Ultrasound, Excretory Urography and Urinary problems in Iraqi Children

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Abstract

Background : Urinary tract problems are common causes of UTI in pediatric practice ,imaging studies are designed for early diagnosis and treatment .

Objective: This study evaluates the effect of U/S and EU among children with urinary problems.

Method:-One hundred children age 2 months to 10 years (55 Female- 45Male) referred for investigation in specialized surgical hospital in Baghdad from September 2002 to January 2004. All underwent U/S and EU with in three weeks.

Results:-Both U/S and EU correlate well in detecting hydronephrosis, 100% sensitive for U/S, while EU did not show four cases of bilateral hydro nephrosis (73.3% sensitive). Both U/S and EU were equally able to demonstrate bladder defects, but U/S is more sensitive to show mucosal wall thickening in patients with recurrent cystitis. Execratory Urography is superior to U/S in demonstrating dilated ureters.

Conclusion: - Ultrasound is superior to EU in detecting bilateral hydronephrosis and bladder wall thickening.

Recommendation:-Ultrasound is an initial imaging procedure in investigating urinary problems and UTI, EU is assumed to answer specific questions regarding anatomy and function.

Keywords:-Ultrasound (U\S), Excretory Urography (EU), urinary problems, pediatrics.

Introduction: -

Urinary tract problems are common causes of UTI , in pediatric practice .

It is the most common indication for imaging the urinary track in order to detect factors that predispose to infection and renal scarring [1, 2].

With early diagnosis and treatment of renal diseases, there will be a significant reduction in future hypertension and renal scarring [3, 4].

Ultrasound is non invasive and reproducible for follow up measurements. It provides details of the anatomy of the kidney, urinary bladder and other retroperitoneal structures [5, 6]. Excretory Urography, provides a good index of the renal function and best examination of a non dilated ureters [5, 7, 8, 9]

Patients & Method:

One hundred patients (55female, 45male) were, proved to have UTI by the relevant laboratory investigations, underwent imaging study(U\S and Eu , some patients already had a previous EU that was recently arranged) in the Pediatric Central Teaching hospital in Baghdad from September 2002 to March 2003

Patients with systemic disorders (Neoplastic, connective tissue diseases and other illnesses) were excluded from the study.

Examination Technique:

1-Ultrasound: using the Siemens Sonoline versa pro machine 4 or 7.5 MHZ probe. Scanning in supine position of both kidneys and urinary bladder.

2- Excretory urography (EU):-

Fasting 2-3 hrs before investigation.

In supine position:

a-Full length inspiration (KUB).

b- Contrast injection 2-3 ml\ Kg using Iohexol.

1-1 mint film.

2- 5mint film.

3- 15 mint full length.

4- Post voiding.

In statistical analysis we correlate both studies with surgical, histo pathological or clinical follow up findings.

Results:

The distribution of study sample according to U/S and EU findings and the correlation between them were shown in **Table 1, 2,** this study revealed that bilateral hydronephrosis were the commonest findings as well as renal stones and cystitis respectively.

Table 1: The distribution of the study sample according to US and EU findings.

Ultrasound findings	US findings		EU findings	
	Positive findings		Positive findings	
	No	%	No	%
Bilateral Hydronephrosis (n=15)	15	100	11	73.3
Unilateral Hydronephrosis (n=10)	10	100	6	60.0
Bilateral PUJO (n=1)	1	100	-	-
Unilateral PUJO (n=4)	4	100	3	75.0
Bladder stone (n=3)	3	100	3	100
Bladder ureterocele (n=3)	2	66.7	1	33.3
Congenital single K (n=2)	2	100	2	100
Cystitis (n=15)	13	86.7	9	60.0
Dilated ureter (n=11)	6	54.5	11	100
Duplex system (n=6)	6	100	4	66.7
Horse-shoe K (n=3)	2	66.7	3	100
Renal dysplasia (n=1)	-	-	1	100
Renal scar (n=5)	5	100	5	100
Renal stone (n=10)	9	90.0	8	80.0
Skeletal anomalies (n=1)	-	-	1	100
No findings (n=10)	10	100	10	100

Table 2 distribution of study sample in U\S and EU correlation

DISEASE	US findings	EU findings			
		Positive		Negative	
		No	%	No	%
Bilateral Hydronephrosis	Positive	11	73.3	4	26.7
	Negative	-	-	-	-
Unilateral Hydronephrosis	Positive	6	60.0	4	40.0
	Negative	-	-	-	-
Bilateral PUJO	Positive	-	-	1	100
	Negative	-	-	-	-
Unilateral PUJO	Positive	3	75.0	1	25.0
	Negative	-	-	-	-
Bladder stone	Positive	3	100	-	-
	Negative	-	-	-	-
Bladder ureterocele	Positive	1	50.0	1	50.0
	Negative	-	-	1	100
Congenital single K	Positive	2	100	-	-
	Negative	-	-	-	-
Cystitis	Positive	9	69.2	4	30.8
	Negative	-	-	2	100
Dilated ureter	Positive	6	100	-	-
	Negative	5	100	-	-
Duplex system	Positive	4	66.7	2	33.3
	Negative	-	-	-	-
Horse-shoe K	Positive	2	100	-	-
	Negative	1	100	-	-
Renal dysplasia	Positive	-	-	-	-
	Negative	1	100	-	-
Renal scar	Positive	5	100	-	-
	Negative	-	-	-	-
Renal stone	Positive	7	77.8	2	22.2
	Negative	1	100	-	-
Skeletal anomalies	Positive	-	-	-	-
	Negative	1	100	-	-
No findings	Positive	10	100	-	-
	Negative	-	-	-	-

