

Original Research Article

A study proposal on short term outcome and prognosis of primary and delayed fulguration in posterior urethral valve

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ABSTRACT

Background: Posterior urethral valve (PUV) is the most common cause of lower urinary tract obstruction in male neonates. The incidence is 1 in 4000, 1 in 7500 births PUV occur exclusively in males. This disease has a broad spectrum of presentations. They may present at any age during childhood and may vary from ascites in the neonate to renal failure in infants and only minor voiding dysfunction in an older child. Urinary tract infection is common at all ages. The objectives of the study were to assess the impact of primary impaction on short term outcomes and to assess the outcome of diversion and delayed fulguration.

Methods: This retrospective study was conducted at the Pediatric Urology outpatient department (OPD) at the Institute of Child Health and Hospital for Children, Madras Medical College, Chennai including the patients who attended the pediatric surgery from August 2008 to December 2011.

Results: In the current series, the incidence of renal insufficiency in patients with urosepsis was 45%. Recurrent urosepsis >3 episodes in a year (fever with urine culture showing infection) primarily due to poor patient compliance lead to progressing pyelonephritis and nephron damage and plays an important role in the outcome of these children.

Conclusions: The incidence of renal insufficiency in children with posterior urethral valves in this series was 38% (30-45%) with an average follow up 3 years. Several factors were important in prognosticating the progression towards renal insufficiency and bladder dysfunction. Urodynamics is of immense help in cases having symptoms despite good stream. The use of anticholinergic for abnormal urodynamics gives encouraging results.

Keywords: Short term outcome, Prognosis of primary, Delayed fulguration, Posterior urethral valve

INTRODUCTION

Posterior urethral valve (PUV) is the most common cause of lower urinary tract obstruction in male neonates. The incidence is 1 in 4000, 1 in 7500 births PUV occur exclusively in males. This disease has a broad spectrum of presentations. They may be present at any age during childhood and may vary from ascites in the neonate to renal failure in infants and only minor voiding dysfunction in an older child.¹ Urinary tract infection is common at all ages. Oligohydramnios and hydronephrosis detected by antenatal ultrasound may be associated with renal

dysplasia which may compromise renal function despite relief of obstruction.² The diagnosis is made by ultrasound and micturating cysto-urethrography to know the renal status and to evaluate the urinary tract infection. Serum creatinine, blood urea and urine culture and sensitivity (c/s) will give a clue.³ Surgical care of the patient with PUV varies according to age, bladder status and renal status ideal treatment involves transurethral ablation using electro cutlery of the PUV (fulguration). When urethral size precludes saline ablation, vesical (i.e. vesicostomy), supra-vesical (ureterostomy) diversion can be created to provide upper tract drainage.⁴ Bilateral ureterostomy can

also be placed for urinary drainage in a certain condition.⁵ PUV presents with a wide spectrum of renal and bladder pathology including damage to renal parenchyma as well as to smooth muscle function of the urinary bladder. These changes may persist despite successful management of the primary obstructing PUV leading to bladder dysfunction and renal insufficiency, which is the primary cause of morbidity and mortality in these children.⁶ Much work has been done to identify the factors that predict the outcome in these cases to prognosticate the result and implicate the correct treatment protocol.⁷

METHODS

This retrospective study was conducted at the Pediatric Urology OPD at the Institute of Child Health and Hospital for Children, Madras Medical College, and Chennai including the patients who attended the pediatric surgery from 2009-2011. 35 children with posterior urethral valves were presented from 2009 to 2011. The average duration of follow-up was 3 years. A routine anemogram, routine urine analysis and culture examination, serum creatinine and electrolytes, ultrasound examination, and micturating cystourethrogram (MCUG) constituted the baseline investigations. All the patients were put on urethral cathedral drainage admission, which was continued till the serum creatinine level stabilized, with 2 c on consecutive levels showing no further drop. This was followed by primary valve fulguration and continuous chemoprophylaxis. At follow-up, weight and height estimation of the child, urine routine and culture analysis, serum creatinine in estimation were done to assess the progress of the child for every 3 months in 1st year, and every 6 months for 3 years. 35 children with post periurethral valves were presented from 2008 to 2010. The average duration of follow-up was 3 years. Ultrasound to assess the size of kidney and corticomedullary differentiation and size of the ureter.

RESULTS

In group-I, 22 children who presented below the age of 2 years, 81% (18/22) had a normal renal just 19% (4/22) progressed while to renal function insufficiency. In contrast, of the 13 children who presented above the age of 2 years, 40% (13) of the children progressed to renal insufficiency while 0% (8) had a normal renal function.

Post-valve fulguration, at 3 months follow up in group A, 25 patients had a normal renal function, while in group B, 10 patients had insufficiency, 6/25 of which stabilized to normal renal function at 3 years who had initially elevated serum creatinine. Hence the percentage of children with normal renal function at 3 years follow up was 70%, while 30% had renal insufficiency. 10 of these 35 children had a nadir serum creatinine of more than 0.8 mg % (Figure 1).

