

Research Article

Outcome of Febrile Urinary Tract Infection (UTI) in Posterior Urethral Valve Patients

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Abstract

Objectives: to determine the effect of urinary tract infection on the renal function in patients with posterior urethral valves. **Patients and methods:** the study included 48 patients (9 of them below age of one month and 39 above the age of one month) who diagnosed to have posterior urethral valve. Pre-operative diagnosis was established by abdominal ultrasonography, voiding cystourethrogram, radio-isotope renal scanning. Laboratory investigations involved; urine culture and sensitivity, blood urea, serum creatinine and estimated GFR. **Results:** There was a significant correlation between the degree of hydronephrosis and the risk of UTI, patients with Bilateral massive hydronephrosis at presentation was the only significant risk factor for UTI (83.3% of UTI cases had massive hydronephrosis at presentation and 0% of cases without UTI had massive hydronephrosis at presentation. The mean GFR was significantly reduced during febrile attack of UTI, (from 47.6 to 24.6 ml/minute/1.73m²). **Conclusions:** Urosepsis was an important factor determining bad renal outcome.

Key words: Posterior, Urethral, Valve, Urinary tract

Introduction

PUVS Posterior urethral valve is a common cause of lower urinary tract obstruction in male infants and the most common congenital cause of bilateral renal obstruction. PUVS continues to be a significant cause of morbidity, mortality and ongoing renal damage in infants and children¹.

The incidence of PUVS is estimated to be 1 in 6000 to 8000 male births, but it may be more common for some fetal demise. High bladder outlet obstruction throughout gestation leads to severely compromised renal function secondary to renal dysplasia in many children with puv².

Diagnosis of puv has improved in the era of maternal ultrasonography, with the majority of the cases detected prenatally. However, there are still patients with late presentation in whom the characteristics and outcome are less well established³. Despite the limited number of studies concerning this population, late

presentation is generally assumed to represent the milder clinical spectrum of the disease, with a lesser degree of obstruction and a more favorable outcome⁴.

Treatment of puv remains a clinical challenge, requiring active management from infancy to adulthood to avoid progressive renal dysfunction and deterioration of the upper and lower urinary tracts⁵.

Patients and methods

This prospective randomized study included 48 patients presented with posterior urethral valve (36 patients at Abo El-Reish University Hospital, Cairo University and 12 patients at Minia University Hospital). In the period between May 2010 to May 2023. The study included postnatally diagnosed patients with posterior urethral valve based on clinical presentation, abdominal ultrasonography, voiding cystourethrographic and cystourethroscopic findings. While Children with

prunebelly syndrome, neurogenic bladder disorders were excluded from our study.

Physical examination, laboratory investigations in the form of (Complete Blood Picture, blood urea, serum creatinine, serum Na, serum K, urine analysis and urinary culture and sensitivity) was done to all patients.

Ultrasonography (US) was done to all the patients using a pediatric probe with frequency of 9MHz prior to the procedure and as follow up after management, Ascending and voiding cystourethrography was carried out for all patients to settle the diagnosis. The grading of reflux was based on the international reflux grading system. The International Classification System for vesicoureteral reflux combines features of systems previously used in Europe and in the United States¹. Renal Isotope Scan was done for cases of poor improvement after management as an informative functional test for the upper tract.

The preliminary treatment consisted of correction of metabolic disturbances; Vesicostomy was done for some patients as a result of severe urinary tract infection with elevated creatinine level with bad general condition. The definitive line of management was primary valve ablation using pediatric cystoscope (3Fr) after visualization of the valves. Older children with thick valves were treated by valve resection using (11 Fr) resectoscope.

Results

The age of presentation ranged from 9 days to 7 years (mean=27 months, median=22

months). The patients were divided into two groups according to their age at presentation:

Group 1, younger than one month, and **group 2**, older than one month. Group 1 (early presentation group) included 9 boys presented in the neonatal period (median age 14 days, range 9, 20 days), while the rest involved 39 boys (group 2: late presentation group) presented later in life (median age: 1.0 years range: 3 months to 7 Years). The most common presentation of PUV was weak urinary stream and difficulty of micturation (in 38%) followed by urosepsis (in 20%). Although, 3 patients (6.2%) had a history of antenatal hydronephrosis, and presented later during infancy with urosepsis in group 1. Initial examination showed 33.3% of our patients had high grade fever, 46% had weights \leq 10th percentile for age and 81% had heights \leq 10th percentile for age.

Thirty four patients (50.8%) reported recurrent episodes of non febrile UTI from the day of presentation to the last time of follow up; of them 4- 6 episodes were noted in 9 patients (3 from the early group and 6 from late group). Four UTI episodes were noted in 13 patients (3 from the early group and 10 from late group), 3 episodes were noted in 11 (1 from the early group and 10 from late group), and two episodes of UTI were reports in 9 patients from the late group. There was no statistical significance between the occurrence of non febrile UTI and the changes in the renal functions as well as the GFR levels ($p=0.430$), also there was no statistical significance related to the change in the renal echogenicity during the febrile UTI attacks. Fig. (R-9).

