Unusual diffuse $^{131}$I-MIBG accumulation in a kidney with renal artery stenosis

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Renal history

A 16-year-old woman was admitted for evaluation of hypertension. A CAT-scan study showed an abnormal area in the upper pole of the right kidney or right suprarenal region. Technetium-99m mercaptoacetyltriglycerine (Tc-99m MAG3) renogram was then performed. The right kidney showed no abnormalities, but in the entire left kidney there was a diffuse decrease of radiotracer perfusion and uptake, which was considered highly suggestive of left renal artery stenosis (Fig. 1). $^{131}$-Iodine metaiodobenzylguanidine ($^{131}$I-MIBG) scan was also performed because of clinical and radiographic suspicion of a pheochromocytoma in the right suprarenal region. The MIBG scan revealed abnormal tracer accumulation homogeneously distributed in the whole left kidney at 48 and 96 h but no abnormalities in the right renal or suprarenal area (Fig. 2). On the basis of Tc-99m MAG3 and $^{131}$I-MIBG findings, this patient underwent selective angiography which confirmed an 80% stenosis of the lumen of the left renal artery.

Discussion

MIBG is a radiopharmaceutical that is avidly taken up by the sympato–adrenal tissue. It is safe and effective in the location of pheochromocytomas and neuroblastomas, and has had only limited success in other tumour types [1,2]. In our patient, the topographic appearance of the MIBG accumulation corresponded exactly to the entire left kidney, as defined by diffuse homogeneously decreased MAG3 perfusion and uptake. Horne et al. supposed this accumulation to imply an increased sympathetic innervation or activity in severe renal artery stenosis [3].

A false-positive MIBG scan is very rare [1,4]. Misleading focal $^{131}$I-MIBG accumulation in the renal area has been reported in the presence of a dilated renal pelvis [5,6] and acute pyelonephritis [7]. To our knowledge, only two false-positive results due to unilateral renal artery stenosis have been reported but in both the topographic location of $^{131}$I-MIBG accumulation was focal and imprecise [2,3]. In contrast, $^{131}$I-MIBG was diffusely and homogeneously concentrated throughout the left kidney of our patient. $^{131}$I-MIBG is largely (90%) excreted unchanged in the urine over the 4 days after intravenous administration. Free radioactive iodide is eliminated primarily in the urine. In our patient, the left kidney had diminished and delayed excretion (as shown in Fig. 1). $^{131}$I-MIBG scanning at 48 h post-injection allowed for visualization of both the entire left kidney and the bladder (images not shown); however, the kidney, but not the bladder, was clearly observed on the 96-h images (as shown in Fig. 2). We believe that delayed, physiological urinary excretion of either $^{131}$I-MIBG or free radioiodide cannot fully explain our findings, since it should have been associated with simultaneous visualization of the bladder. Retention of free radioiodide in the urinary tract has been associated with a renal cyst [8], bilateral polycystic renal disease [9], a dilated calyx [10], an either extrarenal or voluminous pelvis [10]. Such entities are easily detected by radiological studies. In cases of unexplained diffuse $^{131}$I-MIBG uptake in an entire kidney, stenosis of its artery should be kept in mind and excluded by further studies.

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Fig. 1. A Tc-99m-MAG3 scan (76 MBq) showing normal perfusion, uptake and excretion of the radiotracer by the right kidney and suspected pheochromocytoma: experience in 400 cases. J Nucl Med 1985; 26: 576–585


References

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Fig. 2. Posterior scan performed 96 h post-injection of 11.1 MBq of $[^{131}]$MIBG, showing high relative concentration of MIBG homogenously distributed in the whole left kidney. No focal or collecting system accumulation of MIBG is seen. Activity in urinary bladder was absent.