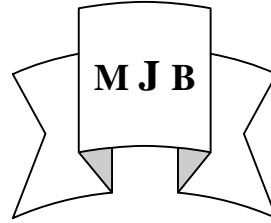


The Role of Renal Ultrasound in Urinary Tract Infection in Children

Sabih S. Mehdi

Babylon University - College of Medicine



Abstract:

To study the role of renal ultrasound in urinary tract infection in children, any child with proved urinary tract infection is examined clinically and sent for renal ultrasound and results were analysed.

A total of 132 patients with urinary tract infection age 1 month — 14 years, 40(30%) patients were found to have urinary tract abnormalities on ultrasound and the commonest abnormality was renal stones and the commonest organism linked with renal abnormality was E Coli.

Renal ultrasound is a useful tool to diagnose urinary tract abnormalities, however, it is not useful to detect renal scars and vesicoureteric reflux.

الخلاصة

لدراسة اهمية فحص السونار للاطفال المصابين بالتهاب المجاري البولية استقطائيا وتثبيت اصابتهم ،درست مجموعة من الاطفال (١٤٢) استصقائيا لتثبيت اصابتهم بالتهاب المجاري البولية بالطرق الاولى وقد تراوحت الاعمار من شهر واحد الى اربعة أشهر وقد اجري فحص السونار للمسالك البولية لدراسة التغيرات الاحصائية نتيجة الالتهاب ونوع الجرثومة المسببة وكانت حصى الكلي هي اهم ماوجد اثناء الفحص واهم بكتريا هي Ecoli .

وجد من البحث ان فحص السونار مهم في حالات التهاب المجاري البولية لشخص التغير في المجرى البولي ولكن فائدة محدودة

Introduction

Urinary tract infections (UTI) represent the most common nephrologic problem. Many elements of the disease covering management remain unclear and are points of debate and in particular imaging procedures

including ultrasound[1] In some areas (UTI) is considered the second most common infection in children[2] after disappearance of H-Influenzae Infection.

The incidence of UTI in the

first year is about 41 - 42/1000 and it is a cause of acute morbidity and vesicoureteral reflux is more common in young age leading to scarring, renal damage, decreased renal function and hypertension[3] .

Urinary tract infection by definition; A urine culture with a bacterial count of 105/ml[4] .

Taking an aseptic urine sample from children is a difficult job but a catch specimen is ideal for routine work [5]. Except for the first 8 - 12 weeks of life when infection of the urinary tract may be secondary to a hematogenous source UTI is believed to arise by the ascending route after entry of bacteria via the urethra[6]. An experienced ultrasonographer can provide a great deal of information about anomalies of the renal tract, echogenicity of the kidney, hydronephroses, stones, and even reflux can be thought of by the presence of intermittent dilatation of the retrovesical ureter[6], however renal scars are best detected by DMSA scan[7] and VUR by cystourethrography.

The yield of ultrasound in children <2 years with UTI is high in one study done in Denmark[8]. It was successful in diagnosing 55% of abnormalities which were in need for treatment.

Patients and methods

One hundred thirty two patients with urinary tract infection (UTI) were studied during the period March 1999 - July 2002, age 1 month - 14 years as out - patients in Babylon. They were examined fully during the first visit after taking a thorough history and parameters for each patients were recorded.

A urine sample is taken by a clean catch for each patient suspected to have UTI by history and the specimen is cultured immediately on blood agar and Mconky. Urine culture results were obtained after 48 hours and those with a positive result were sent for renal ultrasound.

Mixed growth and those below 105 / ml were discarded as it does not fit our definition of UTI (a growth of bacteria 105 / ml of urine).

Each patient included in the study should not have been taking antibiotics for at least 4 days before the test.

