Renal Ultrasonography Lesson

Errors in ultrasonographic measurements of the kidney

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During each sonographic examination the following measurements should be obtained: maximal length and parenchymal border width—this measurement should be done in longitudinal section. Also the comparison of both parameters between the right and the left kidney should be carried out and if possible a comparison with previous measurements, should be made.

**Longitudinal measurement**

The maximal longitudinal axes should be evaluated from the ventral side according to the longitudinal axes of the kidney (Figure 1a and 1b). It is imperative to make several measurements.

Usually the right kidney is smaller than the left kidney. The difference between the two sides should be within 15 mm if the right kidney is the smaller kidney, and 10 mm if the left kidney is the smaller kidney.

**Parenchymal width**

This must be measured at the point of transition between columna renalis and the beginning of the medulla (Figure 2a and 2b). This measurement should not be performed at the upper and lower poles, but in the middle third of the kidney. The section should be perpendicular to the renal surface (avoid sections in an oblique plane).

Measurements should be made with the patient in the side position, and here with the transducer from dorsal direction; examinations in supine position or from ventral cause false low values because the parenchymal width near the renal hilus is smaller than in the other parts of the kidney.

There is no upper limit of normal which is applicable to all patients. A rather large parenchymal width should be a hint to exclude a compensatory hypertrophy of the kidney, diabetes mellitus, acute nephritis or acute renal failure, or to look for physiological reasons, e.g. pregnancy.

**Common error:** comparison of examination of the right kidney from ventral aspect (hepatic window) with left kidney examined from the flank (spleen window or section behind the colon).

**Suggested reading**


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Fig. 1. (a) Ventral longitudinal ultrasonographic section of the right kidney. (b) Schematic drawing depicting the correct sectional plane to the longitudinal measurement. Interrupted lines show incorrect sections which yield spuriously low values (normal value in the adult, 90–120 mm depending upon height and age).

Fig. 2. (a) Dorsal longitudinal scan in side position with examination from dorsal. Note clearly delineated pyramids. For measurement of parenchymal width, see schematic drawing. (b) Schematic drawing giving the correct positions where to measure parenchymal width (solid line) and incorrect positions yielding erroneous measurements (interrupted lines). Normal values in adults 15–20 mm (depending on age).