35 children had evidence of recurrent 13 of the urosepsis. Poor patient compliance had an important role to play. Of the 13 cases with recurring urosepsis, 6 progressed to renal

sufficiency. Only 2 cases out of 22 children with less than 3 episodes or nil urosepsis are groups which progress to renal sufficiency (Figure 2).

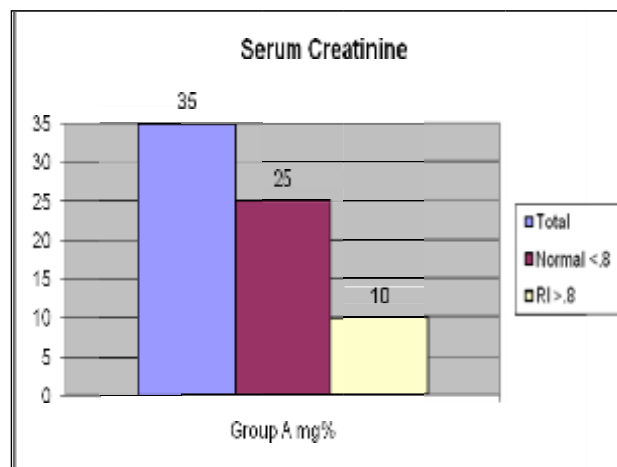


Figure 1: Serum creatinine level post valve fulguration.

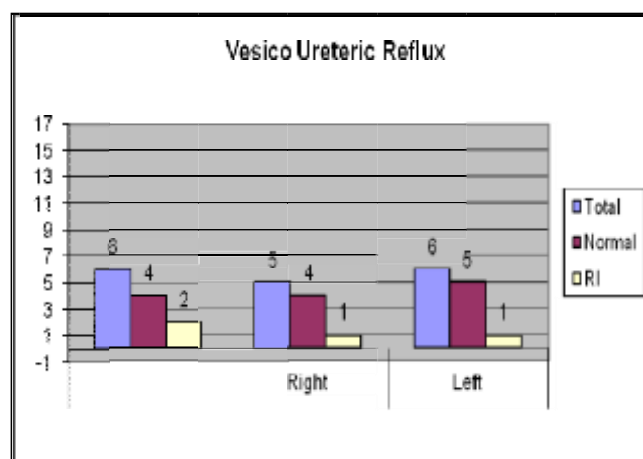


Figure 2: Urosepsis post valve fulguration.

17 of 35 children had vesicoureteric reflux on the initial MCUG. Bilateral reflux was present in 6 children, U/L in children in the right side reflux was noted in 5 cases and in left side 6 cases were seen, 10 of which were low grades (I-III) and the other remaining high grade (IV-V). 2 (40%) of the 6 children with bilateral high-grade vesicoureteric reflux had deterioration in renal function at 3 years follow up. There was no effect of surgical treatment (re-implantation procedure) or spontaneous solution (with chemoprophylaxis) of the reflux on the outcome of the 11 cases of unilateral high-grade reflux, 9 (80%) had a normal renal function, while 2 (20%) progressed to renal insufficiency (Figure 3).

Of the 5 cases with unilateral renal parenchymal damage as seen on ultrasonography, 1 progressed to renal insufficiency while 4 had normal renal parameters. Evidence of bilateral parenchymal damage was seen in 9

cases, 4 of which progressed to renal insufficiency (Figure 4).

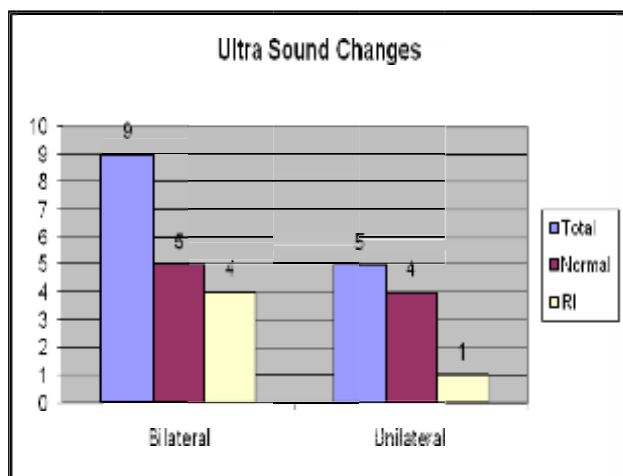


Figure 3: Ultra sound changes post valve fulguration.

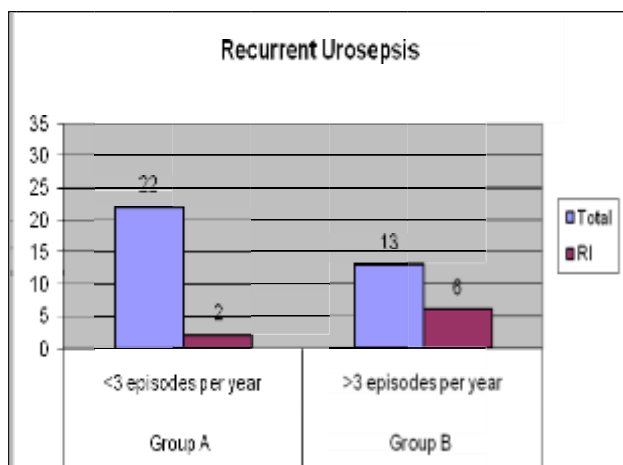


Figure 4: Recurrent urosepsis in post valve fulguration.

