13.1 Introduction

In many European countries, obstetric ultrasound (US) is performed routinely during normal pregnancies. (In Belgium, three sonographic examinations are performed, one in each trimester.) This leads to the discovery of many fetal anomalies, and among them, uropathies represent one of the largest groups amenable to neonatal management. Furthermore, dramatic changes have occurred in this management since nowadays the uropathies are detected in mostly asymptomatic patients, and the treatment is mainly preventive. Also, antenatal detection and postnatal follow-up have yielded new data on the natural history of many pathologies (Levi et al. 1991; Thomas 1990; Scott and Renwick 1999; Rosendahl 1990; Livera et al. 1989; Preston and Lebowitz 1989).

13.2 Normal Sonographic Appearance of the Fetal Urinary Tract

Urine production starts during the 9th week of fetal life. The first US landmark of the normally functioning urinary tract is the bladder, which is visualized as a cystic structure in the fetal pelvis around the 11th week (Fig. 13.1a, Fig. 13.2). The kidneys themselves are visible as oval echogenic structures in the two lumbar areas around 13th week (Fig. 13.2b). During the rest of the pregnancy, their aspect will change and their size will increase progressively (Rosati and Guariglia 1996; Zalel 2002). The size measured during an examination can be plotted against the nomograms of renal growth (Cohen et al. 1991; Scott et al. 1995; Chitty and Altman...
The echogenicity of the kidneys decreases with time and simultaneously the corticomedullary differentiation appears. The final sonographic appearance is demonstrated around the 26th week (Fig. 13.3). The fetal bladder fills and empties continuously, and this can be monitored during the US examinations (Chamberlain et al. 1984). These cycles become slower during the third trimester, particularly in female fetuses. Under normal conditions, the fetal ureters are not visible.

Besides the visualization of a normal-appearing urinary tract, other indirect evidence of a normally functioning urinary tract is a normal amount of amniotic fluid (two-thirds of which is produced

**Fig. 13.1a–b.** Normal urinary tract first trimester. A Fetal bladder 12 weeks’ gestation. Mid-sagittal scan of the fetus. A small bladder (arrow) is visible. B Fetal kidney 12 weeks’ gestation. Latero-sagittal scan of the fetus; the kidney appears as an ovoid echogenic mass (arrows)

**Fig. 13.2.** Fetal bladder at 18 weeks after the last menstrual period (LMP). Transverse scan of fetal pelvis. The bladder (B) appears as a cystic structure limited by the two umbilical arteries (arrowheads)

**Fig. 13.3a,b.** Normal kidney third trimester. A Sagittal scan of the left kidney; limited by the “+.” It displays a normal cortico-medullary differentiation. The arrow points to the stomach. B Transverse scan of the fetal abdomen (the fetus is prone). Both kidneys (K) are visualized on each side of a vertebra (arrow)