Urinary tract infection in children: Descriptive, microbiological and ultrasonic study

Zainab Sulaiman Erzaiq , Osama Morad , Sameer Khaialla, Ahmed H. Alanee.

(Received 23 / 3 / 2008 , Accepted 29 / 10 / 2008)

Abstract:

A descriptive, microbiological and ultrasonic study was done on 100 patients with urinary tract infection under age of 10 years attending pediatric Department of Tikrit Teaching Hospital during the period from 1st of February to the last of October 2007. The patients were divided into two groups (50 patients for each), the first group were with first attack of urinary tract infection and the second group were with recurrent urinary tract infection. Most of the patients in the first group (60%) were between the ages of 5-10 years, and most of them were males (58%)and they were from the urban areas (64%), while those with recurrent infections were at the ages range between 1-5 years (88%) , most of them were females (86%) and they were also from the urban areas (88%). The commonest presentation of patients with the first attack urinary tract infection was urgency (44%) while those in the second group present with failure to gain weight (98%). *E.coli* was the most commonly isolated microorganism in both groups with regard to age as well as for sex of patients (56% and 66% respectively). Cystitis was the commonest ultrasonic picture in patients with first attack of urinary tract infection (58%)while bladder wall thickening was the commonest picture in the recurrent attack group (66%).

Introduction

Urinary tract infection (UTI) is defined as the presence of bacteria in urine along with symptoms of infection. UTIs occur in as many as 5 percent of girls and 1 to 2 percent of boys. The kidneys filter and remove waste and water from the blood to produce urine. They get rid of about one and half to two quarts of urine per day an adults and less in children(1). Normal urine contains no bacteria (germs).Urinary tract infection usually occur as a consequence of colonization of the periurethral area by a virulent organism that subsequently gains access to the bladder(2) . Bacteria may, at times, get into the urinary tract and the urine from the skin around the rectum and genitals by traveling up the urethra into the bladder. When this happens, the bacteria can infect and inflame the bladder and cause swelling and pain in the lower abdomen and side. This bladder infection is called cystitis(3). If the bacteria travel up through the ureters to the kidneys, a kidney infection can develop. Kidney infections are much more serious than bladder infections. . During the first few months of life, uncircumcised male infants are at increased risk for UTIs, but thereafter UTIs predominate in females(1). Urinary tract infection (UTI) is common in pediatric practice and an important cause of morbidity and mortality in children. Infected urine stimulates an immunological and inflammatory response leading to renal injury and scarring, ultimately leading to end stage renal failure(4). Prompt diagnosis and management of UTI can reduce the incidence of morbidity and life threatening bacteraemia. Approximately 3-5% of the if undiagnosed leads to permanent renal damage causing hypertension or end stage renal disease. The diagnosis of UTI is difficult in the neonatal period because the signs and symptoms are non-specific in this age group(3). The incidence in the neonates is 0.01-1% and can also be as high as 10% in low birth weight and preterm babies(2). Checking a urine sample is the only way to diagnose a bladder infection, as there is usually no outward sign on the penis or vagina that indicates an infection. *E coli* usually causes a child's first infection, but other gram-negative bacilli and enterococci may also cause infection. The specimen for urinalysis and culture should be obtained by catheter or suprapubic aspiration in the infant or child unable to void on request . Additional tests may be recommended to check for abnormalities in the urinary tract. Repeated infections in abnormal urinary tracts may cause kidney damage(5). The kinds of tests ordered will depend on the child and the type of urinary infection. Because no single test can tell everything about the urinary tract that might be important, more than one of the following tests may be needed: Kidney and bladder ultrasound, Voiding cystourethrogram, Intravenous pyelogram, Nuclear scans, Computed tomography (CT) scans and magnetic resonance imaging (MRI) (3). Although intravenous urography has been a time-honored examination in the initial radiologic evaluation of UTI in children,ultrasonography has largely replaced intravenous urography as the initial screening examination.Ultrasonography alone is not generally adequate for investigation of UTI in children, as it is unreliable in detecting vesicoureteral reflux, renal scarring or inflammatory changes(6). If reflux or morphologic abnormalities are identified, renal scintigraphy and voiding cystourethrography are recommended to further search for renal scarring or urinary tract abnormalities(7). The way the antibiotic is given and the number of days that it must be taken depend in part on the type of infection and how severe it is(6).

Materials and methods

A descriptive , microbiological and ultrasonic study was done on children under 10 years with acute and recurrent UTIs attending the Pediatric Department in Tikrit Teaching Hospital during the period from 1st of February to the last of October 2007.