Results

Patients characteristics were mentioned in table (1):

Table 1 Patients Characteristics

	Characteristics	No	%	Total
1	Residence			132
	Urban	69	52.3	
	Rural	63	47.7	
2	Sex			132
	Males	72	54.5	
	Females	60	45.5	
3	Circumcision			72
	Uncircumcised	50	69.4	
	Circumcised	22	30.6	
4	Weight <1 year			43
	<50 th centile	31	72.1	
	Normal	12	27.9	
5	(US) abnormality and sex			40
	Males	23	57.5	
	Females	17	42.5m	
6	(US) abnormality and circumcision			23
	Circumcised	12	52.2	
	Uncircumcised	11	47.8	

Clinical symptoms as noted by parents or children were presented in table (2):

Table 2 Complaints of parents or patients

Complaint	No	%
Pallor	80	28.6
Screaming, abd. pain	66	23.6
Fever	73	26.1
Vomiting	30	10.7
Enuresis	12	4.3
Dysuria	8	2.8
Polyuria	6	2.1
Haematuria	4	1.4
Convulsions	-	-
Offensive ouder	-	-

Clean catch urine samples were subjected to culture studies following standard methodology as noted in table

(3), and the commonest organism was E- Coli.

Table 3 Types of bacteria on urine culture

Organisms	No	%
E coli	56	42.4
Proteus	29	21.9
Pseudomonas	7	5.3
Other Gram Neg. bacteria	18	13.63
Klebsiella	12	9.09
Enterobacter	4	3.03
Staphylococci	6	4.5
Total	132	100

The commonest organism causing urinary tract abnormality was E coli as shown in table (4)

Table 4 organisms according to urinary tract abnormality

Organisms	No	%
E coli	21	52.5
Proteus	5	12.5
Pseudomonas	4	10.0
Other G-ve bacteria	2	5.0
Klebsiella	2	5.0
Enterobacter	5	12.5
Staphylococci	2	5.0
Citrobacteria	1	2.5

Ultrasound findings in regard to urinary tract abnormalities was recorded in general as in figure (1) :

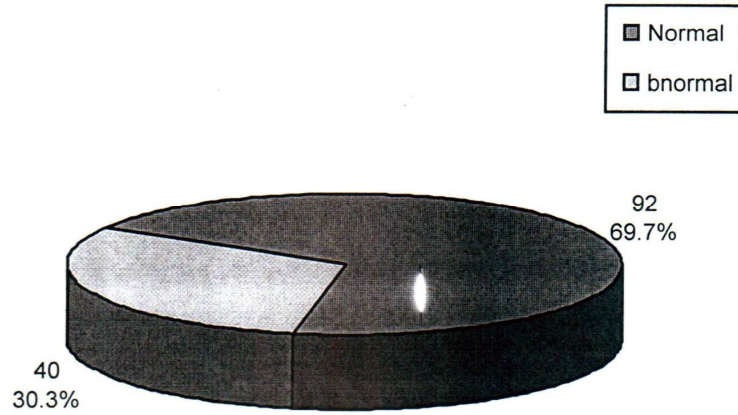


Figure 1 General abnormalities on renal ultrasound

A detailed ultrasound was done for each patient with proved urinary tract infection , some patients have more than one abnormality as shown in table (5) :

Table 5 Ultrasound abnormalities

Type of abnormality	No	%
Cystitis	4	8.6
Large Kidney	3	6.5
Polycystic kidney	1	2.1
Small kidneys	4	8.6
Renal stones	16	34.7
Hydronephrosis	6	13.04
Vesical stone	4	8.6
Left renal cyst	1	2.1
Left ectopic kidney	2	4.3
Ureteric stone	3	6.5
Absent left kidney	1	2.1
Ectopia vesicae	1	2.1

Discussion:

In our study of 132 patients with (UTI), by ultrasound we found urinary tract abnormalities in 30.3% compared to a study done in Malaysia where the results were 37% [9].

In another study done in Cumbria both ultrasound and DMSA scan were used as screening tests in patients with UTI. Ultrasound was found of little value, it detected only 3% while DMSA scan yield was 12% [10], however, ultrasound is a driver dependent test and DMSA scan is not available in our hospital.

In some areas of the world renal ultrasound is done routinely in utero to detect fetal renal abnormalities and authors advise selective use of ultrasound [11,12] and this might explain the small figure mentioned above in Cumbria study.

