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Ultrasonography in Renal Diseases*

E. Hasanoğlu, M.D. / N. L. Gregory, M.Sc., A.R.C.S., M.I.P.,*** / A. V. Murphy, M.B., M.R.C.P.******

Investigation of the urinary tract of the young child is generally confined to procedures which depend on the presence to some degree of renal function. In various conditions such as in hydronephrosis and cystic disease little or no function may be present in a kidney, and it may be difficult to assess the degree of dilatation and the extent of parenchymal damage by intravenous pyelography.

Successful retrograde pyelography and nephrotomography may provide some additional information but are rarely used in the infant, and even if they are, they cause some complications. Uremia in patients with renal disease of unknown etiology requires urgent investigation since immediate surgical intervention may be necessary. High-dose excretory urography usually allows the diagnosis of obstruction even if the blood urea nitrogen (BUN) is high,[1] but definite results may not be obtained particularly if the patient is obese. In the past such patients underwent the hazards of retrograde pyelography to make certain that obstruction was not present.[2]

Holmes[3] and Barnett[4] et al showed ultrasonography to a safe, nonsurgical technique in the investigation of the urinary tract in adults, they reported its usefulness in differentiating renal cysts and tumours, in assessing hydronephrosis and in visualizing bladder tumours.

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* This study was carried out in Glasgow University, Royal Hospital for sick children.

** Associate Professor of Pediatrics, Kayseri University.

*** Senior physicist-Department of Clinical physics and Bio-Engineering Glasgow University.

**** Consultant of Pediatric Nephrology-Glasgow University.

Hünig and Ameri[5] illustrated some uses of ultrasound in children contact B scanning. This technique is being used more widely because of its advantages. Our aim is to report six cases of uretro-pelvic (U-P) junction stenosis and to compare the ultrasonic findings before and after surgical correction.

Method

The bare child is placed prone on the examination trolley in a warm room. The ultrasonic equipment used is a hand-held mechanical 60° sector scanner in which an oscillating transducer is ultrasonically coupled to the patient through an oil filled cell which also separates the patient from the movement of the transducer.

The specifications of those transducers are 2-5 MHZ 15 mm diameter. The B scanner is used, an oscilloscope as it is built up and a permanent record secured by a polaroid camera attached to the apparatus and both in the longitudinal and transverse measurements were made.

The ultrasonogram was carried out on six children with U-P junction stenosis before and after operation, all patients blood ureas being over 70 mg/dl, we had failed to do intravenous pyelography on them.

Discussion

Longitudinal and transverse scans from normal subjects are illustrated in (Figures 1, 2.).

As seen in Figures 3, 5, 6 the hydronephrotic changes and Pelvicalyceal dilatations due to U-P junction stenosis.

Upon re-examination two months after surgical correction, normal kidney and calyceal system were seen. (Figures 4, 6, 8).

This system of nephrosonography has proved of value in assessing pelvicalyceal dilatation and cortical width in hydronephrosis with poor renal function.

If a non-functioning kidney is found on IVP then ultrasonography may differentiate between renal agenesis, renal venous thrombosis, hydronephrosis, or a tumour replacing normal renal tissue.[6]

Ultrasonography may be used for children for whom there is known to be a danger of reaction to iodine containing contrast media used for IVP. We diagnosed U-P junction stenosis by ultrosonography in those patients with whom we failed to cary out IVP due to high blood urea levels. After surgical correction the pelvi-calyceal system dilatation returned to normal.

