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Outcome and Short Term Follow up of Children with Posterior Urethral Valves: Prognostic Factors

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Abstract: ***Posterior urethral valves (PUV) are the commonest cause of renal impairment in boys during early childhood. Despite a systematic approach in deciding choice of therapy in each case, renal failure is seen in 25-40% of posterior urethral valves (PUV) at varying ages[1]. Aim of the work: To identify the prognostic factors in patients with posterior urethral valve and help in defining the end result and implicating the correct treatment protocol. Patients and methods: This study reviews retrospectively a series of 50 children with posterior urethral valves who presented at department of pediatric surgery, Zagazig university hospital, Egypt in the period from 2009 to 2014, These included age at presentation and intervention (less than or more than 2 years), recurrent urosepsis, presence of vesico-ureteric reflux, renal parenchymal damage as seen on ultrasound, vesical dysfunction and the nadir serum creatinine level. Results: 29% of children had renal insufficiency at the end of 2-years' follow-up. Factors important in the progression towards renal insufficiency were evaluated. Factors found to be statistically significant with a p value <0.05 were ,age at intervention more than 2 years, recurrent urosepsis, bilateral high grade vesico-ureteric reflex, bilateral parenchymal damage as seen on ultrasonography and nadir serum creatinine of more than 0.8 mg%. Conclusion: prognostic factors in patients with posterior urethral valve depend on, age of intervention, and recurrent urosepsis, and degree of reflux,and degree of renal damage, and serum creatinine.***

Keywords: posterior urethral valves, prognostic factors, renal function

1. Introduction

Although posterior urethral valves (PUV) is not a common disease (1:5000 births),[2]its sequalae on the bladder function and the growing renal tissue makes it one of the most challenging diseases and it may carry a mortality rate of 50%[3]. Antenatal diagnosis of hydronephrosis is possible since 1980s but sensitivity and specificity of ultrasound for antenatal diagnosis of posterior urethral valves (PUV) remains low [4]. Specific diagnosis is required as posterior urethral valves(PUV) is associated with a poorer prognosis as compared to other causes of hydronephrosis which are diagnosed antenatally, such as pelvi-ureteric junction obstruction (PUJO) and vesico-ureteric reflux (VUR)[5]. Antenatal diagnosis helps in parental counseling and considering options for antenatal intervention if the diagnosis could be made with precision andfetuses with posterior urethral valves (PUV) and poorer prognosis could be identified antenatally.Prolonged and unrelieved lower urinary tract obstruction leads to back pressure effects on the kidneys resulting in obstructive uropathy with renal impairment. [6] Late presentation, which is common in a developing country, is associated with urosepsis, uremia, anemia, and complications of posterior urethral valves (PUV), which add to the morbidity of these patients.[7]

2. Patients and Methods

50 children with posterior urethral valves presented at department of pediatric surgery, ZagazigUniversity, Egypt, during the period of 2009 -2014. The average duration of follow-up was 2 years. A routine complete blood picture, routine urine analysis and culture examination, serum creatinine and electrolytes, ultrasound examination and micturating cystourethrogram (MCUG) was done as the baseline investigations in all patients.Pre operative urethral catheter drainage was put in all patients till stabilization of serum creatinine, and then endoscopic valve fulguration was done. The outcomes of vesico ureteric reflux (VUR) were then compared between early fulguration group (fulgurated before 1 year of age) and late fulguration group (fulgurated after 1 year of age). The various parameters studied were ,age at presentation, presenting symptoms, age at primary fulguration, unilateral, or bilateral VUR; outcome in the form of decrease or resolution of the grade of vesico ureteric reflux (VUR) and/or the requirement of additional procedures (re-implantation or ureterostomies).At follow-up, weight and height estimation of the child, urine routine and culture analysis, serum creatinine estimation and ultrasound examinations were done to assess the progress of the child.Micturating cystourethrogram(MCUG) was done at 3 monthly follow-up. Indication for aUrodynamic evaluation included persistent upper urinary tract dilatation or rising serum creatinine in spite of an adequate bladder drainage and persistent voiding dysfunction after an adequate valve fulguration.

