

Qualitative and quantitative evaluation of renal parenchymal damage by ^{99m}Tc -DMSA planar and SPECT scintigraphy

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The initial ^{99m}Tc -DMSA studies carried out over a four year period in 229 patients with various heterogenic causes of lower urinary tract abnormalities were reviewed. Anatomical damage to the renal parenchyma was graded by means of planar and SPECT studies into a six group classification proposed by Monsour et al.: grade 0 (normal), I (equivocal), II (single defect), III (more than 2 defects), IV (contracted or small) and V (no visualization). Parenchymal uptake of ^{99m}Tc -DMSA was quantitated from planar images at 2 hours postinjection by a computer assisted gamma camera method. SPECT studies could enhance the pick-up rate for parenchymal uptake defects by a factor of 1.5 in comparison with planar imaging. The incidence of anatomical damage to the renal parenchyma increased with a high radiological grade for VUR, and renal uptake per injection dose of ^{99m}Tc -DMSA by the individual kidney significantly decreased in grades III and IV of the anatomical classification.

These data revealed that ^{99m}Tc -DMSA planar is still useful for evaluating gross structural damage and for quantitative evaluation of the kidney with computer assistance. SPECT scintigraphy is more effective in disclosing anatomical damage to the renal parenchyma than planar, although it needs further discussion as to whether SPECT may increase sensitivity with minimal or no adverse affect on specificity.

Key words: ^{99m}Tc -dimercaptosuccinic acid (DMSA), scintigraphy, planar and SPECT, vesicoureteral reflux, upper urinary tract infection, renal scar