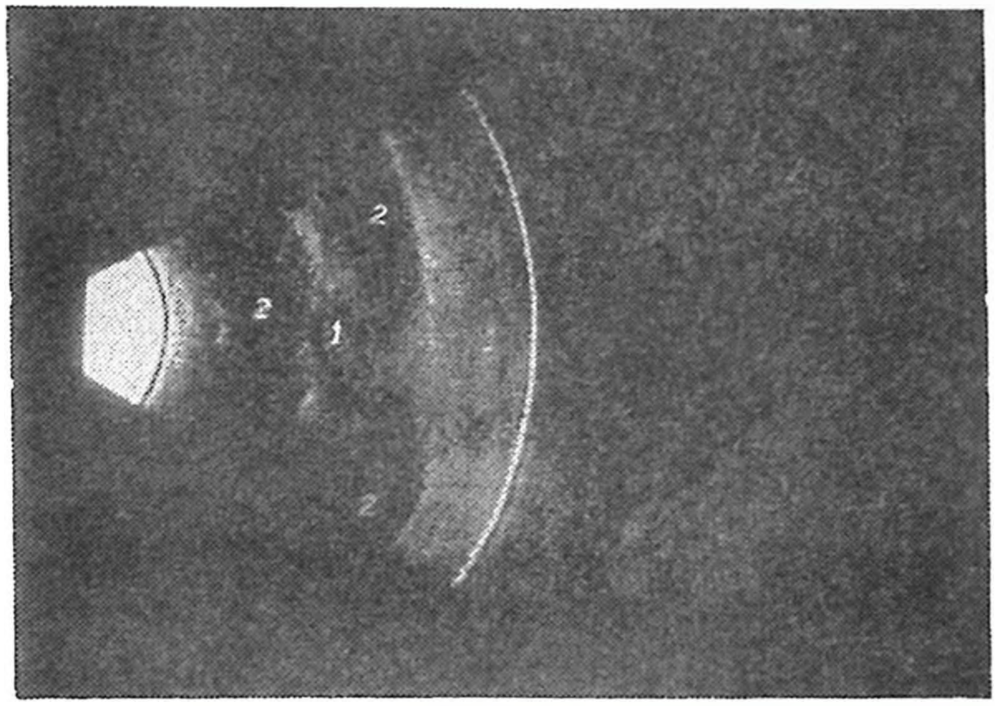

Figure 1

Longitudinal scan from normal subject

1. Collecting system
2. Renal parenchyma

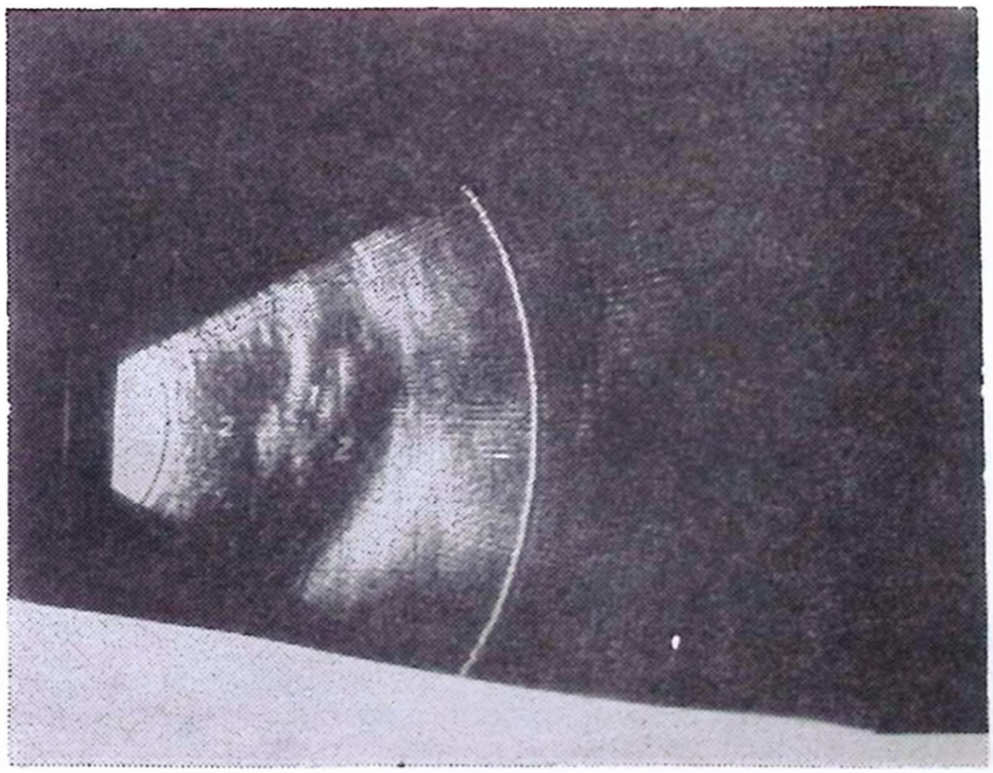

Figure 2

Transverse scan from normal subject

1. Hilum (Collecting system)
2. Renal parenchyma

