

Association of First Urinary Tract Infection in Children with Urinary Tract Abnormalities

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ABSTRACT

Background: Urinary Tract Infections (UTI) may be a variety of presentation of underlying urinary tract abnormalities including obstructive uropathy, vesicoureteral reflex (VUR), renal calculi and urethral duplication. The long term complications of (UTI) with these conditions are hypertension, renal scarring and chronic renal failure (CRF).

Aim: To determine the incidence of first UTI associated with urinary tract abnormalities.

Methods: This study was carried out in the Department of Nephrology, Sandeman Provincial Hospital/Bolan Medical College, Quetta. We reviewed 78 patients who were hospitalized with symptomatic UTI during a 3 year period (January 2009 to December 2012). The age limits were two months to 15 years. Patients with incomplete investigations were excluded from the study. Seventy patients were included in the study (50 Girls and 20 Boys). Confirmed cases of UTI underwent renal and urinary tract ultrasonography (US), micturating cystourethrography (MCUG) and 99m TC-dimercaptosuccinic acid (DMSA) scan.

Results: The common causative agent was E-Coil (75.5%). The most common presentation was fever in 62 cases and dysuria in 42.8% VUR was found in 24 patients (34.2%), 70.8% girls and 29.2% boys. Other urinary tract abnormalities were kidney stone in 7%, obstructive hydronephrosis in 4.2%, neurogenic bladders in 4.2%, double collecting system in one patient and posterior urethral valves in two boys respectively.

Conclusion: 35% of pts had VUR & 20% had other associated abnormalities in urinary tract we recommend that US, MCMG and DMSA scan should be routinely performed on all pts after first UTI.

Keywords: Urinary tract infection, Abnormalities, Vesicoureteral reflux

INTRODUCTION

In all age groups urinary tract infection is common and it is presented with a variety of urinary tract pathologies. The recurrent UTI have a variety of long term complications like renal scarring, hypertension, and even chronic renal failure^{1,2}. In young children urinary tract infection indicates abnormalities of urinary tract³. The first attack of UTI occurs mostly in the first year of life and it is experienced that the new young growing kidneys are more prone to develop renal parenchymal damage⁴. The radiological abnormalities occur in 25-55% of children in different studies who were investigated after their first UTI. It is important that among them one third having vesicoureteral reflex (VUR). The purpose of this study was to know the association of first urinary tract infection in children with urinary tract abnormalities.

PATIENTS AND METHODS

This study was conducted in department of Nephrology Sandemen Provincial Hospital/ BMC

Quetta from January 2009 to December 2012 in three years periods prospectively. All the UTI patients were investigated. The age limit was two months to 15 years, who presented with first confirmed UTI. Micturating cystourethrography (MCUG), ultrasonography (US) and DMSA renal scan were done in all the patients. 78 patients were treated. 8 of them were excluded from the study due to incomplete investigation. In the remaining 70 patients 50 were female and 20 were male children. A Performa was used for all the patients to note the history of dysuria, vomiting, anorexia, fever, poor feeding, irritability, frequency, dark urine and foul smelling urine. The circumcision of all male patients also noted. While blood pressure taken in all patients. Urine analysis was done after collecting the urine sample according to the age of patient in the form of suprapubic aspiration, clean catch catheterization or mid urine stream. The diagnosis of UTI was made if a single pathogen bacillus detected on culture urine. Culture were taken by at least two consecutive bag urine samplings with > 10 colony forming units (CFU)/ml of a single bacterial species or by suprapubic aspiration (growth of 10³ CFU/ml). All patients suffering from UTI received intravenous ceftriaxone with or without ampicillin for 7 days minimum, after that they were

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given cefixime orally with or without ampicillin for 10 days. According to reports of bacterial sensitivity, where needed the antibiotic were changed. Those patients who have abnormal image received antibiotic for 14 days. Renal and urinary tract US were done within 2 to 3 days of their admission in the hospital to look for abnormality.