1. Descriptive study:

Each patient with acute or recurrent UTI is assessed by a prepared questionnaire including the name, age , sex, residence, frequency, urgency, painful micturition, fever, vomiting, diarrhea, loss of appetite and failure to gain weight.

Each patient was examined for weight (and assessed using the Tanner percentile chart for age and sex) to assess the nutritional state (figure 1 and 2)and for abdominal exam for any enlarged kidneys by bimanual examination.

Urine culture was done for each patient with suspected UTI. The child was considered to have UTI if they have positive culture. The sensitivity test was done to those who had positive urine culture.

Each patient included in the study was send for ultrasound examination for the presence of any renal or bladder pathology.

The patients include in the study was divided into two groups , first attack of UTI and those with recurrent UTIs. Children with no history of previous attack of UTI is considered to have first attack UTI while patients who had history of two or more previous UTIs during a period of 6 months was considered recurrent UTIs(1).

2-Microbiological study:

In infants and older children the urine was collected in urine collecting bag or sterilized container, after washing the genital region with soap and water. Mid stream, clean catch, early morning specimens were collected in a sterilized container. All the antibiotics were discontinued 72 hours before sending the urine for culture and sensitivity. Urine sample was delivered to the laboratory within 1 hour of collection. In case of delay the urine samples was kept at $4^{o}C$ and analyzed within 6 hours of the collection. The urine samples were cultured in 5% sheep blood agar and MacConkey's media. (8) Inoculation was done with the help of a 0.001ml caliber loop. All the sample plates were incubated for 48 hrs at $37^{o}C$ in 5-10% carbon dioxide for anaerobic growth. Bacterial identification was done by hand lens and standard biochemical tests. Where multiple growths were obtained the culture was repeated again before accepting the results. The diagnosis of urinary tract infection was based on microscopic finding of more than 5 white blood cells per high power field on urine microscopy and a colony count of 10^{5}/ ml of single pathogen. (8)

3. Ultrasound examination:

All the patients were studied by US. The ultrasound examinations were done using US machine Siemens sonoline versa pro & through 3.5 MHz convex probe.

The cooperation of the child is required and to obtain good results a quiet environment are necessary

In the infant the US examinations should begin with the bladder, since micturition may occur at any time and a complete study cannot be obtained with empty bladder ..

The Kidneys are examined by both supine & lateral decubitus positions. Coronal views can be reliably reproduced and allow the accurate measurement of renal length, which is important for the assessment of renal growth .

The study include the ureters and bladder. The ureters are followed along their course…the urinary bladder (UB) are examined by a suprapubic approach….

The dilated ureter may be detected at either its upper end or its lower end behind the bladder, especially when the bladder is full. Details such as the pelvicalycial system (PCS) dilatation,ureteric dilatation,stones,post-voiding residual urine, thickness of the bladder wall, are parts of the routine information provided. Calculi and nephrocalcinosis have characteristic ultrasonic appearances. (7)

Results:

1. The descriptive study:

The total number of cases included in the study was 100 cases , 50 with acute UTI and 50 with recurrent UTIs.

Table(1) shows the age distribution of the study cases at the time of the study. It is clearly shown that most of the newly diagnosed UTI were 30 cases (60%) within the ages of 5-10 years, while most of the recurrent category group 44 cases (88%)were within the ages of 1-5 years.

Table (2) shows the distribution of the study cases according to the sex. Most of the patients with first attack UTI 29 cases(58%) were males, while were 21 cases (42%) females and most of the cases with recurrent UTIs were females 43 cases (86%).

Table (3) shows the distribution of the study cases according to the residence of patients. It is clear that most of the study cases were from urban areas for both first and recurrent attacks of UTIs, 32 (64%) and 44 (88%) cases, respectively.

Table (4) shows the distribution of study cases according to the presentation of the patients. The most common presentation of patients with newly diagnosed UTI 22 cases (44%) was urgency followed by 19 cases (38%) pain during micturition and dribbling of urine. Enuresis was the form of presentation in 15 cases (30%). Failure to gain weight was the commoenest manifestation in patients with recurrent UTIs 49 cases (98%) followed by 44 cases (88%) loss of appetitie and dribbling of urine 22 cases (44%).

Table (5) shows the distribution of the study cases according to the weight and abdominal exam. Most of the patients with first attack of UTI 44 cases (88%) had normal weight for age and sex , while most of the patients with recurrent UTIs 43 cases(86%) had abnormal weight (less than the 3rd percentile for age and sex).