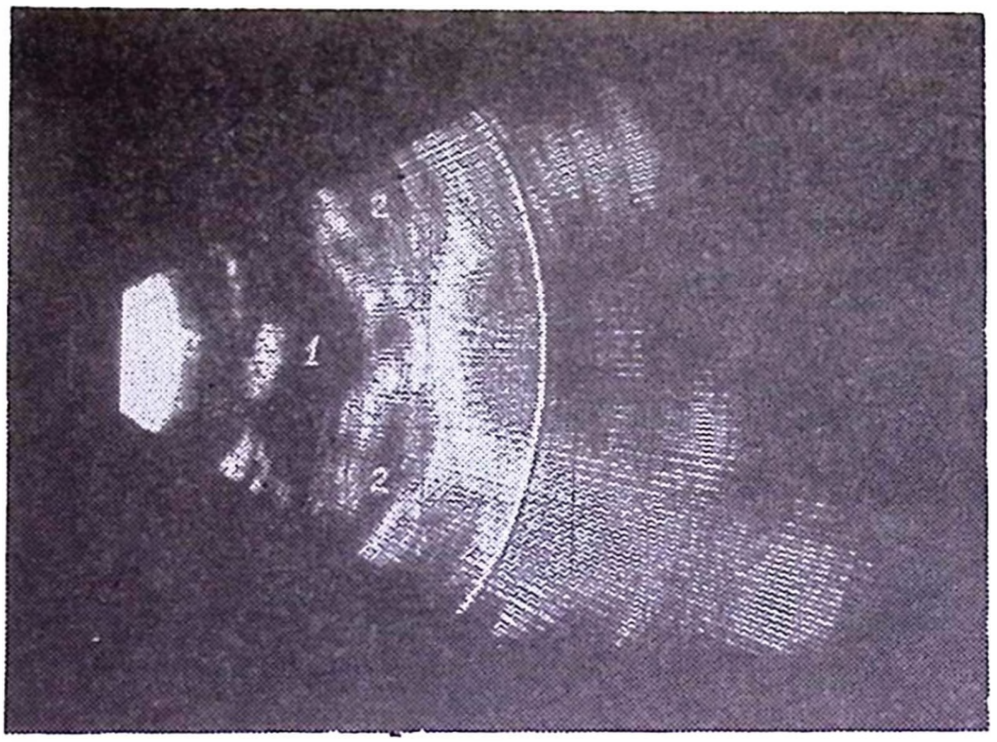

Figure 3

Longitudinal scan from left kidney of one patient before operation

1. Collecting system (Pelvicalyceal)
2. Renal parenchyma

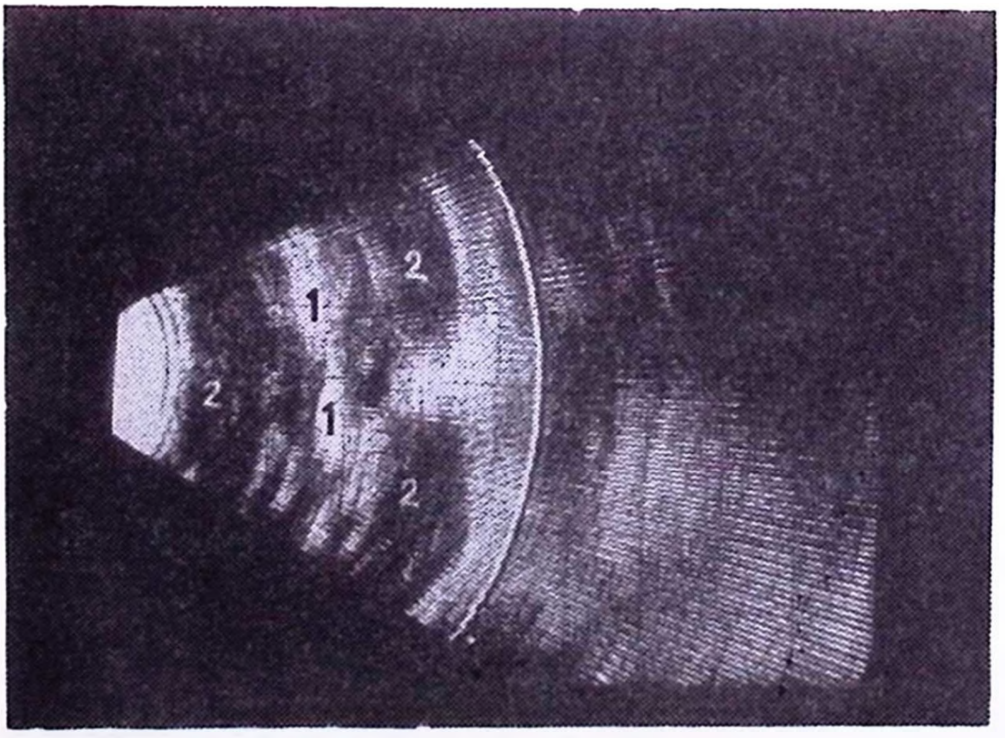

Figure 4

Longitudinal scan of the same patient after operation

