LOCATING THE KIDNEY FOR RENAL BIOPSY

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Since Kark and Muehreke (1954) described their method of renal biopsy, the use of surface markings derived from a previous intravenous pyelogram (IVP) or straight X-ray of the renal tract has become the most widely used method of locating the kidney. An exploring needle is usually employed to confirm the position of the kidney. There are several inherent faults in this method which make any estimate of the kidney site inaccurate. We have estimated some of the errors by taking pyelograms with a measuring grid over the renal area (Douglas et al., 1965).

Parallax error

Straight radiographs of renal tract and IVP's are usually taken with the tube centred on the spine. The use of any such radiograph to measure the distance of the kidney from the midline results in an overestimate. This error was estimated in 11 patients and averaged 1.3 cm. Since it is common practice to select a biopsy site 1 to 2 cm from the lateral margin of the kidney, this small error may be important.

Movement of the kidney with change of position

Kark and Muehreke (1954) recommended the use of IVP's taken in the prone position. This precaution is often ignored. In 8 patients we estimated the change in position of the kidney when the patient moved from the supine position normally employed in pyelography to the prone position with the abdomen supported that is used for renal biopsy. Both kidneys moved upwards by an average of 2.6 cm (range 0.6 to 5.9 cm) when the prone position was assumed.

Even if the original IVP is taken in the prone position some movement of the kidney undoubtedly takes place when the abdomen is subsequently supported by a sandbag; as the sandbag is radio-opaque we have not been able to estimate this movement.

Movement of the kidney with respiration

The variation in position of the kidney with respiration was studied in 50 patients. The right kidney moved an average of 3.5 cm and the left an average of 2.8 cm between full inspiration and full expiration. Unfortunately these figures cannot be used to guess the position of the kidney during respiration since the variation in extent of respiratory movement is wide (0.8 to 6.5 cm). Some patients find difficulty in inspiring or expiring fully under the stress of pyelography or biopsy. For accurate location of the kidney it is therefore essential that the operator uses the same phase of respiration as the radiographer and it is desirable that he should watch the films being taken to ensure that the patient is breathing consistently.
Difficulty in surface-marking bony landmarks

If the estimated position of the usual bony landmarks (12th rib, iliac crest, lumbar spines) is indicated by a metal marker and a film is then taken with X-ray tube vertically over the marker, a surprising discrepancy is often revealed. This is particularly true in obese and oedematous individuals.

Movement of the exploratory needle

Probing with an ‘atraumatic’ exploring needle may compensate for poor surface marking, but it is not infallible. Respiratory movement very similar to that imparted by the kidney can be seen when the needle is in liver, spleen or perinephric fat. Moreover the use of an exploring needle may produce a perinephric haematoma before the biopsy needle is introduced; with the Menghini technique this sometimes results in the needle being blocked by blood clot.

Suggested method for locating the kidney

Most of these errors can be eliminated by using pyelograms taken immediately before biopsy with the patient in the prone position supported by a radiolucent pad (pillow or plastic sponge) under the abdomen. The tube is centred on a wire grid* placed over the expected position of the kidney and films are taken in full inspiration and expiration under the supervision of the physician performing the biopsy (Fig. 1). The position of the grid is then marked on the skin with brilliant green or ball-point pen and the biopsy needle is inserted vertically downwards through a selected grid square in the correct phase of respiration.

Fig. 1. IVP taken with grid over renal area

*Obtainable from Charles Thackray, Park Str., Leeds, U.K.
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We have used this technique in more than 300 of the last 500 biopsies performed in Newcastle and have now abandoned the use of an exploratory needle to confirm the radiographs. In a radiology department equipped for minor surgical procedures it adds only 10 minutes to the length of procedure—less if several biopsies are performed at the same session. The minutiae of the technique are described elsewhere (Douglas and Kerr, 1965).

Blind biopsy in uraemic subjects

When pyelography is impossible because of uraemia we have seldom found that straight films give sufficient detail in the prone position for the use of a measuring grid. The kidney must then be located as far as possible from bony landmarks. We have studied 50 pyelograms taken with a grid in place to find the most suitable spot for blind biopsy. In all 50 patients the junction of the outer and middle thirds of a line joining the tip of the last palpable rib to the midline overlay some part of the kidney, in full inspiration. However, since the kidneys of patients unable to produce a pyelogram are likely to be small on average, an exploring needle should certainly be employed to confirm this “guesstimate” of renal position.

REFERENCES