Only one case (2%) from the recurrent UTIs group had palpable kidney .

Table(1) The distribution of study cases according to age of pateints.

Age	First attack, No.(%)	Recurrent UTIs,No.(%)
Less than 1 year	7 (14%)	- (0%)
1-5 years	13 (26%)	44 (88%)
5-10 years	30 (60%)	6 (12%)
total	50 (100%)	50 (100%)

Table (2) The distribution of study cases according to the sex.

Sex	First attack, No.(%)	Recurrent UTIs,No.(%)
male	29 (58%)	7 (14%)
females	21 (42%)	43 (86%)
total	50 (100%)	50 (100%)

Table (3) The distribution of study cases according to the residence of the patients.

Residence	First attack, No.(%)	Recurrent UTIs,No.(%)
Rural	18 (36%)	6 (12%)
Urban	32 (64%)	44 (88%)
total	50 (100%)	50 (100%)

Table (4) The distribution of study cases according to the presentation of the patient.

Clinical manifestations	First attack, No.(%)	Recurrent UTIs,No.(%)
Frequency	13 (26%)	6 (12%)
Urgency	22 (44%)	14 (28%)
Painful micturition	19 (38%)	12 (24%)
Dribbling of urine	19 (38%)	22 (44%)
Enuresis	15 (30%)	3 (6%)
Fever	2(4%)	15 (30%)
vomiting	5 (10%)	17 (34%)
Diarrhea	11 (22%)	12 (24%)
Loss of appetite	12 (24%)	44 (88%)
Failure to gain weight	9 (18%)	49 (98%)

Table (5) The distribution of study cases according to examination of weight and abdominal exam.

Examination		First attack, No.(%)	Recurrent UTIs,No.(%)
Weight			
normal		44 (88%)	7 (14%)
<3rd percentile		6 (12%)	43 (86%)
Abdominal			
Palpable kidneys	yes	- (0%)	1 (2%)
	no	50 (100%)	49 (98%)

2-Microbiological results:

Table (6) shows the distribution of the microorganism isolated from the patients with first attack UTI with regard to age groups. The most commonly isolated microorganism 28 cases (56%) was *E.coli* followed by 10 cases (20%) *Klebiella* pneumoniae. The least isolated microorganism 2 cases (4%) was *Pseudomonas*.

Table (7) shows the distribution of isolated microorganism from patients with recurrent attacks of UTI with regard to the age groups. Most of the isolated microorganism 33 cases (66%) was *E.coli* followed by 13 cases (26%) *staphylococcus aureus*.

Table (8) shows the distribution of the isolated microorganism from patients with first attack UTI regarding to the sex .In males, *E.coli* was the most common, 18 cases (62%) isolated microorganism followed by7cases (24.1%) *klebiella*

Table (9) shows the distribution of the isolated microorganism from patients with recurrent attacks of UTI with regard to the sex. In males, *E.coli* was the most common, 4 cases (57.1%) isolated microorganism followed by 2 cases (28.5%) *Klebsiella pneumoniae*, while in the females, *E.coli* was the commonly , 29 cases (67.4%) isolated microorganism, followed by13cases (27.9%) *staphylococci*,.

Table-6: Distribution of the microorganisms in patients with first attack UTI in regard to age.

Age Group(years)	*Escherichia coli*	*Klebsiella pneumoniae*	*Proteus mirabilis*	*Staphylococci aureus*	*Pseudomonas aerogenoza*	Total
< 1	4 (14.2%)	1 (10%)	Nil (0%)	2 (40%)	Nil (0%)	7 (14%)
1-5	7 (25%)	3 (30%)	2 (40%)	1 (20%)	Nil (0%)	13 (26%)
5-10	17 (60.7%)	6 (60%)	3 (60%)	2 (40%)	2 (100%)	30 (60%)
total	28 (56%)	10 (20%)	5 (10%)	5 (10%)	2 (4%)	50 (100%)

Table-7: Distribution of the microorganisms in patients with recurrent attacks of UTI in regard to age.

Age Group (years)	*Escherichia coli*	*Klebsiella pneumoniae*	*Proteus mirabilis*	*Staphylococci aureus*	*Pseudomonas aerogenoza*	Total
< 1	\	\	\	\	\	\
1-5	30 (90.9%)	2 (50%)	Nil (0%)	12 (92.3%)	Nil (0%)	44 (88%)
5-10	3 (0.9%)	2 (50%)	Nil (0%)	1 (7.6%)	Nil (0%)	6 (12%)
total	33 (66%)	4 (8%)	0 (0%)	13 (26%)	Nil (0%)	50 (100%)

Table (8) : Distribution of microorganisms isolated in patients with first attack UTI in regard to sex.