Statistical analysis was done for all results obtained.

3. Results

Our study include 50 patients with posterior urethral valves(PUV), the age of distribution was as follow ,10 patients presented during first month of life, 15 patients was presented between 2 to 12 months of life, 20 patient was presented between 1 to 5 years, and 5 patients was presented between 6 to 8 years of life (Table :1) .50 patients (100%) presented by voiding abnormalities, 45 patients (90%) was presented by distended bladder,15 patients (30%) was presented by anemia,5 patients (10%) was presented by ballotable bladder,5 patients (10%) was presented by fever,10 patients (20%) was presented by failure to thrive,5 patients(10%) presented by hiccups, and 5 patients (10%)presented by haematuria (Table:2). Per-urethral catheter drainage was instituted in all the 50 patients with an average duration of 3.5 days. 20 patients had vesicoureteric

reflux on the initial micturating cystourethrogram (MCUG). 8 patients of which were low grade (I-III) and unilateral and the remaining 12 patients with high grade (IV-V) and bilateral. Serum creatinine stabilized at >0.8mg% in 15 patients, while 35 patients had a nadir creatinine of <0.8mg%. Post-valve fulguration, at 3-months' follow-up20 patients had a normal renal function, while 30 patients had renal insufficiency, 5 of which stabilized to normal renal function at 2 years. While remaining 25 patients (50%) had renal insufficiency. 2 patients of these children subsequently underwent a renal transplantation. 23 of these 25 children had a nadir serum creatinine of more than 0.8mg% ($p<0.05$).28 of the 50 children had evidence of recurrent urosepsis. Poor patient compliance had an important role to play. Of the 28 cases with recurrent urosepsis, 18 progressed to renal insufficiency ($p<0.05$).9 patients (75%) of the 12 children with bilateral high grade vesico-ureteric reflux had chronic renal failure at 2-years' follow-up. And we found that surgical management and chemoprophylaxis had no effect on the outcome. And 8 children with unilateral vesico ureteric reflux and low grade, of these only 3 patients (37.5%) was developed chronic renal failure after 2- years follow up.

Urodynamic evaluation in 12 children with renal insufficiency showed high intravesical pressure with low compliance in 6 cases, low compliance with normal voiding pressure in 2 case and hypocontractile bladder in 4 children. All the low compliant bladders improved with probanthine. Hypocontractile bladders were seen in the older children (age> 5 yrs) and were put on clean intermittent self-catheterization.

Table 1: Age of distribution

Age of presentation	*Number and percentage (%)*
0-1 month	10 (20%)
2-12 months	15 (30%)
1-5 years	20 (40%)
6-8 years	5 (10%)

Table 2: Clinical features and presentation:

Clinical features and presentation	*Number and percentage (%)*
Voiding abnormalities	50 (100%)
Distended bladder	45 (90%)
Anemia	15 (30%)
Ballotable bladder	5 (10%)
Fever	5 (10%)
Failure to thrive	10 (20%)
Hiccups	5 (10%)
Haematuria	5 (10%)

