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VESICOURETERAL REFLUX IN CHILDREN UP TO 5 YEARS OF AGE WITH TREATED URINARY TRACT INFECTIONS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Object: To determine the frequency of vesicoureteral reflux in children up to 5 years of age with treated UTI in a tertiary care hospital.

Patient & Method: This Cross sectional study was carried out in the department of Paediatric Medicine, Chandka Medical College, Children Hospital Larkana, from July 2009 to December 2009. A sample size of 98 cases calculated all children up to 5 years of age, of either gender with first episode of treated UTI (<10 WBC per high power field on urine analysis) in a tertiary care hospital were included in the study, children with contraindication to voiding cystourethrogram or untreated/active UTI (>10 WBC per high power field on urine analysis) were excluded. X-Ray voiding cystourethrography was taken and outcome was noted as presence or absence of VUR. The data was collected on study specific proforma after an informed consent and analyzed non probability Purposive.

Results: Total 98 UTI treated patients who fulfilled the inclusion criteria were included. The mean age of the patients was 27.15± 20.72 months. There were 80 (81.8%) males and 18 (18.2%) females. Most of the patients were in the age group of 1.00 to 24.66 months. The frequency of VUR was present in 33 (33.67%) patients, while in 65 (66.3%) patients VCUG was normal.

Conclusion: This study showed the significantly high frequency of VUR in UTI treated children. So we recommend that every UTI patient up to 5 years of age should investigated for VUR through VCUG.

Keywords: UTI, Children, VUR

INTRODUCTION

Vesicoureteral reflux (VUR) is defined as the back flow of urine from the bladder to the ureters and is a risk factor for pyelonephritis. Primary VUR is congenital and is not associated with any underlying neuromuscular or obstructive phenomenon[1].

Primary VUR is usually detected during radiological evaluation of children with urinary tract infection (UTI). It can also be identified in the uninfected siblings or offspring of the index patients and with prenatal diagnosis of hydronephrosis[2]. Vesicoureteral reflux can be secondary, for example associated with anatomical obstruction to bladder outflow; more often, however, it is a primary lesion, associated with failure of the anti-reflux mechanism at the uretero-vesical junction. Reflux nephropathy describes renal parenchymal disease due to vesicoureteral reflux. Renal parenchymal damage that occurs in childhood in the context of primary VUR has been considered to predispose to hypertension[3]. Furthermore, long- term follow-up studies of children with bilateral nephropathy and primary VUR show a small but significant risk of developing end-stage renal failure, in a survey, reflux nephropathy was present in 7 to 9% of children and adults in UK dialysis and kidney transplant program[4].

Severe VUR plays a role in the development of chronic kidney damage such as kidney growth

failure and reflux nephropathy, because of the back pressure in VUR to the kidneys is unusually high. This increased pressure can damage the kidneys and cause persistent parenchymal abnormalities. Furthermore, VUR predisposes to pyelonephritis and renal parenchymal abnormalities or renal scars. Although sterile VUR can cause renal scarring, most studies indicate that the appearance or extent of established renal scars indicates UTI[5].

In the light of current management of recurrent UTI, the level of severity of VUR possibly has much more role in the development of permanent kidney damage in children[6].

Vesicoureteral reflux is detected by voiding cystourethrography (VCUG), whereas scanning with 99mTechnetium-dimercaptosuccinicacid (99mTc-DMSA), which is concentrated in functional cortical kidney tubules, is the most sensitive test to detect focal kidney abnormalities, including scars of infectious origin, both in patients and in experimental animals[7].

Early diagnosis and prompt treatment is critical to preserve renal functions and reduced the morbidity, as the risk of scarring is great and progressive if there is delayed in diagnosis and management. Radiological evaluation is necessary in most children with UTI, to identify underlying predisposing conditions such as vesicoureteral reflux, obstruction or other urinary tract abnormalities. Both ultrasonography and voiding cystourethrogram are initial tests, which may determine the underlying pathological condition and helps to decide further management plan. Children with all types of require prophylaxis and need close observation and follow up to prevent renal scarring.

Our aim of study is to determine the frequency of VUR in children less than 5 years of age, with treated UTI.

PATIENTS AND MATHOD

This Cross sectional study was carried out in the department of Paediatric Medicine, Chandka Medical College, Children Hospital Larkana, during period of July 2009 to December 2009. Ninety eight patients were enrolled, as per inclusion and exclusion criteria. In all cases history, Physical examination and investigations were carried out. Along with ultrasonography x-ray voiding cystourethrogram was performed, for detecting vesicoureteral reflux. The procedure begins with the child lying in supine position on the x-ray table. Normal size urethral catheter according to age was inserted through the urethra in to the urinary bladder. Bladder filled with water soluble contrast material, then catheter withdrawn. X-ray images of the bladder and urethra taken when the child void. The data regarding positive or negative vesicoureteral reflux was recorded in the proforma. The data was collected on study specific proforma after an informed consent and analyzed non probability Purposive..

