The Monitoring of Renal Dysfunction in Renal Emphysema by Dual Radiopharmaceutical Scintiscanning

Tapan K. Chaudhuri, R. Venkatesan, and J. V. Bobbitt
Veterans Administration Center and Eastern Virginia Medical School
Hampton, Virginia

Followup renal scintiscans using two radiopharmaceuticals were performed in a patient with renal emphysema. This allowed us to more accurately determine whether the emphysematous pyelonephritis was responding to antibiotic therapy or whether surgical intervention was indicated. Both Ga-67 citrate and a cortical agent (Tc-99m dimethylsuccinate) were used. A reciprocal relationship in the renal uptake of these two agents indicates the response of therapy and the degree of improvement of renal cortical function.


Renal emphysema (1–9) (gas in the renal substance) may result from gas-producing infections of the urinary tract; it is usually a rare manifestation of ordinary aerobic pathogens such as Escherichia coli. Bacterial generation of gas occurs more commonly in the severely diabetic patient, which promotes speculation that hyperglycemia may furnish a special situation in which excess glucose in the tissues may be fermented by the bacteria. A literature review revealed no previous report on the value of scintiscan monitoring of renal dysfunction in renal emphysema. The purpose of this paper is to report such an example.

CASE REPORT

A 51-year-old black man with known diabetes was referred to this hospital for exacerbation of E. coli infection of the urinary tract, with right renal emphysema. An i.v. pyelogram (Fig. 1) revealed markedly decreased function in the right kidney with evidence of renal emphysema, which was confirmed by nephrotomogram (Fig. 2). The patient was treated with multiple antibiotics. Urinalysis showed 1+ glycosuria, no protein, and 60–80 white blood cells per

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For reprints contact: T. K. Chaudhuri, Nuclear Medicine Service, V. A. Hospital, Hampton, VA 23667.
DISCUSSION

Renal emphysema is an unusual condition in which there is gas within the renal parenchyma, or sometimes within the pyelocaliceal collection system. Most of the cases are associated with diabetes mellitus. E. coli is usually the offending organism, although other coliforms have occasionally been found (1,2). Most coliform organisms are capable of metabolizing glucose to acid and carbon dioxide, and the elevated blood sugar and urinary sugar concentrations in diabetes may contribute to the causes of this emphysema (3). This is in contrast to the gas-producing infections where Clostridia are the usual causative organisms.

Pathologically, the involved kidney features a necrotizing pyelonephritis with multiple abscesses of the cortex and medulla. The sequential dual-radiouclide studies used here provide information as to the extent of damage to renal cortical function and monitor the progress of healing resulting from therapy. The initial therapy of emphysematous pyelonephritis is usually medical, but if unsuccessful, nephrectomy becomes necessary (9). Our patient apparently responded well to antibiotic therapy.

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