1. Pelvicalyceal system
2. Renal parenchyma

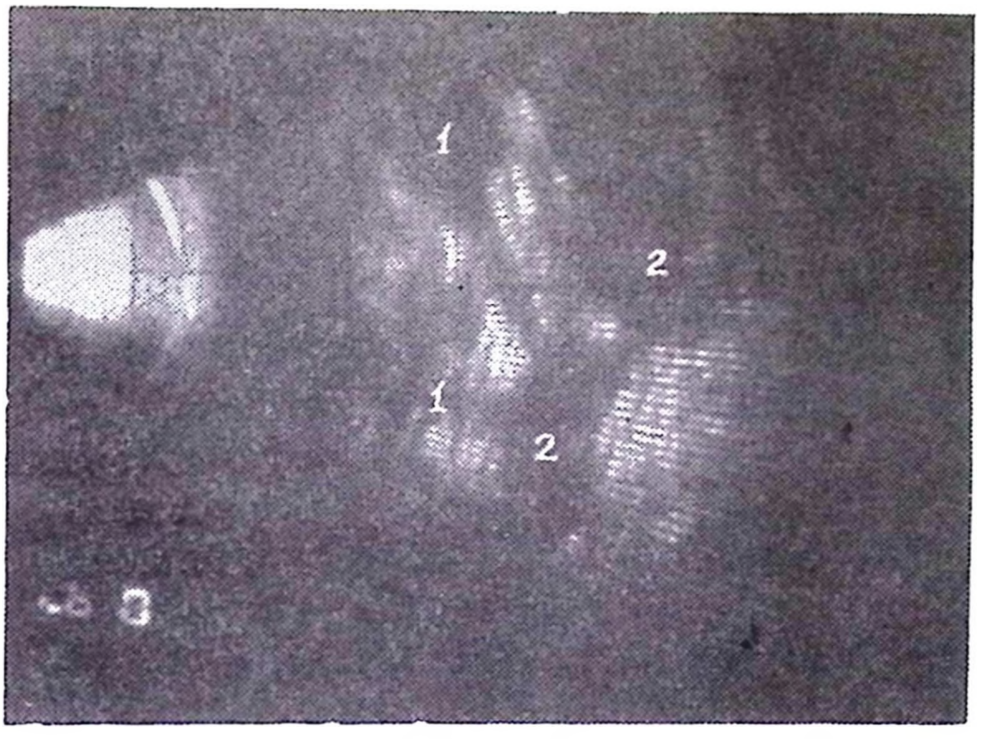

Figure 5

Longitudinal scan from another patient before operation

1. Pelvicalyceal system
2. Renal parenchyma

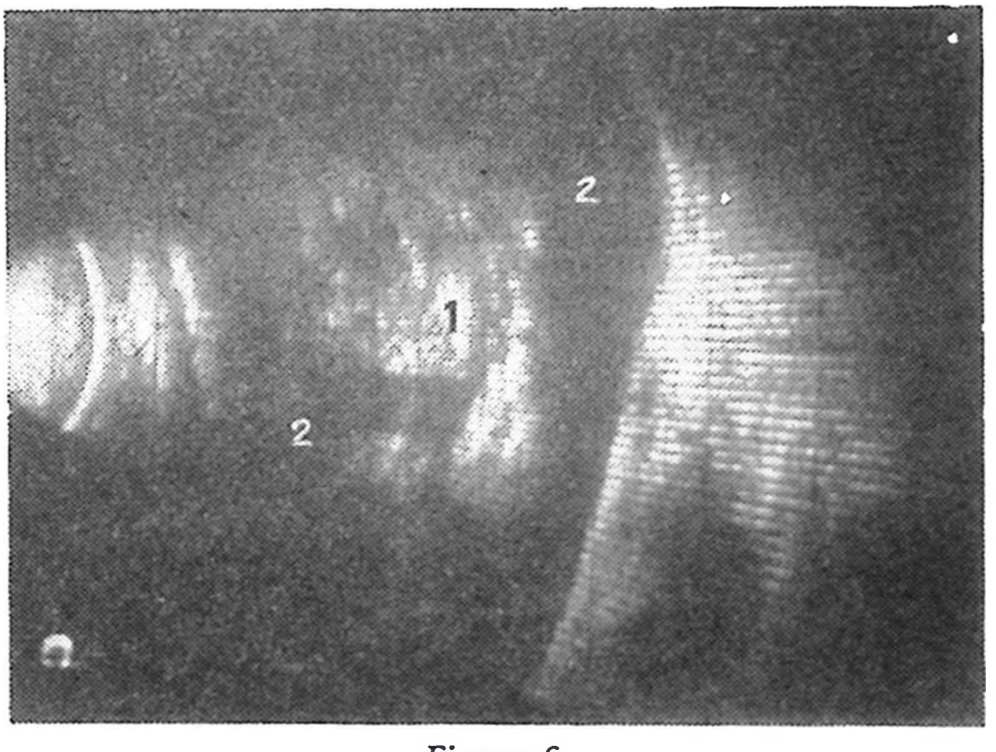

Figure 6