DISCUSSION

Posterior urethral valves cause an abroad array of renal parenchymal and vesicles function. Because urethral valves are present during the earliest phase of fetal development, primitive issues mature in an abnormal environment of high intraluminal pressure resulting in permanent male development (hydronephrotic, cystic, or dysgenetic kidneys) and long-lasting function abnormalities, with gradual progress towards renal insufficiency.⁸ The incidence of renal failure in literature is reported at 15-40%. Factors possible in defining the outcome were evaluated in this series. Our study showed that deterioration of renal function occurred in 19% of children with intervention before the age of 2 years, as compared to 40% after 2 years. This finds incorrect as well with those of Hendren.⁹ The process of nephrogenesis, which continues to mature till the attainment of maximum glomerular filtration till the age of 2 years, allows some

degree of compensation after a near intervention. In a country like ours, lack of awareness of the normal urinary stream and poor patient compliance plays a major role in defining the outcome. Early referral by primary health centers will facilitate early diagnosis and intervention, which in turn improves renal function.¹⁰ The baseline serum creatinine after bladder and upper tract drainage indicate the baseline renal parenchymal functional status. 10 out of 35 children with renal insufficiency in this series had creatinine of more than 0.8% which was more than twice the normal for their respective age. Hence a serum creatinine of more than 0.8% prognosticates subsequent renal insufficiency.¹¹ In the current series, the incidence of renal insufficiency in patients with urosepsis was 45%. Recurrent urosepsis >3 episodes in a year (fever with urine cultures showing infection) primarily due to poor patient compliance (as regards to following up and chemoprophylaxis) leads to progressing pyelonephritis and nephron damage and plays an important role in the outcome of these children.¹² Vesicoureteral reflux is present at the initial diagnosis in 50% of boys with valves. Bilateral grade vesicoureteric reflux is associated with a high incidence of renal insufficiency due to associated primary dysplasia and recurrent ascending pyelonephritis. In our series 6 children had bilateral high-grade vesicoureteral reflux, 2 (40%) of which had renal deterioration.¹³ The role of unilateral reflux as a pop-off valve mechanism by buffering the high intravesical pressure, with its protection to the opposite kidney, is true only if the contralateral kidney does not show primary dysplastic changes. The incidence of renal insufficiency in cases with unilateral reflux in this series was 20% (2/11).¹⁴ Ultrasound examination serves to assess the state of renal parenchymal changes as features of renal parenchymal damage on ultrasound include increased cortical echogenicity, loss of corticomedullary differentiation, and atrophic or decreased renal size. The presence of these factors on ultrasonography in towards renal insufficiency of the 5 cases with parenchymal damage as seen on ultrasonography, 1 child progressed to renal insufficiency, while the remaining had normal repair a meter.¹⁵ Evidence of bilateral parenchymal damage was seen in 9 cases of which 4 cases progressed to renal insufficiency. Hence bilateral renal parenchymal changes may persist for so many years on ultrasonography but 45% chance so progression towards renal insufficiency. Bladder dysfunction may be associated with posturethral valve in 13-38% of patients and may or may not be reversible after relief of obstruction.¹⁶ Urodynamic abnormalities are present in 90% of boys with posterior urethral valves in our series. Aerodynamic evaluation should be done in all children above 3 years after an adequate fulguration or post diversion closure show presence of urge incontinence, dribbling of urine, residual urine, increase in upper tract dilatation, or renal insufficiency. In our series, we did urodynamic studies (UDS) for 17 children. The three major categories of bladders functions are: normal capacity high-pressure bladder, small capacity high-pressure bladder, and detrusor instability (myogenic failure). These prevent adequate upper tract drainage with

subsequent increase dilatation and damaged upper tracts.¹⁷ Anticholinergic therapy improves bladder compliance, decreases detrusor instability, improves continence, and facilitates upper tract drainage in the majority of boys as seen in 9 boys in our series in 6-9 months.¹⁸ Clean intermittent catheterization should be done for hypo contractile bladder. Both presented at the age of above 5 years, indicating the length and duration of obstruction leading to decompensation of bladder musculature. With the advent of maternal antenatal ultrasonography, a significant number of PUV patients are being diagnosed prenatally.¹⁹ Any male fetus with bilateral hydronephrosis and a dilated bladder should be considered to have PUV until proven otherwise. PUV constitute about 10% of all prenatally detected uropathies.²⁰

CONCLUSION

The incidence of renal sufficiency in children with PUV in this series was 38% (30-45%) with an average follow up 3 years. Factors important in prognosticating the progression towards renal insufficiency and bladder dysfunction were: age at intervention more than 2 years, serum creatinine more than 8%, recurrent urosepsis of 3 episodes per year and bilateral grade reflux. Bilateral parenchymal damage was detected by ultrasonography. Urodynamics is of immense help in cases having symptoms. Despite good stream, the use of anticholinergics for abnormal urodynamics gives encouraging results.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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