Excretory Urography failed to pick up four cases of bilateral hydronephrosis because one of the diseased kidneys failed to excrete contrast. This is also true with unilateral hydronephrosis were EU failed to show about 40% of cases.

Table 3. The distribution of study sample according to the occurrence of congenital anomalies on U/S.

Fig.1, 2. The distribution of the study sample according to the occurrence of congenital anomalies on U/S.

Table 3: The distribution of the study sample according to the occurrence of congenital anomalies on U\S.

Congenital anomalies	US	
	No	%
Renal dysplasia	-	-
Pelvic ectopic kidney	1	5.0
Duplex system	7	35.0
Pelviureteric junction obstruction (PUJO)	5	25.0
Unilateral	4	80.0
Bilateral	1	20.0
Horse-shoe kidney	3	15.0
Congenital single kidney	1	5.0
Bladder ureterocele	3	15.0

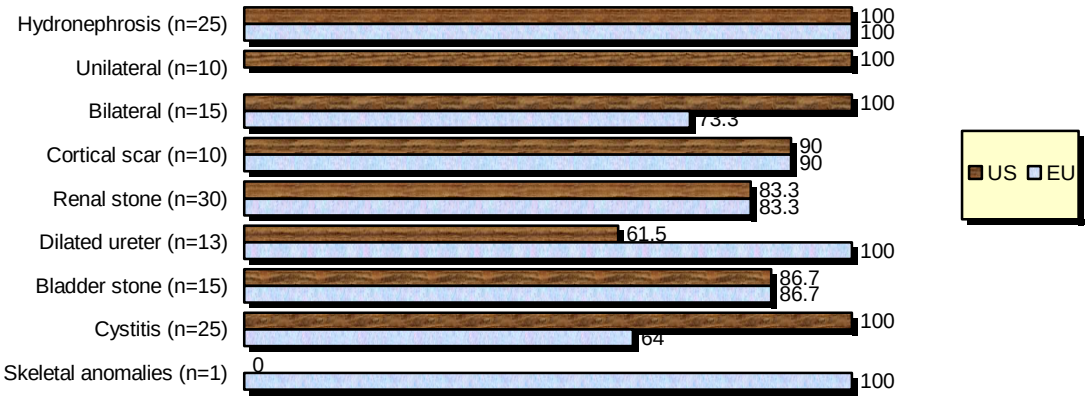

Figure 1: The distribution of the study sample according to US and EU findings.

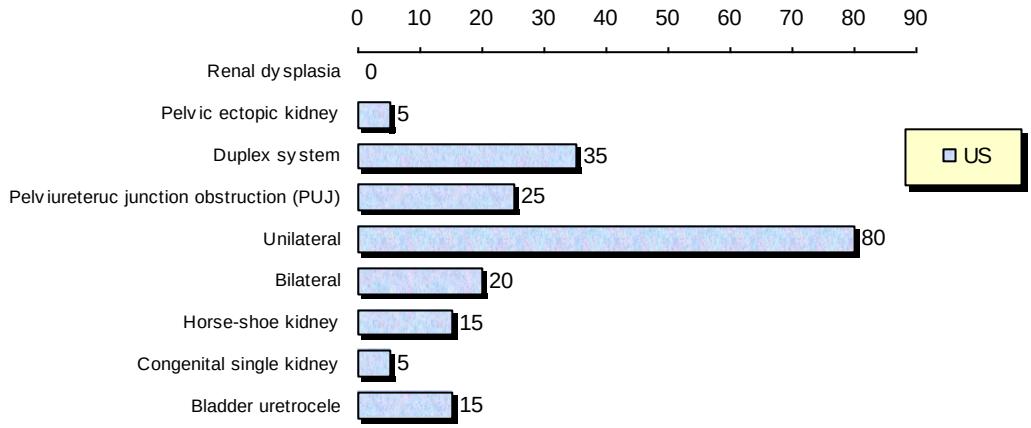

Figure 2: The distribution of the study sample according to the occurrence of congenital anomalies

The bulk of cases fall in the age group 2-5 years, to a lesser extent above 5 years and the Least below 2years, being 54, 35, and 11 respectively. **Table 4 and fig.3** The distribution of the study sample according to the occurrence of congenital anomalies on EU.