Sex	*Escherichia coli*	*Klebsiella pneumoniae*	*Proteus mirabilis*	*Staphylococci aureus*	*Pseudomonas aerogenoza*	Total
Males	18 (62%)	7 (24.1%)	Nil (0%)	3 (10.3%)	1 (3.4%)	29 (58%)
Females	10 (47.6%)	3 (14.2%)	5 (23.8%)	2 (9.5%)	1 (4.7%)	21 (45%)
Total	28 (56%)	10 (20%)	5 (10%)	5 (10%)	2 (4%)	50 (100%)

Table (9) : Distribution of microorganisms isolated from patients with recurrent attacks of UTI in regard to sex.

Sex	*Escherichia coli*	*Klebsiella pneumoniae*	*Proteus mirabilis*	*Staphylococci aureus*	*Pseudomonas aerogenoza*	Total
Males	4 (57.1%)	2 (28.5%)	Nil (0%)	1 (14.2%)	Nil (0%)	7 (14%)
Females	29 (67.4%)	2 (4.6%)	Nil (0%)	12 (27.9%)	Nil (0%)	43 (86%)
Total	33 (66%)	4 (8%)	Nil (0%)	13 (26%)	Nil (0%)	50 (100%)

3. Ultrasound results:

Pateints with acute UTI:

Most of cases showed signs of acute cystitis(29 cases= 58 %),followed by 26 cases(52 %) showing dilatation of the pelvicalcyceal system ,,the least abnormality was renal stone, pyelonephritis,pelviuriteriv junction (PUJ)narrowing & ectopic kidney(2 cases 4% for each)..Table(10).

Table-10 Ultrasound findings in newly-diagnosed patients

US abnormalities	No.	%
Cystitis*	29	58
Pelvicalyceal system (PCS)dilatation	RT-side(16)	32
	LT-side(10)	20
Ectopic kidney	2	4
Dilated ureter	10	20
Pelviureteric junction (PUJ)narrowing (figure 3)	2	4
Renal stone** (figure4)	2	4
Pyelonephritis***	2	4
Thickening of the urinary bladder wall**** (figure 5)	2	4
Post-voiding residual urine	2	4

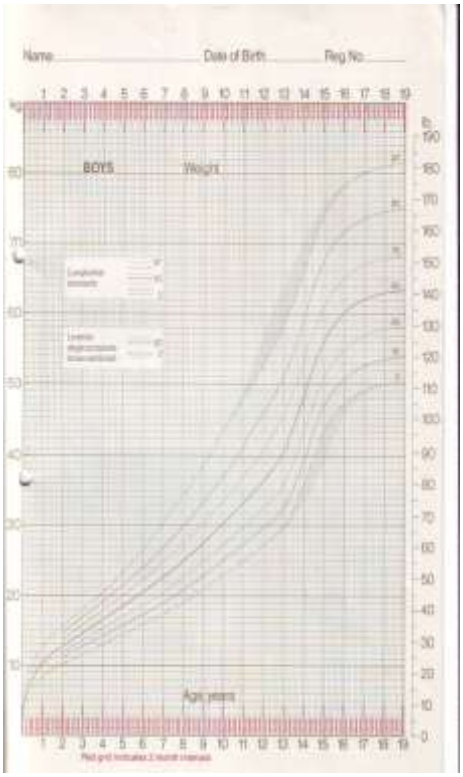
*distended UB with hazy mucosal lining & basal urinary sediments.
**echogenic shadows with distal acoustic shadowing
***enlarged kidney with mildly-dilated PCS & increased cortical echogenicity.
****more than 2 mm with a full UB &more than 5 mm with an empty UB.

Recurrent UTIs patients:
Most of them having thickened UB wall(33 cases=66 %),followed by PCS dilatation (22 cases, 44 %),,the least abnormality was PUJ narrowing & ectopic kidney(2 cases 4% for each).....Table (11)

Table-11 Ultrasound findings in recurrent UTIs patients

US abnormalities	No.	%
Thickening of the urinary bladder(UB) wall*	33	66
Pelvicalyceal system (PCS)dilatation	RT-side(10)	20
	LT-side(12)	24
Ectopic kidney	2	4
Dilated ureter(reflux)	4	8
Pelviureteric junction (PUJ)narrowing	2	4
Renal stone**	RT-side(6)	12
	LT-side(6)	12
	Bilateral(2)	4
Pyelonephritis***	3	6
Small atrophic Kidney (chronic pyelonephritis)	RT-side(4)	8
	LT-side(2)	4

*more than 2 mm with a full UB &more than 5 mm with an empty UB.
**echogenic shadows with distal acoustic shadowing
***enlarged kidney with mildly-dilated PCS & increased cortical echogenicity.