All the patients were investigated for VUR .For this purpose Maturation cystourethrography (MCUG) was done 3 to 6 weeks after the urinary tract infection. When the culture of urine became negative, MCUG was done by using urograffine 30% which was pulled in the bladder by using a pediatrics feeding tube or a small Folly's catheter. The residual bladder volume for male patient and a urethral view was also noted. VUR was classified according to the international reflux study classification⁵. For the measuring of glomerulor filtration rate of each kidney and renal scaring DMSA was done in all children. Normal renal scan was that in which the uptake upto 45 to 55% by the kidney of the total renal activity. The focal or generalized area defined as area of diminished uptake of the isotopes with loss or contraction of functional renal cortex and this appear as wedge shaped defects, cortical thinning or flattening. Same panel of nuclear radiologist were evaluated all the renal scanning. Due to religious obligation, all the male patients enrolled in the study were circumcised. Analysis of the data done by Fisher's exact text and chi-squared test.

RESULTS

VUR was found in twenty four patients (34.2%), 17 were girls and 7 boys. It was founded bilaterally in 7 (10%) and unilaterally in 17 (24.2%). In grade one reflux only 2 (2.8%) patient, grade 2 in 6 (8.5), grade 3 in 11(15.7%), grade 4 in 4 (5.7%) and grade 5 in one (1.4%) patient founded respectively. Other urinary tract abnormalities except of VUR were founded in 14 (20%) patients. Nephrolithiasis was founded in 5 (7%), obstructive hydornephrosis in 3 (4.2%), double collecting system in one (1.4%), Neurogenic bladder in 3(4.2%), and posterior urethrlvalves (PUVS) was found in 2 boys (2.8%), respectively. Abnormal DMSA scan was noted in 37(53%) patients. The most common causative pathogens was Escherichia coli in 53(75.7%), followed by Klebsiella in 9(12.8%), protease in four (5.7%), Staphlocoeeussu prophyticus in two (2.8%) patients respectively. Among these patients 12 patients (17%) were less than one year and 4 (5.7%) were 10 to 15 years old. The urine specific gravity in high grade VUR was repeatedly less than 1.005 in 5 patients of this group which is the indication of confirm reflux nephropathy in 66(9.42%) patients. In

these patients the serum creatinin was normal according to the age of patient but in 4 patients (two boy and two girl) it was raised, in these cases 4 had higher grade of reflux .Primary VUR was found in 3 patient (one boy and two girls) and PUVs was found only in one boy.

DISCUSSION

The urinary tract anomalies frequently cause urinary tract infection in children. It is important to mention that the cause of approximately 13 to 15% of ESRD is unrecognized UTI in children.² Fever noted in 62(88.5%) patient in the present study and dysuria in 30 (42.8%). The main organism was E-coli which was detected in 53(75.7%) cases. This figure correlates the literature and coincides with the neighboring countries⁶. In general population the prevalence of reflux is not well known. Bailey reported 0.4 to 1.8% of children out a history of UTI had reflux⁷. In different racial groups the prevalence of VUR in children with UTI varies, it is more common in white children with symptomatic UTI. Studies from the United States, United Kingdom and Italy show the highest prevalence of VUR (41%-63%)⁸⁻¹⁰. VUR was the most common abnormality in our study detected in 24 (34.2%) patient of these 17(70.8%) were girls and 7(29.2%) were boys. Howard et al¹¹ has reported the presence of VUR in 39% of symptomatic Chinese children having UTI and our study is near to him. Male patient had high frequency of reflux than female (42.5% VS 39%). In our study renal scaring was detected in 37(53%) patients, it was unilaterally in 22 (31.4%) and bilaterally in 15(21.4%). Severe scar s were founded in both kidneys in only 4 patients (2 boys and 2 girls), all these patients had raised serum creatinin level and low GFR. Out of these four three had high grade (3—5) reflux. The fourth patient with raised renal function had PUVs and dilatation of collecting system from the renal calyces to the uretero vesical junction resulting in various degrees of hydronephrosis and hydroureter. Uretero pelvic junction obstruction is the most common; it is easily detected by doing the US which is highly sensitive for detection of hydronephrosis and hydroureter¹². In our study other abnormality other than VUR founded 14(20%) cases, among them 5(7%) had renal calculi, 3(4.2%) neurogenic bladder, 3(4.2%) obstructive hydronophrosis, 1(1.4%) double collecting system and 2(2.8%) PUV.

CONCLUSION

In our study VUR has founded in about 35% of infant and children having symptomatic UTI. The result of our study also shows the others urinary tract

abnormalities in 20% patient. These analyses give the idea that all the children having UTI needs complete evaluation. Ultrasound, MCUG and DMSA are our recommendation in all children after their first UTI.

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