Chapter 8

Urinary Tract Abnormalities

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1 Investigation of the Urinary Tract

Ultrasonography in this area consists of examination of the kidneys, the ureters, and the bladder. It is not necessary to sedate the child, a bottle given during the examination will calm the child sufficiently. A 5 Mhz transducer is used and occasionally a 3.5 Mhz transducer in the older child. The examination is started in a supine position to reassure the child.

The right kidney is first examined in a supine position via the hepatic window. Its upper pole is always visible on longitudinal and transverse sections, whereas its lower pole is often obscured by intestinal gas. The child is then placed in a prone position with, if necessary, a cushion under the abdomen to lessen the lumbar lordosis. One can then undertake transverse and sagittal sections of both kidneys. The ureteropelvic junction is studied on longitudinal sections with internal angulation of the transducer. Sections in right and left decubitus lateral positions are then carried out specifically in the search for an ureteral dilatation.

For the bladder, longitudinal and transverse sections are indispensable not only to measure the shape and size, but also to judge the appearance of the lower ureters and the ureterovesical junction. In the very young child who normally has a diminished bladder capacity, numerous spontaneous mictions take place during the examination. To obtain a sufficiently full bladder, furosemide 0.5–1 mg/kg per os may be administered. In this way sufficient filling of the bladder is achieved without diagnostic difficulties due to water-filled intestinal loops. However, the furosemide provokes a slight dilatation of the upper urinary tract which should not be considered pathological. After the examination, one must make sure that the child is sufficiently hydrated.

2 The Normal Kidney

The frontal or bivalve section of the kidney corresponds with an anatomical section of the kidney and is very similar to the image seen on IV urography. One identifies the typical “bean shape” with an internal hilus as well as the pelvis and the initial part of the ureter (Fig. 1). Transverse sections have a variable appearance depending on the level and corresponding with either the polar or the hilar region (Figs. 2 and 3). In the newborn, the renal outline has an irregularly rounded appearance corresponding with fetal lobulations (Fig. 4).

Fig. 1. Normal kidney, “bivalve” section: the pelvis (B) is very narrow, extended medially and below by the ureter (U).
Ultrasonography gives an immediate and real measurement of the kidneys, although it is difficult to carry out precise measurements. In fact, the length remains difficult to determine as the section must pass through the longest axis.

The renal structure can be divided into a parenchymal region with little echogenicity and a central zone with increased echogenicity which is made up of the pelvis, the blood vessels, and fat. (Fig. 55):

1. At the level of the echogenic region called the central zone or central pyelovascular region, the pelvis is identified as an oval liquid pouch with a vertical long axis that varies in size depending on the degree of the patient’s diuresis. In the very young child, the pelvis is often extrahilar and globular. One may mistake this for early hydronephrosis (Fig. 27). An excess of sinusoidal fat may render this central region very echogenic (Fig. 6).

**Fig. 2a–c.** Transverse section of a left normal kidney in a prone position.
- **a** Upper pole, partly obscured at its outer edge by the shadow of a rib.
- **b** Middle portion with the pelvis (arrow).
- **c** Inferior pole.