Figure(1) Weight for age (Boys)

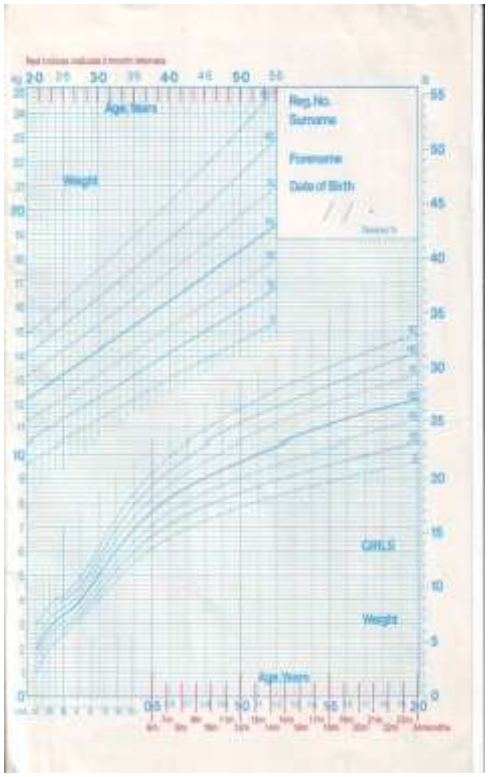


Figure (2) Weight for Age (Girls)

Fig-3 LT-kidney showed severe PUJ narrowing with thin cortex.

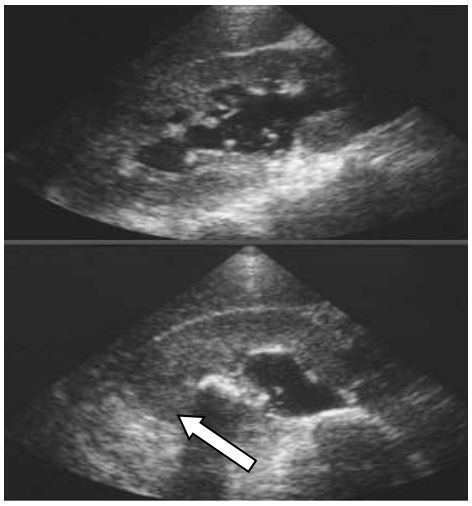


Fig-4 Rt-kidney upper calyx stone (arrow) &diffuse pyelonehritis

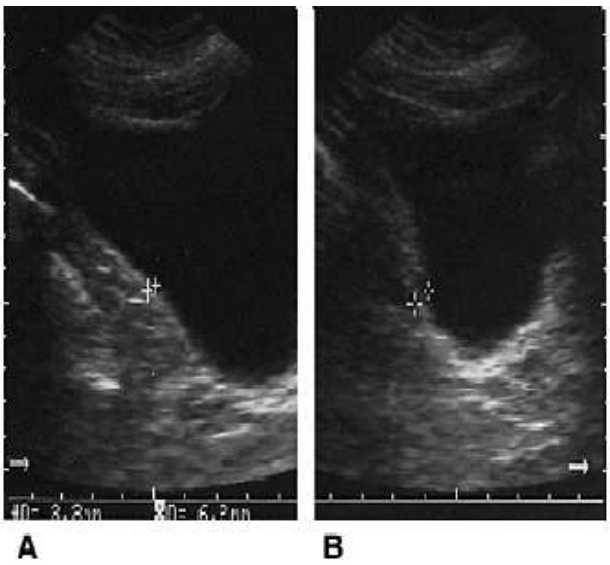


Fig- 5 Mild-degree urinary bladder wall-thickening with evident residual post-voiding urine A-full UB B-After void.

Discussion

UTI is a common important problem affecting children world wide for which its early recognition and treatment will greatly decrease both morbidity and mortality from the disease (1) . Studying the distribution of microorganism causing UTI is of paramount importance for diagnosis and right treatment for the disease. (3) Ultrasound is still an important tool for dianosis and followup of UTI patients. (6)

Most of the newly diagnosed UTI were common at the age of 5-10 years . This agree with other study by Andrich MP (9) which shows the same results in that most patients with first attack of UTI present at age more than 5 years. This may be due the reason that most of the families (and physicians) are not aware about UTI in infants and young children specially if it is asymptomatic and with older age the child may sart to aware about dysuria and frequency and urgency which may through a light on the presence of UTI.

