

Original article:

Radiological abnormalities and complications of urinary tract infection among urine culture positive children

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Abstract:

Introduction: Urinary tract is very often the site of bacterial localization. Symptomatology of urinary tract infection is quite variable. Urinary tract infection is very common cause of morbidity in infants and children. With this view the present study was planned to assess the radiological abnormalities in culture positive patients and to enumerate the complications of UTI among culture positive patients.

Methodology : With the help of 'predesigned, pretested questionnaire patients were evaluated by history, clinical examination, complete urine examination, urine culture and sensitivity, renal parameters, X ray KUB, MCUG and DMSA Scan. Children who met the inclusion criteria were screened (around 1-2/day). Urine for culture was sent in appropriate cases. Consent to carry out investigations was obtained from parents of each child after explaining to them the nature of illness in terms they could understand, most often in their own language.

Results : Out of 54 cases who were studied, 29 had normal study and 25 had abnormal study. out of which 8 had cystitis, 4 cases hydronephrosis (Grade IV VUR) 6 had echogenicity of collex; with pyelonephritis as a possibility and were further radiologically evaluated. 5 cases had calculi and 2 cases had pelvic uretic obstruction.

Conclusion: Radiological evaluation in children with first documented UTI is essential to prevent renal parenchymal damage that can cause hypertension and chronic renal failure at a later date.

Introduction:

Urinary tract is very often the site of bacterial localization. Symptomatology of urinary tract infection is quite variable. Urinary tract infection is very common cause of morbidity in infants and children. Because of lack of urologic signs and symptoms, many attacks of pyelonephritis in infants are missed or are diagnosed late, or are misdiagnosed as teething problems tonsillitis, bronchitis or stomach upsets. Untreated or inadequately treated, urinary tract infection lead to chronicity. As a result, the progression from acute to chronic pyelonephritis is common.^{1, 2}

Thus urinary tract infection is not an isolated event, but represents a complex situation which may follow a variety of courses during the life time of the individual. Early detection proper and prompt treatment influences the prognosis beneficially.³ Hence, the study was undertaken to find out the clinical profile or type of presentation of patients with urinary tract infection and to investigate those cases to find out if there is any associated congenital or acquired anomaly. With this view the present study was planned to assess the radiological abnormalities in culture positive patients and to enumerate the complications of UTI

among culture positive patients.

Methodology :

With the help of 'predesigned, pretested questionnaire patients were evaluated by history, clinical examination, complete urine examination, urine culture and sensitivity, renal parameters, X ray KUB, MCUG and DMSA Scan. Children who met the inclusion criteria were screened (around 1-2/day). Urine for culture was sent in appropriate cases. Consent to carry out investigations was obtained from parents of each child after explaining to them the nature of illness in terms they could understand, most often in their own

language.

Inclusion criteria

Children with fever with signs and symptoms of UTI (burning m icturation, haematuria, urinary incontinence, bed wetting, abdominal pain, foul smelling urine) and Children with fever with no specific focus of infection.

Exclusion criteria

Children or infants with diagnosis of upper respiratory tract infection, otitis media, gastroenteritis or central nervous system manifestations and Children who have been on antibiotics prior to evaluation.

Plain x ray abdomen

Total no. of cases: 58

Table 1

X-RAY	Numqer	Percentage
NORMAL	53	91.
CALCULI	5	8.61

Table shows that the plain X-ray abdomen were normal in 53 (91.37%) cases while urinary calculi in 5 (8.61%) cases.

Abdominal ultrasound

Total no. of cases studied: 54

Table 2

USG Abdomen	No. ofcases
Normal Study	29
Abnormal Study	25

Abnormal USG

Table 3

Cystitis	8(32%)
Hydronephrosis	4(16%)
Pelvic ureteric junction obstruction	2(8%)
Calculi	5(20%)
Increased echogenecity of cortex	6(24%)
Total no	25/54

MCUG (MICURATING CYSTOURETHROGRAM)

Total no of cases: I0
 Abnormal MCUG: 8
 Normal MCUG: 2

Abnormal MCUG

Table 4

GRADES	CASES
I	0
II	3
III	3
IV	I
v	I

MCUG was done in 10 cases. 2 cases had normal study. 8 cases (13.79%) revealed abnormalities. Grade II and III reflux was seen in 6 cases and 2 showed grades IV and V.