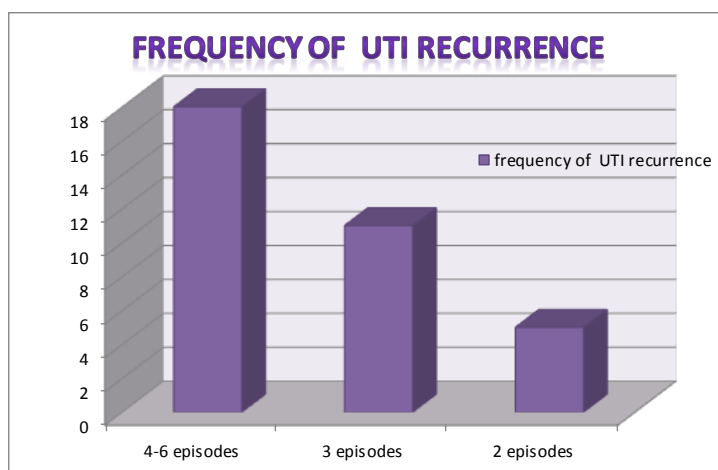


Fig.(R-1) frequency of UTI recurrence

Thirty one febrile UTI episodes (12 at presentation, 9 after PUV ablation and 10 during follow-up) were recorded in 23 patients (47.9%); of them Three patients in the early group developed 2 episodes of febrile attacks while one patient devolved one attack, While In the late presenting group 8 patients had 2 attacks, 4 patients 3 attacks and 2 patients had one febrile attack. 2 episodes were noted in 2 patients after closure of vesicostomy.

Febrile UTI recorded in 4 patients of late group after valve ablation, and treated conservatively with broad spectrum antibiotics and catheter

fixation except in one patient who developed bilateral infected kidney's with significant post void residual urine and required conversion to vesicostomy.

Gram negative Organisms was 61% of cases and mixed Gram-negative and Gram-positive infection was 39%, Urine cultures were responsive to antibiotic mono therapy in 64.3% (31% to ampicillin-sulbactam, 19% to Nitrofurantoin, 9% to Cefoperazon, and 0.3% to Amikacin sulphate), while 33.7% of urine cultures were resistant to antibiotics mono-therapy and required antibiotic combination. Fig. (R-2).

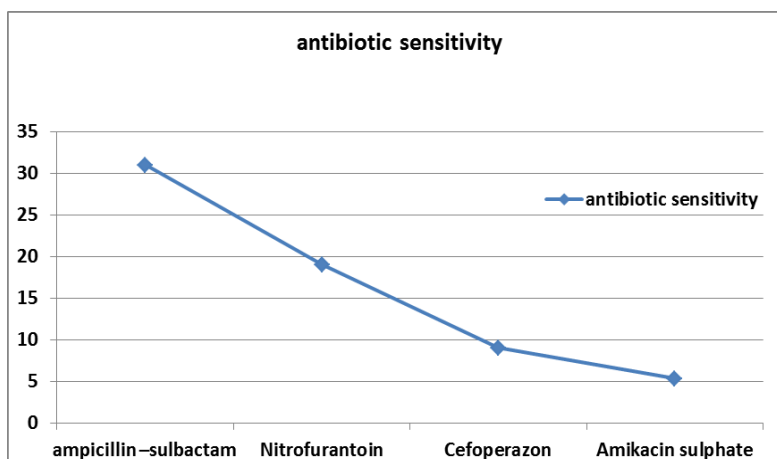


Fig.(R-2): Antibiotic sensitivity

There was a significant correlation between the degree of hydronephrosis and the risk of UTI, patients with Bilateral massive hydronephrosis at presentation was the only significant risk factor for UTI (83.3% of UTI cases had massive hydronephrosis at presentation and 0% of cases without UTI had massive hydronephrosis at presentation; $p=0.006$, Pearson's Chi Square test).

The mean GFR was significantly reduced during febrile attack of UTI, (from 47.6 to 24.6 ml/minute/1.73m²; unpaired t-test: $p=0.001$). After control of urosepsis, there was a significant improvement of mean GFR (from 24.6 to 40.1 ml/minute/1.73m²; unpaired t-test: $p=0.007$).

Urosepsis resulted in renal impairment in 4 patients (who had favorable renal function previously) and progression of renal insufficiency to ESRD in another 2 patients.

Febrile UTI was a significant risk factor for multiple blood transfusions when compared to those who did not have febrile UTI (66.0% vs. 14.8% respectively, $p=0.007$ Fisher's Exact test).

There was no correlation between the method of valve ablation, timing of valve ablation and urosepsis.

Discussion

PUV represent the most common obstructive uropathy in children⁵ with a broad spectrum of clinical severity and sequelae ranging from voiding dysfunction without renal impairment to early onset of renal failure and occasionally even death. In recent decades, prognosis of PUV has improved considerably and mortality has decreased from 0% to less than 0% in the last 30-40 years⁶.

In adults, lower urinary tract obstruction is usually diagnosed because of specific lower urinary tract complaints. Such complaints are not common in children as they cannot express the sensation of bladder fullness or their inability to void. Furthermore, urine volume in the first 24 hours of the infant's life is low, voiding frequency is normally high with small volume each, and "staccato type" voiding

occurs in more than 0% during the first 1 to 2 years of life, all these factors may be considered normal and contribute to delayed diagnosis⁷.

We found that The GFR significantly reduced during the febrile attacks. Additionally, the presence of bilateral massive hydronephrosis is a significant risk factor for recurrent UTIs as a result Narasimhan KL et al., 2006 was construed that recurrent febrile UTI was a contributory factor for the progression to ESRD in PUV patients¹¹.

DMSA scan documented non-functioning renal units in all cases with renal dysplasia and 10% of cases with persistent massive HN at last follow-up ultrasound, some authors was found that presence of one or more renal scars on DMSA scan had prognostic value; 94% of those with chronic renal failure had one or more renal scars compared to 43% of patients with normal renal function. Renal scarring has an adverse effect on the patient with PUV¹¹, Narasimhan et al., 2006 concluded that the patients who are at highest risk of renal scarring are those with breakthrough UTI, diurnal incontinence, and dilated ureters on ultrasound with poor drainage on DTPA scan¹¹.

Conclusions

Urosepsis was an important factor determining bad renal outcome in our series; it also significantly alters the renal function either before or after valve ablation.

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