Yet most of the children with recurrent UTIs group present between the age of 1-5 years. This goes with Gordon study (10) which shows that little cases of repeated UTIs presen before the age of 1 year. This due to the same reason above and also due to that most of the patients with recurrent UTIs have congenital abnormalities of the genitourinary tract that may necessitate repeated urinary analysis.

Males were the most commonly affected inregard to the first attack UTI . This is goes with other studies by Zelkoic (11) and Klein JO (12) which show nearly similar results . On the contrary , in the recurrent UTIs females were more common than males . This may be due to the reason that recurrent UTIs are more common in females is due to that females have short urethra which may facilitate the entry of pathogenic bacteria from the lower urinary meatus special in mother who clean her baby after defication with backwash behaviour (creating bakwash cystitis) (2). In addition low vaginal PH (3.5-4.5) due to lactic acid produced by action of lactobacillus on the glycogen of slughed vaginal cells . This occur under control of estrogenes. Any distruption in the vaginal PH (by the non proper use of antibiotics or hormonal disturbance) will enhance the liability of having urinary tract infection.

Regarding the residence of the patients, it is clear that most of the study cases were from the urban areas for both first and recurrent attacks of UTIs . This may be to the reason that most of urban families are more aware about their children regarding symptoms of UTI with no problem in transport and contact with their pediatrician.

The most common presentation of patients with newly diagnosed UTI was urgency followed by pain during micturition and dribbling of urine . This goes with other similar studies (13), (14), (15)which show that patient with first attack UTI (specialy older children) present with classical features of UTI like frequency and urgency. Enuresis present in 30% of cases which is slightly higher than that reported by Hansson S. study (13) and theis may be due to that current study sample were mailnly between the age of 5-10 years age group which is the age of definition of enuresis (1).

Failure to gain weight was the commoenest manifestation in patients with recurrent UTIs followed by loss of appetitie and dribbling of urine. This does not goes with Schiff study (16) in which frequency and urgency were the commonest manifestations of recurrent UTIs followed by asymptomatic patients. This due to the fact that UTI is one of the commonest reason for failure to thrive in children (2) and the reason that most of our patients are little aware about the effect of recurrent UTI on the growth of their child and because of difficulties in transport for follow up and repeating the urinary tract evaluation.

Most of the patients with first attack of UTI had normal weight for age and sex while most of the patients with recurrent UTIs had abnormal weight (less than the 3rd percentile for age and sex). This due to the same reason above in that recuurent UTIs are one of the common causes of failure to thrive in children(2)

In patients with first attack UTI with regard to the age groups, the most microorganism recovered was *E.coli* followed by *klebiella pneumoniae* . The least

microorganism recovered was *pseudomonas*. This is goes with other studies by Majd M (15) and Hallesrstein S (17) and which still stated that *E.coli* is still the commonest microorganism recovered in patients with acute UTI. This due to the fact in general the gram negative endotoxin decrease ureteral peristalsis. In addition the *E.coli* has pili and adhesence allow bacteria to bind to and colonise urinary tract epithelium (3) In addition motile bacteria (like *E.coli*) can ascend through the urethra against urinary flow by which it infect urinary tract frequently.

The least microorganism isolated was *Pseudomonas eroginosa* , a result which is similar to that found by Hallesrstein S study which dose not isolate any *pseudomonal* growth during the study period. This is due to that this microoerganism isolated usually in patients with urinary catheterization and following urinary surgery which is not the case in this study.

In regard to the patients with recurrent attacks of UTI distributed according to age groups. Most of the microorganism recovered was *E.coli* followed by *staphylococcus aurous*. This is goes with Gordon I. study (10) which shows quietly the same results . The reason why *E.coli* was the commonest organism recovered was due to the same reason above , in addition to that normal urinary flow will regularly wash the microorganism ascending through the ureter , so defect in the urinary flow (which is may the case in patient with recurrent UTIs) may allow the colonization and infection with this microorganism. The reason why *Staphylococcus aureus* was the second microorganism recovered is that these organisms was a normal urinary flora which grow abnormally with any disruption in the normal urinary epithelium (which may occur in patients with recurrent UTIs). In adittion IgM and IgG antibodies produced against O antigens (*E.coli*) and k antigens (*kliebiella*), protective role of antibodies was un clear , may limits damage within the kidney and prevent persistent colonization and thus provoke for recurrent infection.