Inclusion criteria:

All children up to 5 years of age of either gender with first episode of treated UTI (Proved on urine culture and sensitivity test) in a tertiary care hospital included. In all children urine analysis was done for presence and count of WBCs (Pus cells), pus cells count < 10/HPF were included.

Exclusion criteria:

Those children who have untreated/active UTI or WBCs (Pus cells) >10/HPF on urine nalysis, recurrent UTI and those children where voiding cystourethrogram was contraindicated like hypersensitivity to contrast or above 5 years of age were excluded.

All the data was entered and analyzed in SPSS version 13. Descriptive statistics were used to summarize the categorical and continuous data while categorical data like gender, voiding cystourethrogram, VCUG findings were presented as percentages and frequencies and continuous data was reported as mean + S.D for the variable of age. Stratification was done by age, gender to control the confounding variables.

RESULTS

This study was conducted on 98 UTI treated patients who met the inclusion criteria.

The mean age of the patients was 27.15± 20.72 months. There were 80 (81.8%) males and 18 (18.2%) females (Table-1). Most of the patients were in the age group of 1.00 to 24.66 months, while 26 (26.5%) patients were in between 24.67 to 48.32 months (Table- 2). Voiding Cystourethrogram was performed in 97 (99.0%) patients while one Patient was excluded due to active UTI WBCs >10 on urine analysis(**T**able- 3).

Most of the patients 65 (66.3%) had normal VCUG findings, while 33 (33.67%) patients have VUR. Among 33 VUR patients 9 (9.2%) patients had bilateral grade V VUR, 7 (7.1%) patient had left sided grade V VUR, 3 (3.1%) patient had right sided grade IV VUR, 3 (3.1%) had left sided grade II VUR, 2 (2.1%) patient had right sided grade II VUR (Table-4).

TABLE 1. DISTRIBUTION OF SEX

Sex	No	Percentage
Male	80	81.8 %
Female	18	18.2%
Total	98	100 %

TABLE 2 DESCRIPTIVE STATISTICS FOR AGE (N=98)

Age (months)		
Mean		27.1531
Median		24.0000
Mode		24.00
Std. Deviation		20.72369
Minimum		1.00
Maximum		72.00
Percentiles	25	8.7500
	50	24.0000
	75	48.0000

TABLE 3
DISTRIBUTION OF VOIDING CYSTOURETHROGRAM

Voiding Cysto Urethrogram	Frequency	Percent
Yes	97	99.0
No	1	1.0
Total	98	100.0

TABLE 4 VCUG FINDINGS

VCUG Findings	Frequency	Percent	Valid Percent	Cumulative Percent
Normal Study	65	66.3	66.3	84.7
Bilateral VUR grade V	9	9.2	9.2	10.2
B/L VUR grade IV	1	1.0	1.0	1.0
Rt VUR grade V	1	1.0	1.0	11.2
left sided grade V VUR	7	7.1	7.1	18.4
Rt VUR grade IV	3	3.1	3.1	87.8
Lt sided VUR grade IV	1	1.0	1.0	88.8
Rt side VUR grade III	1	1.0	1.0	89.8
Lt sided VUR grade III	1	1.0	1.0	90.8
Rt sided VUR grade II	2	2.1	2.1	22.4
Lt sided VUR grade II	3	3.1	3.1	87.8
Lt sided VUR grade V+ right				
side grade III	1	1.0	1.0	96.9
Rt sided VUR grade V Lt side grade III	1	1.0	1.0	98.0
Rt VUR grade IV Lt VUR II	1	1.0	1.0	99.0
Lt sided VUR grade IV + Rt VUR I	1	1.0	1.0	100.0
Total	98	100.0	100.0	

TABLE- 5 DISTRIBUTION OF AGE ACCORDING TO VOIDING CYSTO URETHROGRAM

Voiding Cysto Urethrogram		Yes	No
Age (Months)	1.00 - 24.66	56 57.7%	0 .0%
	24.67 - 48.32	25 25.8%	1 100.0%
	48.33+	16 16.5%	0 .0%
	Total	97 100.0%	1 100.0%

In distribution of age group according to voiding cystourethrogram 56 (57.7%) patients found in the age group of 1.00 to 24.66 months while 25 (25.8%) and 16 (16.5%) in the age group of 24.67 to 48.32 and more than 48.33 months. Only one patient was found in the age group of 24.67 to 48.32 months with active UTI (Table-5).