Of the Congenital Anomalies, PUJ Obstruction and Duplex System are more common. One Case of Congenital Renal Dysplasia was seen on EU associated with lumbar spine skeletal abnormalities, where on U/S there was an empty renal bed.

Renal stones were other common findings, seen on both U/S and EU But, EU failed to show Lucent Stones.

On the other hand, U/S failed to show Renal Stone in one kidney because U/S did not provide enough Gain.

Table 4: The distribution of the study sample according to the occurrence of congenital anomalies on EU.

Congenital anomalies	EU	
	No	%
Renal dysplasia	1	6.25
Pelvic ectopic kidney	1	6.25
Duplex system	5	37.5
Pelviureteric junction obstruction (PUJO)	5	37.5
Unilateral	5	100
Bilateral	-	-
Horse-shoe kidney	2	12.5
Congenital single kidney	1	6.25
Bladder ureterocele	1	6.25

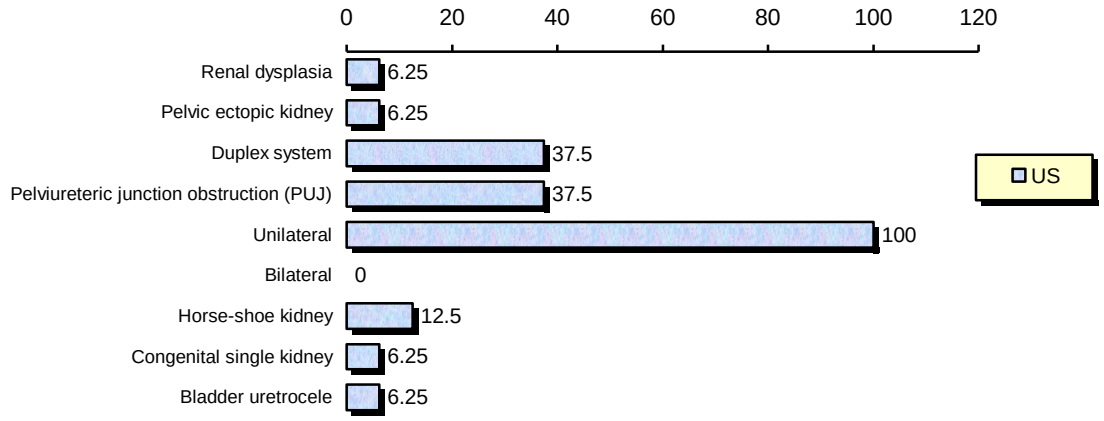

Figure 3: The distribution of the study sample according to the occurrence of congenital anomalies on EU.

Discussion:-

In the assessment of the urinary tract of this study, both U/S and EU correlated well in the majority of cases. In 88% of children U/S was abnormal, while on EU it was 82%. It was higher than those reported by others [11, 12]; these were 42% and 37% respectively (regarding U/S).

Hydronephrosis, the commonest finding (25%) it was higher than other reported studies [13,14,15, 16]. In the Mucci et.al, hydronephrosis was not reported at all. These differences can be explained by the fact that most patients were referred to our unit from specialists and seen initially in an advanced stage, which increases the likely hood of abnormal findings.

Excretory Urography demonstrates 73.3% and 60% of bilateral and unilateral hydronephrosis respectively, and escapes the detection of other cases, due to severely diseased kidneys, which fail to excrete contrast on conventional EU study.

-With renal scarring both EU and U/S were comparable to those reported by other groups [15].

In this study renal scar (100%) was seen on both U/S and EU, indeed, EU is more useful to show minor calceal blunting. In one study, a combination of Scintigraphic evaluation with U/S concludes a higher detection rate of mild scarring using DEMSA 99mtc. [17, 18, 19, 20].

Renal and vesical stones are other common findings on both U/S and EU; it was 90% and 80% respectively. Ultrasound is more sensitive because some radio-lucent, stones, or even radio opaque ones, were concealed by gases or feces on EU. However on U/S very small, stones were not detected even when decreasing the gain , they do not cast shadow when lying in normal echogenic pyramids , these findings were similar to other worker study [13]. Increasing awareness of renal and vesical stones in children is related to climatic factors, poor food quality and underlying anatomic and/or obstructive lesions. [21, 22, 23, 24].

-Ultrasound is more reliable in showing congenital renal anomalies, except for one dysplastic kidney associated with skeletal anomalies, it was not seen, on the other hand it was detected on delay films on EU, and it was a small atretic kidney with multiple bony deformities of the lumbo-sacral spine. Another case of Horse shoe kidney was not seen on U/S because it was difficult to see the soft tissue (Isthmus) connecting the lower pole of both kidneys. However, the true incidence of congenital anomalies are difficult to ascertain because many of

them are asymptomatic and therefore undetected, many reported statistics are derived from symptomatic individuals [24,26].

Ultrasound is the initial work up imaging procedure in children evaluated for Urinary diseases, EU is recommended with abnormal sonographic findings to answer specific questions regarding renal anatomy and function.

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