4. Discussion

Posterior urethral valve is one of the most serious congenital urinary tract anomalies that can lead to deleterious effect on future bladder and renal function.[8] Despite improvement in survival as many as 25-60% of these patients may have significant impairment in renal function in long-term follow-up. [9]Our study evaluates the prognostic factors affect the outcome of children with posterior urethral valve. In our study the median age of presentation was 2.5 years , it was more than other studied in developed countries, in which the median age of presentation was 1.2 years ,may be due to lack of awareness of normal urinary stream and poor patient compliance plays a major role in delayed presentation.[10]In our study all patients presented by voiding abnormities, in the form of dripping of urine, incontinence, and difficult micturation. And 45(90%) of our patients presented by distended bladder by ultrasound examination,15 patients (30%) was presented by anemia,5 patients (10%) presented by ballotable bladder,5patients(10%) presented by fever,10 patients (20%) presented by failure to thrive,5 patients (10%)presented by Hiccup, and 5 patients (10%) was presented by haematuria, these figures was mattached with other studies, in which Tejaniet al was study 150 patients with posterior urethral valve ,and the presentation of patients was ,100% of patients presented by voiding abnormalities, in the form of dripping of urine, urineretention, and incontinence,20% presented by distended bladder,15% presented by failure to thrive,10% presented by ballotable kidney due to marked hydronephrosis, and 30% of patients presented by haematuria.[11]In our study we discuss the prognostic factors affecting the final outcome of patients with posterior urethral valve. In the current series, the incidence of renal insufficiency in patients with urosepsis was 35%. Recurrent urosepsis (fever with urine culture showing infection) primarily due to the poor patient compliance (as regards to follow-up and chemoprophylaxis) leads to progressing pyelonephritis and nephron damage and plays an important role in the ultimate outcome of these children .[12]In our study Vesico-ureteric reflux is present at initial diagnosis in 60% of boys with posterior urethral valves. In other series done by Chevalier RLet al,the incidence of vesico-ureteric reflux at initial presentation of patients with posterior urethral valve was 30% to 70%.[13] Bilateral high-grade vesico-ureteric reflux is associated with high incidence of renal insufficiency due to associated primary renal dysplasia and recurrent ascending pyelonephritis.[14]In our series, 20 children had vesico-ureteric reflux, 8 of them had unilateral vesico-ureteric reflux low grade (I-III),and 2 patients (25%) patients of them proceed to chronic renal failure. And 12 of them had bilateral high grade vesico-ureteric reflux (IV-V),8 patients (66.6%) of which had chronic renal failure. But in other studies the incidence of chronic renal failure in patients with unilateral vesico-ureteric reflux was 33% this due to contralateral renal damage confirmed by ultrasound [15]. Ultrasound examination also serves to assess the state of renal parenchyma. Features of renal parenchymal damage on ultrasound include increased cortical echogenicity, loss of corticomedullary differentiation and atrophic and irregular cortex. Presence of these factors on ultrasonography hint towards renal insufficiency.[16]In our study the bilateral parenchymal damage was seen in 8 patients and unilateral parenchymal damage was seen in 2 patients, all of them proceed to chronic renal failure.Hence presence of bilateral renal parenchymal damage on ultrasonography indicates 100% progression towards renal insufficiency.[17]Another prognostic factor in our study was bladder dysfunction which associated with posterior urethral valves in 5 (10%) of patients and may or may not be reversible after relief of obstruction. In other seriesurodynamic abnormalities are present in 20 to 88% of boys with posterior urethral valves.[18] A urodynamic evaluation should be done in all children, who after an adequate valve fulguration show presence of urge incontinence, high post-void residue or a progressive increase in upper tract dilatation or renal

insufficiency. Peters & Bauer had described 3 major categories of bladder dysfunction: Acontractile bladder, detrusor instability, and low compliant, small capacity with high filling bladder pressure.[19]In our study we use Anticholinergic therapy and intermittent catheterization to improve bladder compliance after valve fulguration . The last prognostic factor in patients with posterior urethralvalve (PUV) was baseline serum creatinine after adequate bladder and upper tract drainage that indicates the baseline renal parenchymal functional status, Serum creatinine stabilized at >0.8mg% in 15 patients, while 35 patients had a nadir creatinine of <0.8mg%. Post-valve fulguration, at 3-months' follow-up 20 patients had a normal renal function, while 30 patients had renal insufficiency, 5 of which stabilized to normal renal function at 2 years. While remaining 25 patients (50%) had renal insufficiency. 2 patients of these children subsequently underwent a renal transplantation. 23 of these 25 children had a nadir serum creatinine of more than 0.8mg% ($p<0.05$).These results matches with other series done in patients with posterior urethral valve.[20]

5. Conclusion

Prognostic factors in patients with posterior urethral valves depend on, age of intervention, and recurrent urosepsis, and degree of reflux,and degree of renal damage, and serum creatinine.

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