On the other hand , in patients with first attack UTI with regard to the sex of the patients. In males, *E.coli* still the most common microorganism recovered followed by *Klebsiella*, while in the females still the *E.coli* was the most common microorganism recovered , followed by *proteus*. This is goes with Majd M.(15) study (15) which stated that E.coli was the commonest microorganism recovered among both sexes.

With regard to the microorganism recovered in patients with recurrent attacks of UTI in regard to the sex of the patients. In males , *E.coli* was the most microorganism recovered followed by *Klebsiella pneumoniae*, while in the females , *E.coli* was the commonest microorganism recovered followed by *staphylococci*. This is goes with Gordon I. study (10) which shows also that *E.coli* was the commonest microorganism recovered in oateuients with recurrent UTIs. The above results were due to the reason mentioned above.

Ultrasonography is noninvasive and should be available in all units responsible for the care of children with renal disease. Ultrasound is an important tool for diagnosis &follow up of patients with UTI (18).

Regarding the ultrasonic features of patients with first attack UTI, most of the study cases with first attack UTI (29 cases, 58 %) had picture of cystitis, followed by 26 patients(52 %) with PCS dilatation. This agree with other study done by Bjorgvinsson E. (19) which shows that most of the cases of first –attack UTI were lower type(cystitis). This is due to the fact that in general most cases of UTI is of the lower tract type which may be due to the presence of short urethra in females with wrong habit of cleaning young female infants (creating backwash cystitis).

Pelvicalyceal system dilatation was the second most common ultrasonic features recovered in patients with first attack UTI (52%). This is agree with the Bjorgvinsson E (19) study which was nearly equal to that of the cystitis (43%) . This is due to the fact that Pelvicalyceal system dilatation occur transiently in most cases with first attack UTI which usually disappeared after proper treatment of the case.

Table-11 shows the ultrasonic features of patients with recurrent attacks UTI, most of the study cases with recurrent attacks UTI (33 cases, 66 %) was having a picture of thickening of the urinary bladder. This goes with other study done by kangarloo H. (20) which shows that most of the cases of recurrent-UTI were having thickening of the bladder wall(43 %). This is due to a well-known fact that because of repeated lower type UTI ,this leads to thickening of the bladder wall with time, which may be reversible if treated properly or sometimes not completely-resolved if its present for years.

Pelvicalyceal system dilatation was the second most common ultrasonic features recovered in patients with recurrent attack of UTI (44%). This is goes with the Hellerstein S. (17) study which shows that Pelvicalyceal system dilatation was the third most common ultrasouinic picture after thickening of bladder and ureteral dialatation . This is due to the same reason above in that that Pelvicalyceal system dilatation occur transiently in most cases with first attack UTI and may be due to the presence of sever type of vasicoureteric reflux or lower urinary obstruction which is usually precipitate recurrent UTIs.

Conclusions:

Urinary tract infection is a major problem in children , most patients were at the age of 1-5 years , most of them were females and from the urban areas. Most of cases presents with failure to gain weight. *E.coli* was the commonest microorganism recovered. Thickening of the bladder wall was the commonest ultrasonic feature seen.

