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Editorial comment

The DMSA scan and intravenous urography in the detection of renal scarring

Jean M. Smellie

University College Hospital (Guy's Hospital and the Hospital for Sick Children, Great Ormond Street), London WC1E 6AU, UK

Reflux nephropathy has been defined in a number of ways but the term is mainly used to describe the renal changes seen in patients with vesico-ureteric reflux (VUR). Goldraich and her colleagues have sought, through their extensive experience, to redefine reflux nephropathy in terms of the DMSA scan in children with VUR and urinary tract infection. Ransley and Risdon [1] have demonstrated experimentally in the piglet the development of renal scars and that the inflammatory renal changes following infection of the refluxing urinary tract can be arrested or reversed by early antibacterial therapy before scarring develops. This perhaps explains the defects in DMSA uptake reported during acute urinary tract infection which can later disappear [2, 3] (Figs. 1, 2a).

Renal scarring, on the other hand, is permanent and irreversible. It is a serious diagnosis, carrying with it risks of future hypertension or renal insufficiency and therefore affecting the management and prognosis of the child in whom it is made. When nephrectomy was more commonly carried out, the macroscopic appearance of the coarsely scarred kidney was shown to match very exactly the appearances on intravenous urography (IVU). The time taken for such scarring to develop in the human is not known and reports depend upon the time interval between successive IVUs. The IVU during acute infection, however, will often show local swelling and a poor nephrogram.

Concern about irradiation, possible reaction to older contrast media (mostly confined to the elderly) and the difficulty of defining the renal outline in infancy without tomography, led to a search for alternative methods of diagnosis. A close correlation was found between defects of isotope uptake on the DMSA scan and radiological renal scarring [3], and this was confirmed by others [4–7]. The differential renal function which the DMSA will also calculate will be unequal if unilateral scarring is present, though a duplex kidney can cause confusion.

The DMSA changes, however, are non-specific and are possibly due to vascular changes which could result from local inflammation or scarring. Furthermore, scars may be seen on IVU without obvious change on the DMSA scan (Fig. 2b) and extensive scarring may be seen on the DMSA scan as a smoothly reduced image [6, 7]. In the absence of other information it would, therefore, be preferable to use descriptive terms rather than to ascribe pathology to the DMSA appearances.

DMSA techniques are not as yet widely standardised and variables such as the timing of the scan after injection, the collimator and scan intensity will all reduce the comparability of serial observations. Renal growth cannot be assessed, but steady proportionate renal function over a period can be helpful. A final disadvantage of the DMSA scan to a young family is the inconvenience of a study prolonged over 4–6 h.

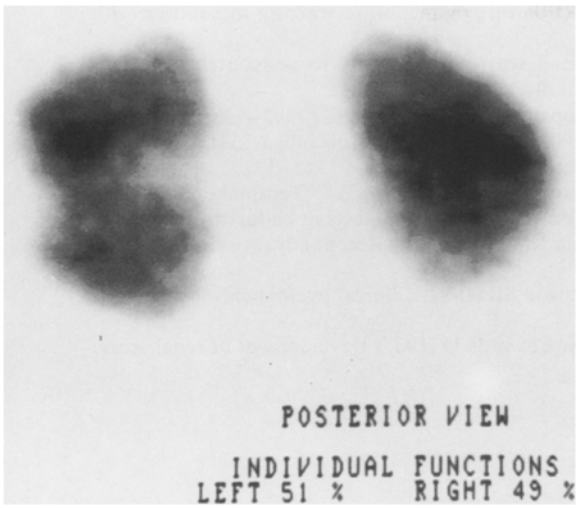

Fig. 1. DMSA scan in a 2-year-old girl during acute febrile urinary tract infection

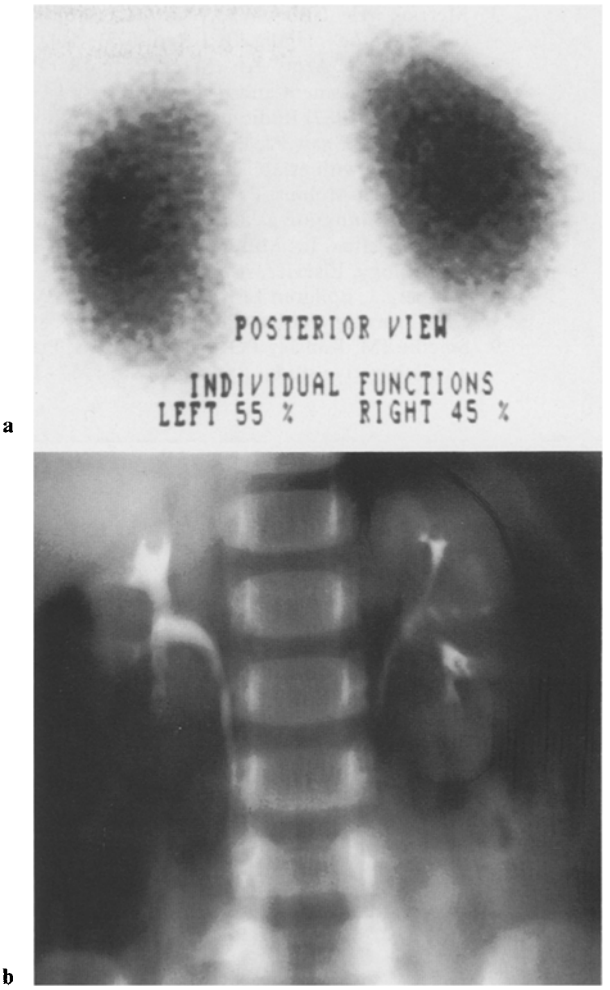

Fig. 2. One year later: **a** DMSA scan showing resolution of defects in DMSA uptake; **b** intravenous urography (tomogram) showing small left mid-zone scar

In summary, the DMSA scan and the IVU are complementary investigations in the diagnosis of renal scarring, the first providing functional and the second morphological information. A suspicion of scarring on either requires further investigation. Clinical and experimental studies of acquired renal scars suggest that the early identification of urinary tract infection and the rapid start of effective antibacterial treatment is the best method of reducing preventable renal scarring [1, 8, 9]. As Goldraich and others have pointed out, the greatest value of the DMSA scan may prove to be in identifying those children with infective renal involvement who need intensive therapy, further investigation and continued follow-up [5, 6].

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