Excretion Urography in Acute Oliguric Renal Failure

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Intravenous excretion urography (IVU) is of established value in the management of patients with acute oliguric renal failure:

1. to define or exclude extrarenal obstruction

2. to show the size and shape of the kidneys (Brown et al, 1970).

The IVU can also be used to diagnose the nature of the underlying parenchymal disease in oliguric or anuric patients in whom there is no extrarenal obstruction. This is based on the study of the manner in which the renal substance opacifies with contrast medium (the nephrogram).

The normal nephrogram (Figures 1, 2a, 2b) is produced by contrast medium in the renal tubules. The density will depend on renal perfusion, glomerular filtration and concentration in the tubules. The development of the nephrogram can, therefore, be expected to vary with the different types of parenchymal damage.

The present findings are based on the IVU in twenty oliguric or anuric patients in whom extrarenal obstruction had been excluded. All had high dose urography with tomography. No ill effects were observed.

ACUTE OLIGURIC RENAL FAILURE

In clinical acute tubular necrosis (Figure 3) there is an immediate and persistent dense nephrogram (Figures 4a and 4b) as predicted by the animal work of Chamberlain and Sherwood (1967).

ACUTE OLIGURIC PYELONEPHRITIS

Two patients were studied. The nephrographic profile was found to be identical to that in acute tubular necrosis.

CHRONIC GLOMERULAR DISEASE

Eight patients have been studied. There may be no nephrogram, but a pyelo-
1. THE DENSITY VARIES WITH BLOOD LEVEL
2. NEPHROGRAM SEEN IMMEDIATELY
3. DENSITY MAXIMAL AT END OF INJECTION
4. DENSITY FADES RAPIDLY
5. NEPHROGRAM RAPIDLY FOLLOWED BY PYELOGRAM

**Figure 1.** Normal nephrogram profile

**Figure 2.** Normal nephrogram and pyelogram during high dose urography (sodium diatrizoate 45%, 2.2 ml/kg)
(a) immediately after injection; (b) after 10 minutes
(7 Patients)
The nephrogram:
1. Is definite and often as dense as normal for dose.
2. Appears immediately
3. Is maximal at the end of injection.
4. Persists unchanged for many hours or days.
5. Is accompanied by little or no pyelogram.

Figure 3. Nephrogram profile in acute tubular necrosis

Figure 4. Nephrogram appearances (a) immediately after injection; (b) 24 hours later in a patient with proven acute tubular necrosis
(8 Patients)
There may be no nephrogram, but a pyelogram is usually seen.
If present, the nephrogram:

1. Is faint
2. Appears immediately
3. Is maximal at the end of injection
4. Persists unchanged for many hours
5. Is frequently associated with a definite pyelogram

Figure 5. Nephrogram profile in chronic glomerular disease

gram is usually seen. The characteristics of the nephrogram, if seen, are detailed in Figure 5.

ACUTE GLOMERULAR DISEASE

Two patients have been studied, one (by Dr H M Saxton) had acute oliguric glomerulonephritis, and the other microscopic polyarteritis. The characteristics of the nephrogram are detailed in Figure 6, and demonstrated in Figures 7a and 7b.

COMMENT

Early diagnosis of the nature of the renal lesion in acute non-obstructive oliguric renal failure is of immense value in planning therapy. Currently available diagnostic criteria are unsatisfactory. Our findings with high dose excretion urography indicate that:

1. different types of parenchymal damage produce different nephrographic patterns
2. the pattern in acute tubular necrosis is distinctive and different from that in acute or chronic glomerular disease
3. the only other condition in which we have observed this pattern is acute oliguric pyelonephritis.

CONCLUSION

Excretion urography would seem to be the most effective method yet available for early diagnosis of the renal lesion in acute oliguric renal failure.

REFERENCES

One acute glomerulonephritis (Dr. Sexton's patient)

One polyarteritis nodosa (microscopic form)

In these patients the nephrogram

1. Became as dense as normal for this dose.
2. Developed slowly.
3. Was maximal at 24 hours.
4. Was accompanied by little or no pyelogram.

Figure 7. Nephrogram appearances in acute glomerular disease
(a) 6 hours after injection; (b) 24 hours after injection.

Figure 8. Nephrogram profile in acute glomerular disease.