirds of cases. If renal function is good (40% to 50% differential function on isotope scan) even though drainage seems to be impaired, these children can be safely observed and followed with ultrasound and isotope imaging at intervals. Pyeloplasty can be deferred until symptoms supervene or function deteriorates. When unequivocal obstruction is combined with moderate impairment of function (20% to 40% on isotope imaging) pyeloplasty should normally be performed at around one month of age. When function is poor (0% to 20%) a period of percutaneous nephrostomy drainage may allow sufficient recovery to allow pyeloplasty rather than nephrectomy to be performed.

**Multicystic kidney.** Functioning renal tissue is completely absent in this lesion—which may resemble hydronephrosis on ultrasound. Most cases are associated with ureteric atresia and ascending infection is, therefore, unlikely. Hypertension or malignant change in later life are cited as justification for nephrectomy, but these risks are probably minimal. There is no need to remove a multicystic kidney in the neonatal period unless the mass is particularly large or the diagnosis is in doubt. Nephrectomy can be safely deferred until 6 to 12 months of age.

**Unilateral megaureter.** Whether due to vesico-ureteric reflux or obstruction of the vesico-ureteric junction, the initial approach to unilateral mega-
ureter is conservative—continuous antibiotic prophylaxis.

Infection. The experimental and clinical evidence increasingly suggests that most renal scarring occurs as a result of urinary infection in infancy. One of the most important roles of the paediatrician, therefore, is to ensure that infections are detected and treated promptly and that antibiotic prophylaxis is carefully maintained throughout infancy.

Baby of a schoolgirl

In 1981 in England and Wales 5330 babies were born to girls of 16 years of age or less.1 Although some of the consequences of the pregnancy and a few facts about the perinatal period are known, reliable information is scanty or non-existent about most aspects of the infants. The known consequences of the schoolgirl pregnancy are all to the disadvantage of the girls, their infants, their families, and society. Marriage is unlikely to solve many of the problems of the pregnant schoolgirl (and in 1981 only 870 of the babies were born within wedlock) and may actually compound the difficulties.

It is widely believed that adolescent pregnancy leads to increased obstetric risk, increased risk of prematurity, and increased risk of perinatal mortality and morbidity. It has also been held that child abuse and neglect are frequent as a result of adolescent childbearing. Until recently, studies looking at the babies of adolescent mothers frequently ignored socioeconomic status and access to medical care and, therefore, the importance of biological versus social factors was unclear.

Pregnancy

Social deprivation is clearly associated with unwanted pregnancy in the teenage mother and this together with physical and psychological immaturity are thought to lead to the poor reproductive performance. The only definite complication associated with age rather than social disadvantage is pregnancy associated hypertension and the incidence of this is higher in school age mothers than in older teenagers. Duenhoelter et al reported that 34% of schoolgirl mothers develop pregnancy associated hypertension, whereas the incidence in a matched older group of women is 25% (P<0.01).

Other obstetric problems are uncommon and out of concern for the mother, obstetricians are reluctant to intervene in pregnancy except in the case of severe pregnancy associated hypertension. This means that in many more adolescent mothers, the pregnancy is prolonged beyond term.

Neonatal period

The perinatal mortality rate in the babies of schoolgirls is two to three times higher than in the babies of mothers 20 to 30 years of age.4,6 The differences in neonatal mortality result primarily from the excess of low birthweight infants with problems of prematurity born to young mothers because of pregnancy associated hypertension. Low birthweight babies are two to six times as common in adolescent mothers4,6 but the weight specific perinatal mortality rates are not increased.5 Lawrence and Merritt6 suggest that 85% of these low birthweight infants are preterm and 15% small for gestational age, and that the reduction in birthweight is strongly associated with low socioeconomic class, smoking, alcohol, drugs, and inadequate prenatal care. The overall incidence of infants with lethal congenital malformations seems to be low, however, meningomyelocele and hydrocephalus are increased.7 The question of whether the high, low birthweight rate is due in any way to a biological disadvantage (that is, the mothers being biologically immature and unable to carry their babies to term) or solely due to the lack of prenatal care, is still not satisfactorily answered. There is general agreement that schoolgirls who become pregnant are largely a socially disadvantaged group, more likely to smoke, drink, and get genital infections, and in urban United States to take hard drugs. They also avoid routine
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