From our encouraging results we continue to use this tool since we lack the other facilities bearing in mind that we are going to miss renal scars and vesicoureteric reflux (VUR) which can not be detected by ultrasound. Scars are best detected by DMSA scan [13] and (VUR) which affect 1 —2% of children [14] is best diagnosed by a

micturating cysto urethrogram which should be done especially in children who are not toilet trained and those with recurrent UTI [15].

Ultrasound abnormalities were commonly found in males 23(57.5%) and circumcised and uncircumcised children get about equal chances in renal abnormalities, however, the place of circumcision in UTI is controversial on medical grounds.

Circumcision was found useful as a protective measure against UTI and it is cost effective especially if done in the first year [16,17] but there are studies which limit its value because of its complications [18], however, in our study of 72 males, 50 of them were circumcised and from our experience the complications are very little.

The commonest organism found in urine culture is E - Coli 42.4% and commonly linked with renal abnormalities in the studied group (52.5%). It might be due to an ascending infection.

E - Coli was found a common infection among adult patients with UTI in Mousil (39.9%) [19].

There is no single test to detect abnormalities which can be applied in

UTI but a combination of tests is better and controversy continues[20] on the best way of management and on the other hand by the mere application of renal ultrasound we could save the lives of many kidneys.

Recommendations

1. Routine renal ultrasound should continue.
2. Other modalities of renal imaging should be available.
3. A follow up period should continue for patients with UTI until the growth of the kidneys is complete.

References

1. Jacob A. Lohr, Pediatric annals 1999,28, 10 / October (637).
2. Abu - Daia J - M, AL - Aaly - M - A, De - Castro - R,Saudi- Med-J. 2000, Aug 21 [8]:711.
3. Kenneth B - Roberts, Olakunle B. Akintemi, Paed. Annals 1999 28:101 October 644.
4. RI-JR white, Archives of disease in childhood (1987) 62, 421.
5. Jean Smellie, Cohn Normand ,1986, Medicine international, 1344.
6. George B - Haycock, 1986, Archives of disease in childhood, 61,1155.

7. Almeida - HN, Ribeiro - M, colorinha - J, Santos - JF, Rosa - FC, Acta - Med - Port ,1993, 6 2, 59.

8. Cortes - D, Lee - K, Thorup - JM ,1999, Ugeskr - Laeger 1999. 161 (2), 147.

9. Cheung - HS, Australias - Radiol 1993, 36 ,1,23.

10. Mucci - B, Maguire - B. , Clin - Radiol 1994,49 ,5, 324.

11. Alexandro Hoberman, Elen R wold, Paediatric infectious diseases 1997, 16 1, 11.

12. Alon - US; Clin. Pediatr. Phila 1999, 38 ,1, 21.

13. Chritian - M, Mc Coll - JH, Makenzie, JR ,Arch - Dis - child 2000 82 ,5,376 .

14. Fanos - V, Khoory - BJ, Vecchini - 5, Pedrolli - A, Pizzini - C, Benini - D, Clinica. Pediatrica., 1998, 50,7,8, 367.

15. Ross - JH, Kay - R. , Am - Fain - Physician ,1999, 15 ,59,6) 1472.

16. Scheon - EJ, Colby - CJ, Ray GT, Pediatrics, 2000, 105,4pti, 789.

17. To - T, Agha - M, Dick - PT, Feldman - W, Lancet 1998, 352,9143, 18, 13.

18. Moses - S - Baiky - RC, Ronald-

AR, Sex - Transm - Infect ,1998, 74 ,5 ,
368.

19. Rakan Yehya Mohanm,^{21^{ed}} Au,
Faraj Mohammed Abdulla, Raad Abdul
Jabar Ahmed, Urinary tract infection in
Mousil city a bacteriological study,
Journal of Faculty of Medicine -
Baghdad 1987, Vol 29 ,4 , 391.

20. Linshaw - MA.,World - J - Urol
1999,17 ,6,383.