Longitudinal scan of the same patient after operation

1. Pelvicalyceal system
2. Renal parenchyma

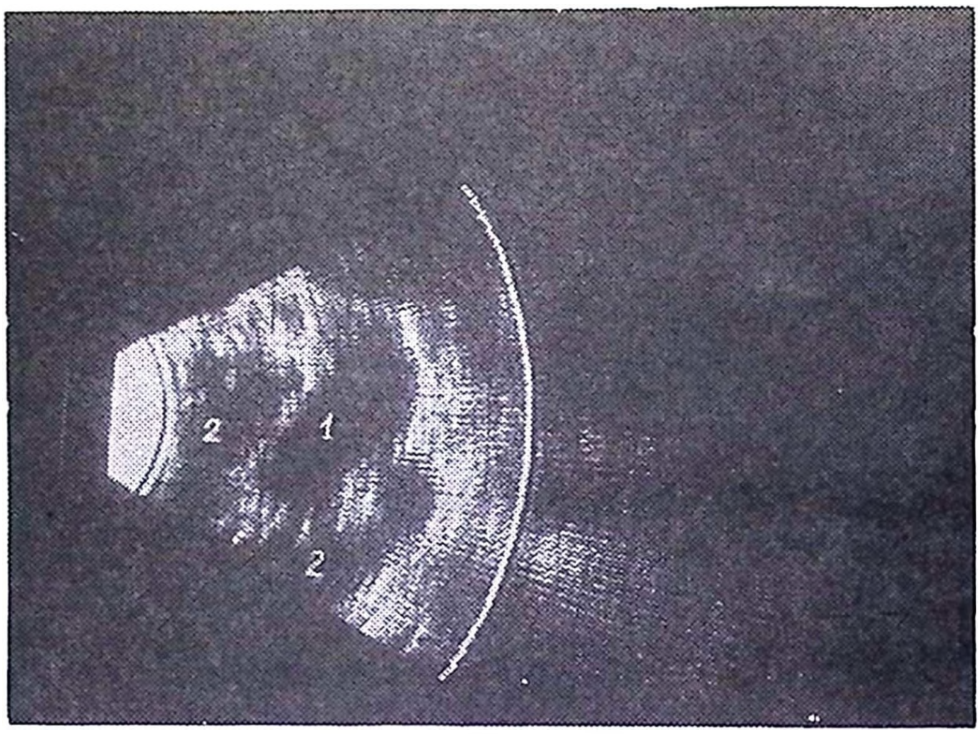

Figure 7

Transverse scan of the same patient before operation

1. Pelvicalyceal system
2. Renal parenchyma

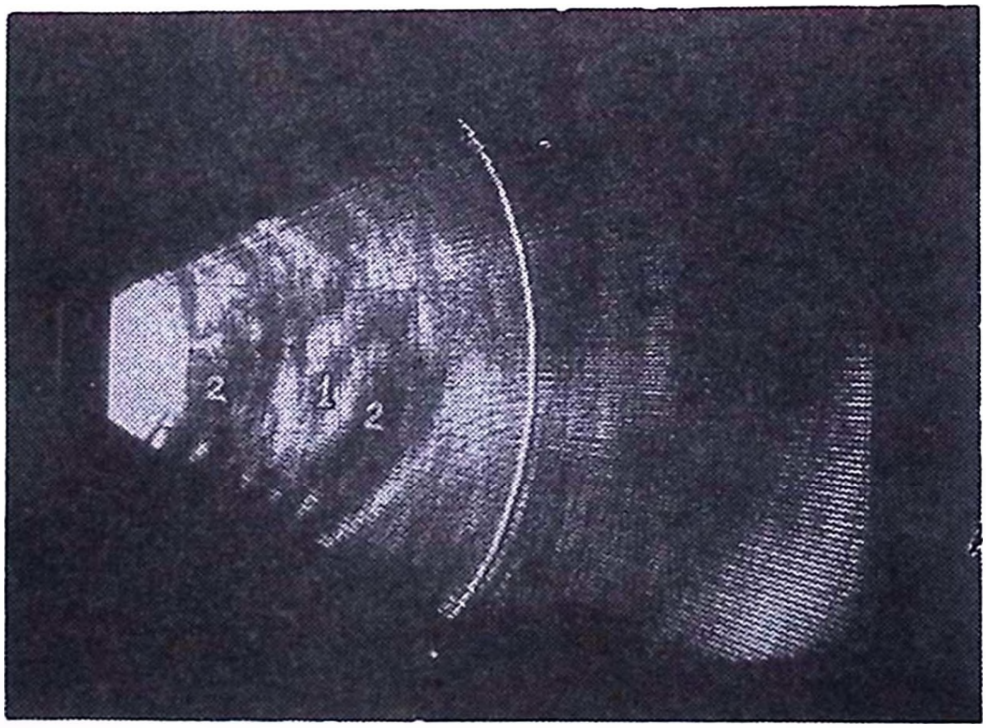

Figure 8

Transverse scan of the same patient after operation

1. Pelvicalyceal system
2. Renal parenchyma

Summary

The safety of ultrasonography and its usefulness is discussed, especially in diagnosis U-P junction stenosis.

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