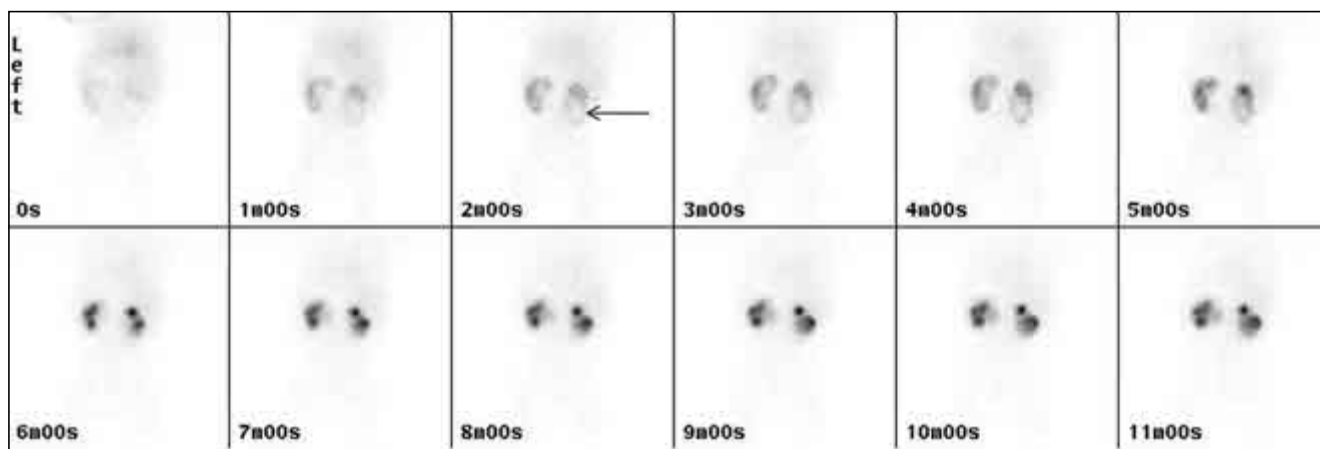


## IMAGING GAMUT

### The 'signet ring' sign on $^{99m}\text{Tc}$ -MAG3 renal scan

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**Figure 1**  $^{99m}\text{Tc}$ -MAG3 dynamic renography regrouped images. In the early phase of the dynamic renography, there is a photopenic area in the lower portion of the right kidney, surrounded by a rim of uptake, as shown at 2 minutes (arrow). On the following frames, this area fills with tracer, but the tracer seems to predominantly concentrate laterally, suggesting that the renal pelvis may face the right anterolateral abdominal wall. The photon-deficient nature of the lower portion of the right kidney is likely to be due to the position of the lower portion of the right kidney further away from the gamma camera compared to the upper portion; the dilated renal pelvis with non-radiolabelled urine within it (as expected in the early phase of the renogram) contributed further to the photon attenuation

**Key words:** Duplex renal system, reflux, paediatric,  $^{99m}\text{Tc}$ -MAG3

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**Background** Ultrasonographic evaluation of the renal tract in a 2-year-old boy revealed bilateral duplex renal systems, a left ureterocele and left hydronephrosis. The patient was previously diagnosed with a left hydroureter on a routine antenatal anomaly ultrasound scan.

**Procedure** The patient was referred to the nuclear medicine department for scintigraphic evaluation of renal function and excretion at



**Figure 2** Ultrasound showing the renal hilum (arrow) closest to the probe on anterolateral images. There is dilatation of the right renal pelvis



**Figure 3**  $^{99m}\text{Tc}$ -MAG3 dynamic renography early parenchymal phase of the study. This shows a photopenic area surrounded by uptake in the lower portion of the right kidney, with good tracer uptake in the upper pole (arrow). These findings were later confirmed to represent a malrotated kidney with hydronephrosis

the age of 1 and 6 months. Dynamic renal scintigraphy was performed after intravenous injection of  $^{99m}\text{Tc}$ -mercapto acetyltriglycine ( $^{99m}\text{Tc}$ -MAG3) and the study processed to generate summed images and renogram curves for the right and the left kidneys.

**Findings** The composite summed image of the dynamic study showed a photon-deficient area at the lower pole of the right kidney. The first impression looking at this scan raised the possibility that the features might represent a duplex right kidney, with a better functioning upper moiety and a lower moiety with reduced function and hydronephrosis (Figure 1). Of note was the circumferential configuration of uptake on all sides of the photopenic area. An ultrasound performed on the same day as the  $^{99m}\text{Tc}$ -MAG3 was reviewed. It was deduced that the photopenic area was in fact due to the dilated renal pelvis being "seen" *en face* due to kidney malrotation (Figure 2).

**Comments** We have quite frequently noticed the appearances described above in our clinical practice; another patient with a malrotated right kidney with hydronephrosis is displayed for comparison (Figure 3). We refer to the  $^{99m}\text{Tc}$ -MAG3 image of a malrotated kidney with an associated hydronephrosis as the "signet ring" sign.