DMSA Scan

Renal scan was done in 6 children. 2 had normal study. Other 4(6.89%) children had abnormal scan suggesting renal parenchymal scars with acute pyelonephritic foci. In 2 cases abnormal study suggested left contracted kidney with parenchymal scarring with reduced renal functions of the left Out of 58 cases with documented UTI (culture positive), 27 children were followed up till a repeat

urine culture suggested no growth and the radiological investigations were done. One child had recurrence of UTI and two children had sterile pyuria. They were followed up over a period of 10 days and futther ultrasound in both the children. DMSA Scan was done in one child who was normal. In two children, were the left kidney function was marginally reduced and had parenchymal scarring were referred to Paediatric

surgeon and were surgically evaluated. Nephroureterectomy was done in both the children.

These children were followed up after surgery and were put on antibiotics for one month and there was complete recovery in both of them.

Eight children had cystitis and were treated with appropriate antibiotics and were symptom free.

However, the remaining 31 cases were lost for further follow up.

Discussion

Out of 54 cases who were studied, 29 had normal study and 25 had abnormal study. out of which 8 had cystitis, 4 cases hydronephrosis (Grade IV VUR) 6 had echogenicity of cortex; with pyelonephritis as a possibility and were further radiologically evaluated. 5 cases had calculi and 2 cases had pelvic ureteric obstruction.

It is said that VUR is responsible for 30 – 40% of UTI. In this study, ultrasound detected 4 cases of significant VUR and 6 had increased echogenicity of cortex. It is also an increasingly popular technique in paediatric practice as it is painless, does not involve the use of ionizing radiation and is entirely safe.⁴ It can be generally recommended for the detection of the VUR from our study. Ultrasound is particularly effective in identifying the presence of obstruction and renal swelling.

MCUG was done in 10 cases. Out Of 10, 8 cases revealed abnormalities. Grade II and III reflux was seen in 6 cases and 2 cases showed Grade IV and V.

The timing of evaluation for MCUG is

often a concern. It had been suggested that MCUG may be delayed by 4 – 6 weeks following acute infection to avoid mild reflux secondary to inflammatory changes of the ureterovesical junction. Nevertheless, a prolonged waiting period is not necessary and the cystogram can be performed when the patient is asymptomatic and urine IS sterile.

Renal scan was done in 6 cases. 4 children had abnormal study suggesting renal parenchymal scars acute pyelonephritis foci. In 2 cases abnormal study suggested left contracted kidney with parenchymal scarring with reduced renal function of left kidney.

They divided patients into two groups, first group included those with positive risk factors, which were age < 1 year, pyelonephritis symptoms, abnormal ultrasound, non Enteric organisms in urine. Second group included children without any of these risk factors.⁵ patients in Gr I had abnormal DMSA scan and one patient in Gr II had abnormal DMSA scan. In all the patients with positive DMSA scan ultrasound was abnormal. No patient with negative risk factors and negative ultrasound had a positive DMSA scan. Therefore this study showed that DMSA scan in patients with UTI should be restricted to children with abnormal ultrasound result and those with associated risk factors. Results in our study reiterated the conclusions drawn by Dr. CHATTERJEE, Dr. RIFKIN on DMSA scans in UTI⁶.

It appears justified from our study that DMSA scan is considered as the most sensitive measure of upper urinary tract

inflammation <⁷. It is appropriate to consider renal scan as the gold standard for detecting renal scars with sensitivity of 90% and specificity of 95% to recognize scars and for following in future⁸

Conclusion:

Radiological evaluation in children with first documented UTI is essential to prevent renal parenchymal damage that can cause hypertension and chronic renal failure at a later date.

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