Figure 8 (A) IVU at 6 weeks showing structurally normal, large kidneys (+2 SD scores). (B) bilateral VUR on MCU aged 1-3 years. (C) DMSA study 1-4 years showing reduced left renal image. (D) IVU 1-5 years showing small scarred left kidney (-2 SD scores), normal right kidney. (Renal ultrasonography normal: enlarged kidneys on IVU overlooked at 6 weeks.)

Figure 9 (A) DMSA study aged 9-0 years showing diffuse and focal defects in the left upper pole diagnosed as scarring in boy with bilateral VUR; left 47%, right 53%. (B) IVU showing normal left and duplex right kidney with dilated right ureters. (C) DMSA study aged 11-0 years normal; left 46%, right 54%. (DMSA study: left upper pole scars diagnosed at 9 years: right kidney considered normal.)

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Commentary (1)

These two papers illustrate several of the problems that remain unresolved in the management of childhood UTI. The authors have used their cases to illustrate the limitations of ultrasonography, which can only be regarded as a basic screening test. Ultrasonography is valuable in demonstrating the presence of two kidneys, excluding obstruction, demonstrating urinary tract dilatation and postmicturition voiding residue. These are all important factors that affect management. In addition, kidney length and volume can be measured relatively easily in the majority of children. Kidney size should be expressed in absolute values and in terms of SD scores or centiles using standard reference data.1 Kidneys can be enlarged during, and for a few weeks after, acute infection, so that comments on the report about the date of the last infection, whether or not the urine was sterile at the time of the examination, and the use of prophylaxis are helpful. The degree of dilatation of the collecting system seen on ultrasonography depends to some extent on the fullness of the bladder and how this relates to the normal for age. It has been suggested that in the presence of an overfilled bladder upper tract dilatation is seen not infrequently in children with ‘normal urinary tracts’. The diameter of the collecting system and upper ureter should also be measured. In infants, the 97th centile is approximately 5 mm, and in older children it is 8 mm. At the end of the examination, the child should be sent to the toilet and the bladder rescanned to look for postmicturition residual urine. In order to pick up all this information, it is essential to have a routine for ultrasound examination and reporting in children, which can permit a thorough and systematic evaluation of the complete urinary tract under optimum conditions. As with much of paediatric practice, this should start with a full explanation by the clinician, and instructions to come with a full bladder. Flexible arrangements within the radiology department, and
staff familiar with children's needs are essential so that a child who is bursting to go to the toilet is not kept waiting for an unreasonable length of time, and another drink can be given if the child has already passed urine. In some instances, a familiarisation visit to the department is helpful, and occasionally the examination may be more satisfactory if the child has been sedated. The report should reflect the full extent of the examination that has been carried out, with appropriate measurements and descriptive comments. Only when a detailed report has been compiled to paper can the clinician be confident that the maximum information has been obtained from this examination, and the report then forms a valuable record for future reference. The report of 'examination normal' has often concealed an incomplete examination.

Perhaps the biggest problem with ultrasonography is the temptation to think that a normal examination can exclude renal scarring and VUR. These studies by Smellie, Rigden, and Frescod, as with others before them, have clearly shown that ultrasonography is an insensitive test for these two abnormalities. Much of the early work on UTI focused on the presence of renal scarring on IVU, particularly in the presence of reflux, as detected by MCU. The association between renal scarring, infection, and VUR in these studies is not in doubt. Although there is good circumstantial evidence to suggest that scarring is less likely to develop or progress if infection is minimised by the use of prophylactic antibiotics and/or reflux is corrected by surgery, effective prevention of scarring has never been demonstrated in a controlled trial. In the Cardiff-Oxford bacteriuria survey the control group did not develop any more scarring than the treatment group. There have been two large controlled studies comparing medical with surgical treatment and no differences were found.

Neither of these trials showed any evidence that one treatment was superior to the other. Questions that are often asked by doctors and patients concern whether invasive tests, in particular MCU, are really necessary. Clearly, no direct therapeutic benefit is derived from the test itself, which is difficult to do and is often emotionally traumatic. It also carries a small risk of introducing infection, even when prophylactic antibiotic cover is used, and involves ionising radiation. It would be justified if there was clear cut evidence from controlled studies that short courses of antibiotic treatment were less effective than prophylactic antibiotics or surgery in preventing renal scarring. Unfortunately there are no controlled studies comparing long term low dose prophylaxis with short course treatment for the prevention of scarring.

However thoroughly the urinary tract is investigated, scarred renal tissue will not be restored to normal. The value of MCU is to identify VUR in order that advice can be given and management planned to minimise the risk of renal scarring due to persistent reflux and intercurrent infection. In the absence of controlled studies to demonstrate that either prophylaxis or antireflux procedures are superior to early diagnosis of intercurrent infection and short courses of appropriate treatment, it is difficult to persuade doctors and parents that these tests are really necessary. UTI is common, but the number of children with renal scarring is much less. The number of children developing renal failure due to reflux nephropathy is very small in comparison, making it difficult for general practitioners and parents to grasp the potential dangers. For these reasons, their enthusiasm for invasive tests, operations, and long term management is less than that of the kidney specialists who regularly see sick children with severe scarring, hypertension, and renal failure. Clearly there is a need for appropriate controlled studies, conducted in the context of the 1990 standards of primary and secondary care, to establish the therapeutic value of the treatments that are recommended for reflux and prevention of infection.

The Royal College of Physicians held a workshop to draw up guidelines for the management of urinary tract infection in childhood, which made recommendations for the diagnosis, management, and investigation of urinary tract infection. In a recent audit of primary care in Wales, it was clear that the minimum recommendations for the diagnosis of UTI were used by only 20% of general practitioners and only 2% of general practitioners were familiar with the recommendation to start prophylactic antibiotics immediately after the first infection, while awaiting investigation (J Wilkinson, unpublished data). Children and infants were often not referred for further advice until they had experienced several episodes of infection. It is likely that the greatest potential for prevention of renal scarring is in early detection and better management of UTI in infants in primary care.

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