References

1. Berman S. Urinary tract infection. In: Berman S, ed. Pediatric decision making. 2d ed. Philadelphia: Decker, 1991:204-7.
2. Merenstein GB, Kaplan DW, Rosenburg AA. Handbook of pediatrics. 17th ed. Norwalk, Conn.: Appleton & Lange, 1994.
3. Feld LG. Urinary tract infections in childhood: definition, pathogenesis, diagnosis, and management. Pharmacotherapy 1991;11:326-35.
4. Travis LB, Brouhard BH. Infections of the urinary tract. In: Rudolph AM, ed. Rudolph's Pediatrics. 20th ed. Stanford, Conn.: Appleton & Lange, 1996:1388-92.
5. Batisky D. Pediatric urinary tract infections. Pediatr Ann 1996;25:266,269-76.
6. Andrich MP, Majd M. Diagnostic imaging in the evaluation of the first urinary tract infection in infants and young children. Pediatrics 1992;90:436-41.
7. Ditchfield MR, de Campo JF, Nolan TM, Cook DJ, Grimwood K, Powell HR, et al. Risk factors in the development of early renal cortical defects in children with urinary tract infection. AJR Am J Roentgenol 1994:162:1393-7.
8. Landau D, Turner ME, Brennan J, Majd M. The value of urinalysis in differentiating acute pyelonephritis from lower urinary tract infection in febrile infants. Pediatrics Infect Dis J 1994;13:777-81.
9. Andrich M P, Magd M.Diagnostic imaging in the evaluation of the first urinary tract infection in infants and young children. Pediatrics 1992; 90:436–441.
10. Gordon I. Vesico-ureteric reflux, urinary-tract infection, and renal damage in children. Lancet 1995; 346:489-90.
11. Zelikovic I, Adelman RD, Nancarrow PA. Urinary tract infections in children. An update. West J Med 1992;157:554-61.
12. Klein JO, Long SS. Bacterial infections of the urinary tract. In: Remington JS, Klein JO, eds. Infectious diseases of the fetus and newborn infant. 4th ed. Philadelphia: Saunders, 1995:925-34.
13. Hansson S, Jodal U, Noren L, Bjure J. Untreated bacteriuria in asymptomatic girls with renal scarring. Pediatrics 1999;84:964-8.
14. Verrier Jones K, Asscher W, Verrier Jones R, Mattholie K, Leach K, Thompson M. Renal functional changes in schoolgirls with covert asymptomatic bacteriuria. Contrib Nephrol 1994;39:152-63.
15. Majd M, Rushton HG, Jantausch B, Wiedermann BL. Relationship among vesicoureteral reflux, P-fimbriated Escherichia coli, and acute pyelonephritis in children with febrile urinary tract infection. J Pediatr 1991;119:578-85.
16. Schiff DW. AAP member alert. Elk Grove Village, Ill., UTI in children.American Academy of Pediatrics, March 10, 1999.
17. Hellerstein S. Evolving concepts in the evaluation of the child with a urinary tract infection [Editorial]. J Pediatr 1994;124:589-92.
18. Grainger R, Wilson A. Paediatric Uroradiology. In: Grainger and Allison's Diagnostic Radiology, a Textbook of Medical Imaging, 4th ed, volume 3. London: Churchill Livingstone, 2001; chap 74,p:32573-2578. Blumenthal I. Vesico-ureteric reflux, urinary-tract infection, and renal damage in children [Letter]. Lancet 1995;346:900.
19. Bjorgvinsson E, Majd M, Eggli KD. Diagnosis of acute pyelonephritis in children: comparison of sonography and 99m Tc-DMSA scintigraphy. AJR Am J Roentgenol 1991;157:539-43.
20. Kangarloo H, Gold R H, Fine R N, Diament M J. Urinary tract infection in infants and children evaluated by ultrasound. Radiology 1995; 155:367–374.

التهاب المجاري البولية عند الأطفال : دراسة وصفية ، دراسة الأحياء المجهرية مع دراسة المواصفات من الأمواج فوق الصوتية

زينب سليمان ارزيك ، سمير خير الله ، أسامة مراد ، احمد هاشم

(تاريخ الاستلام: ٢٣ / ٣ /٢٠٠٨ ، تاريخ القبول: ٢٩ / ١٠ / ٢٠٠٨)

الملخص

تمت هذه الدراسة على١٠٠ طفل مصاب بالتهاب المجاري البولية وسنهم اقل من عشر سنوات المراجعين لقسم طب الأطفال في مستشفى تكريت التعليمي للفترة من٢/١ إلى٢٠٠٧/١٠/٣١. تم تقسيم المرضى إلى مجموعتين الأولى مرضى مصابين بالتهاب المجاري لأول مرة و الأخرى المرضى المصابين بالتهاب المجاري المتكرر. إن أكثر المرضى في المجموعة الأولى كانوا بعمر٥-١٠ سنوات(٦٠%)معظمهم أولاد(٥٨%) وكانوا من مناطق حضرية(٦٤%) أما المجموعة الثانية كان أكثرهم بعمر١-٥ سنوات(٨٨%)معظمهم إناث(٨٦%)من المناطق الحضرية(٨٨%).أكثر المرضى من المجموعة الأولى كانوا يعانون الشعور بالحاجة السريعة للتبول(٤٤%) بينما كان قلة النمو الشكوى الرئيسة للمجموعة الثانية (٩٨%).الايشيريشيا القولونية كانت السبب الرئيس للالتهاب في المجموعتين مقارنة بالعمر والجنس(٥٦%) و(٦٦%) لكل مجموعة على التتابع. كان التهاب المثانة الأكثر حضورا في فحص الأمواج فوق الصوتية في المجموعة الأولى(٥٨%)بينما كانت صورة تثخن جدار المثانة الصورة الأكثر شيوعا في المجموعة الثانية.