DISCUSSION:

Vesicoureteral reflux (VUR) has been thought to be a major risk factor for renal scarring, predisposing patients to long term kidney damage and leading to hypertension, chronic
kidney insufficiency and complications of pregnancy[8]. Since VCUG is the only reliable method for finding and grading VUR, it has been suggested that VCUG should still be performed in children with UTI, although only in a selected group of children[9,10]. VCUG is an unpleasant procedure, causes pain and stress, subject to vulnerable tissues and considerable irradiation and even carries a risk of iatrogenic UTI[11], therefore, the indications for using VCUG should be based on firm evidence. Despite active evaluation and treatment of VUR, the incidence of reflux related renal disease has not declined.

Urinary Tract infection is a source of morbidity and mortality in the infants and children[12]. At least 8% girls and 2% boys have suffered one episode of UTI during school age[13]. During first year of life UTI is more common in males and above 1 year more common in females.

The main risk factors for UTI in children are Posterior urethral valve, vesicoureteral reflux, neurogenic bladder and renal scars.

In weiss RA study vesicoureteral reflux was 30% in boys and 29% in girls mean age 12 months and 48 months respectively[14].

R.G Howard et al conducted a study in china they took 93 children with UTI, 65 of them were male, The prevalence of VUR was 39% (45% in males and 25% in females), and the prevalence of scarring was 23% (28% in males and 11% in females), The prevalence of VUR in children with UTI appears to vary with geographical location. To some extent this may reflect racial difference, as can be seen from the studies comparing different groups in the same location. However, there are likely to be confounding variables that have not been controlled for in these studies. In general, the effect of race on the prevalence of VUR can only be surmised[15].

Khalid M M carried out a study at CMH Multan and Pano Aqil, All patients were less than 12 years of age with median age of 4.25 years and majority (43.33%) of them were 4-6 years of age. Male to female ratio was 1:2.3. Nineteen (63.33%) patients presented with recurrent UTI. All of them having grade IV and V reflux. Primary reflux was diagnosed in 23 (76.66%) of the patients and among them 20 (91.3%)

were girls and 3 (8.7%) boys, with female to male ratio of 7:1. Seven (23.33%) patients, who had secondary reflux, were male. Twenty-six patients (86.67%) had grade IV and V reflux. Among them 43.3% had unilateral and 56.7% had bilateral reflux[16] .

S. Mahant et al University of Toronto, Canada conducted study total of 162 patients were eligible for inclusion (median age 85 days; 71 (44%) were females). The median age for males was significantly lower than for females (74 v 157 days, respectively). The age range for males was 6-712 days, and for females 3-1606 days. Thirty five patients were found to have VUR on VCUG, giving a prevalence of 22%. Of these 35 patients, two had grade I reflux, 20 had grade II reflux, six had grade III reflux, seven had grade IV reflux, and none had grade V reflux[17].

Alejandro Hoberman et al conducted study in USA, they took UTI treated patients, total no of 309 children (276 girls and 33 boys) included in the present report.

Voiding cystourethrography was performed in 98 percent of the children (302 of 309) one month after diagnosis. Thirty-nine percent of the children (117 of 302) had evidence of vesicoureteral reflux. In 96 percent of these (112 of 117), the reflux was classified as grade I, II, or III. [18]

Ali Ahmadzadeh and Shahnam conducted study in Iran and enrolled the 479 patients and they found refluxing ureters of 319 patients; 50% cases were bilateral. The age at diagnosis ranged from 54 days to 16 years (mean: 4.1 years) and the male-to-female ratio was 0.21 (girls = 262, boys = 57). In 95% patients VUR was found during the investigation for UTI.[19]

Mohamed Zaki conducted a study in Kuwaitt they enrolled 34 patients in this study age was less than one year and Micturating cystourethrogram (MCUG) was advised for 32 patients. Vesicoureteral reflux (VUR) was found in 38.8%.[20]

Imad Kassis et al conducted study in Israel. During the study, 84 children under the age of 5 years with first documented UTI who met the inclusion criteria of the study were admitted to Meyer Children's Hospital. VCUG was performed in 78 patients, vesicoureteral reflux was observed in 30-40% of children with first documented UTI[21].

All these international and local studies observed frequency of VUR in children suffering from UTI comparable to the results in our study. There was difference in the techniques employed to diagnose VUR in some studies but all of them used VCUG as one of the major tool for evaluation of VUR.

CONCLUSION

Our study observed significantly large frequency of VUR in children and emphasize on the need that all children suffering from UTI should under go evaluation of VUR either by Ultrasonography or VCUG, so that the VUR can be diagnosed earlier and patient treated earlier to prevent renal insufficiency. Our study is small initial step that can serve as foundation for large cohort and randomized controlled trials, so that health care delivery system can be improved and morbidity and mortality associated with VUR can be decreased.

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