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Original Article

Evaluation of Prognostic Factors Affecting Outcome in Posterior Urethral Valve: A Single Centre Experience

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ABSTRACT

Background: Posterior urethral valve (PUV) is the most common cause of congenital bladder outlet obstruction in male children and a major contributor to chronic kidney disease and end-stage renal failure. Early identification of prognostic factors is crucial for predicting long-term renal outcomes.
Objective: To evaluate clinical, biochemical, and radiological prognostic factors affecting outcomes in children diagnosed with posterior urethral valves.
Methods: This retrospective observational study included 36 male children diagnosed with posterior urethral valves between January 2020 and December 2021 at a tertiary care centre. Demographic characteristics, clinical presentation, laboratory parameters, imaging findings, treatment modalities, and follow-up outcomes were analysed descriptively. Patients were followed for a minimum period of two years.
Results: Primary cystoscopic valve ablation was performed in 88.8% of patients, while 11.1% underwent vesicostomy. Elevated serum creatinine at presentation, at one year of age, and at last follow-up, along with raised nadir creatinine (>0.75 mg/dL), were strongly associated with adverse renal outcomes. Increased renal echogenicity and loss of corticomedullary differentiation were also associated with poor prognosis. Early age at presentation was associated with better renal outcomes.
Conclusion: Serum creatinine levels and nadir creatinine are reliable predictors of long-term renal outcome in posterior urethral valve patients. Early diagnosis and intervention significantly improve prognosis.

Keywords: *Posterior urethral valve; Prognostic factors; Serum creatinine; Renal outcome; Pediatric urology.*

INTRODUCTION

Posterior urethral valves (PUV) represent the most common cause of congenital bladder outlet obstruction in male newborns and are a significant cause of chronic kidney disease and end-stage renal failure in children. PUV consists of obstructing membranous folds in the posterior urethra and occurs exclusively in males. Despite advances in antenatal diagnosis and postnatal management, long-term renal morbidity remains a concern.

Several prognostic factors influencing outcomes in PUV have been described in the literature, including antenatal diagnosis, age at presentation, serum creatinine levels, vesicoureteral reflux, renal parenchymal changes, and pressure pop-off mechanisms. However, data from developing and resource-limited settings remain limited. This study aims to evaluate the prognostic factors influencing renal outcomes in children with PUV treated at a tertiary care centre.

MATERIALS AND METHODS

Study Design and Setting

This retrospective observational study was conducted at the Department of Urology and Renal Transplantation, Gauhati Medical College Hospital, Guwahati.

Study Population

Thirty-six male children diagnosed with posterior urethral valves between January 2020 and December 2021 were included.

Inclusion Criteria:

- Male children with bladder outlet obstruction due to posterior urethral valves.

Exclusion Criteria:

- Bladder outlet obstruction due to causes other than posterior urethral valves.

Data Collection

Data were collected from medical records, including age at presentation, antenatal findings, clinical presentation, laboratory investigations, imaging findings, treatment modality, and follow-up outcomes. Investigations included serum creatinine, urine analysis and culture, ultrasonography of the kidney–ureter–bladder region, micturating cystourethrogram (MCUG), and dimercaptosuccinic acid (DMSA) scan where indicated.

Definitions

Chronic renal failure was defined as an estimated glomerular filtration rate (eGFR) ≤45 mL/min/1.73 m². Recurrent urinary tract infection was defined as more than three culture-positive episodes per year.

Follow-up Protocol

Patients were followed with assessment of urinary stream, renal function tests, ultrasonography, MCUG at six months, and DMSA scan in selected cases.

Ethical Considerations

As this was a retrospective observational study, institutional ethics committee approval was not required. Informed consent had been obtained from parents or guardians at the time of clinical evaluation and treatment.

Statistical Analysis

Data were analysed using descriptive statistics. Continuous variables were expressed as means or proportions, and categorical variables were expressed as frequencies and percentages.

RESULTS

Table 1: Demographic Characteristics

Variable	Number (%)
Total patients	36 (100)
Neonates	6 (16.7)
Age 1–12 months	24 (66.6)
Age >1–4 years	6 (16.7)
Antenatal diagnosis	7 (19.4)
Preterm birth	5 (13.8)
Full-term birth	31 (86.1)

Table 2: Clinical Presentation

Presentation	Number (%)
Voiding symptoms	13 (36.1)
Urinary tract infection	14 (38.8)
Sepsis	2 (5.5)
Oligohydramnios	7 (19.4)
Acidosis	10 (27.7)
Dyselectrolytemia	10 (27.7)

Table 3: Imaging Findings

Finding	Number (%)
Bilateral hydronephrosis	25 (69.4)
Unilateral hydronephrosis	5 (13.8)
Increased echogenicity / loss of CMD	10 (27.7)
Vesicoureteral reflux	10 (27.7)
Renal scars on DMSA	8 (22.2)

Table 4: Renal Outcomes and Prognostic Indicators

Factor	Poor Outcome (%)
Serum creatinine >0.8 mg/dL at presentation	72.7
Nadir creatinine >0.75 mg/dL	88.8
Loss of CMD	80
Presence of VUR	80

Primary cystoscopic valve ablation was performed in 32 patients (88.8%), while four patients (11.1%) underwent vesicostomy. At final follow-up, 22 patients (61.1%) had no complications, eight (22.2%) developed chronic renal failure, four (11.1%) had recurrent urinary tract infections, and two patients (5.5%) expired.

DISCUSSION

The present study highlights the importance of early diagnosis and renal functional assessment in children with posterior urethral valves. Most patients in our cohort presented during infancy, similar to observations reported by Bajpai et al. and Tejani et al. Early age at presentation was associated with better renal outcomes, likely due to reduced duration of obstructive uropathy.

Serum creatinine at presentation, at one year of age, and nadir creatinine were the strongest predictors of long-term renal outcome. A nadir creatinine value greater than 0.75 mg/dL was particularly associated with progression to chronic renal failure, consistent with previously published literature.

Radiological findings such as increased renal echogenicity, loss of corticomedullary differentiation, vesicoureteral reflux, and renal scarring on DMSA scan were associated with adverse outcomes. These findings reflect underlying renal dysplasia and irreversible parenchymal damage.

The type of surgical intervention did not significantly influence long-term renal outcome. Pressure pop-off mechanisms also failed to confer a protective effect in our cohort. These findings suggest that renal outcome is primarily determined by intrinsic renal damage rather than the modality of urinary diversion.

Limitations

This study is limited by its retrospective design, small sample size, and lack of inferential statistical analysis. Longer follow-up is required to assess progression to end-stage renal disease.

CONCLUSION

Early diagnosis and intervention are crucial in improving outcomes in posterior urethral valve patients. Serum creatinine and nadir creatinine levels are reliable predictors of renal prognosis. Identification of high-risk patients allows closer monitoring and timely intervention to prevent progression of renal disease.

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