

Controlled Outcomes for Achievement of Urinary Continence among Boys Treated for Posterior Urethral Valves



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Purpose: We evaluated the age at which boys with a history of posterior urethral valves after no or minimal anticholinergic medication achieve urinary continence and the factors contributing to continence.

Materials and Methods: We reviewed the hospital records of all males treated for posterior urethral valves at a single institution between 1990 and 2008. Continence was considered to have been attained if no weekly wetting episodes occurred. We evaluated the influence of patient characteristics, including reduced kidney function and primary ring type ureteral stoma, on age at which continence was achieved.

Results: A total of 76 patients were assessed. Achievement of daytime and nighttime urinary continence was markedly delayed in patients (mean \pm SD age 5.5 ± 3.3 years and 5.4 ± 3.0 years, respectively) compared to the reference population (2.3 ± 0.5 and 2.9 ± 1.2 , $p < 0.001$). Increased serum creatinine levels at age 5 years were associated with later daytime and nighttime continence (mean \pm SD 6.0 ± 3.2 and 5.5 ± 2.6 years, respectively, vs 4.1 ± 2.3 and 3.7 ± 1.4 years, respectively, in patients with normal serum creatinine, $p \leq 0.05$). Prenatal or neonatal diagnosis of posterior urethral valves was associated with significantly delayed achievement of daytime continence compared to cases diagnosed later (mean \pm SD 5.9 ± 3.6 vs 4.1 ± 1.8 years, $p = 0.02$). Patients with high nadir serum creatinine and vesicoureteral reflux initially also were at increased risk for urinary tract infections ($p = 0.003$ and $p < 0.001$, respectively).

Conclusions: Patients with posterior urethral valves achieve daytime and nighttime urinary continence significantly later than their healthy peers. Prenatal or neonatal diagnosis and high serum creatinine are associated with later attainment of continence.

Abbreviations and Acronyms

PUV = posterior urethral valve

UTI = urinary tract infection

VUR = vesicoureteral reflux

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POSTERIOR urethral valves are the most common cause of lower urinary tract obstruction in boys, being accompanied by variable dysfunction of the lower urinary tract.¹ Valve ablation usually resolves the obstruction. However, dysfunction of the bladder may follow the patient throughout life.^{2,3} Typically patients

suffer from detrusor overactivity and a low compliance bladder in early childhood, and later the bladder may become underactive and distended.⁴⁻⁶ The classic daytime voiding pattern in early childhood of passing small volumes at frequent intervals may affect the success of toilet training.^{5,7} Additionally the impaired concentrating

ability of the kidneys that is present in many cases may lead to polyuria, contributing to incontinence and persistence of hydronephrosis.^{8,9} At an older age poor emptying of the bladder may also lead to persisting incontinence.¹⁰

The age at which children are weaned from diapers for urine varies widely between reports, and there is a lack of controlled series on the achievement of dryness among these patients.^{11–14} We determined the age at which children with a history of PUVs who have received no or minimal anticholinergic medication achieve daytime and nighttime urinary continence in relation to healthy controls in the general population, and evaluated the factors influencing this finding.

MATERIALS AND METHODS

We retrospectively reviewed the records of all patients treated for PUVs between 1990 and 2008 at the Children's Hospital, University of Helsinki. Following institutional ethical board approval a total of 76 patients were identified. No patient was excluded or lost to followup. Diagnosis of PUV was based on voiding cystourethrogram and confirmed by urethral endoscopy. Age at presentation with PUV, presence of VUR at diagnosis, occurrence of UTIs after valve ablation, and age at attainment of daytime and nighttime urinary continence were documented. Febrile and afebrile symptomatic UTIs for which patients received antibiotic treatment were included in the analysis.

Median age at diagnosis of PUVs was 0.02 years (range 0 days to 9.8 years). Standard transurethral ablation of the valves by hot loop or cold knife resectoscope had been performed by a consultant pediatric surgeon in all cases. A temporary ring type ureterocutaneostomy allowing bladder cycling was used in 18 neonates (24%) and vesicostomy in 1 (1%). Diversions were closed after 1 year. Modes of presentation of PUVs are outlined in table 1.

The greatest serum creatinine value at presentation and nadir value during the first year after valve ablation and at age of 5 years were registered. Our institutional reference values for serum creatinine by age are 37 to 98 $\mu\text{mol/l}$ at 0 to 2 days, 15 to 72 $\mu\text{mol/l}$ at 3 to 7 days, 10 to 56 $\mu\text{mol/l}$ at 8 days to 2 years and 10 to 48 $\mu\text{mol/l}$ at 5 years. We analyzed the effects of renal function (primary and later), age and presence of VUR at diagnosis of PUV, and temporary diversion on age at which the patient became dry. Continence was considered to have been attained if

no weekly wetting episodes occurred, criteria that we have found reliable and relevant in clinical practice. The development of continence in PUV cases was compared to the normal unselected child population. Urodynamic findings were not included in our analysis because we have observed that they rarely influence our clinical decision making.

Controls

Recently our research group collected a population of 594 subjects 4 to 26 years old who had been randomly selected from the Population Register Centre of Finland.¹⁵ Controls consisted of age and gender matched boys from this population.

Patients with PUVs Born between 1973 and 1989

We collected data of all patients with PUVs born between 1973 and 1989 and treated at the Children's Hospital, University of Helsinki, and compared whether development of continence had changed through time. During recent decades families of patients with PUV at our institution have received systematic guidance on the early institution of toilet training in the form of frequent and double voiding.

Statistics

The Student t-test was used to compare the groups for a possible difference in dryness age and to evaluate the role of VUR. The Fisher exact test was used to compare the proportion of continent patients in different age groups. Cross-tabulation and Pearson chi-square tests were used to compare the age of attaining continence, and for comparison of groups with and without VUR and UTIs. SPSS®, version 19.0 was used for statistical analysis. P values were 2-sided and $p < 0.05$ was considered statistically significant.

RESULTS

In relation to the control reference population patients with PUVs achieved daytime and nighttime continence significantly later (figs. 1 and 2), at

Table 1. Diagnosis of PUVs

Presentation	No. (%)
Prenatal	30 (39)
Neonatal	20 (26)
Infection	22 (28)
Other	4 (5)
Total	76 (100)

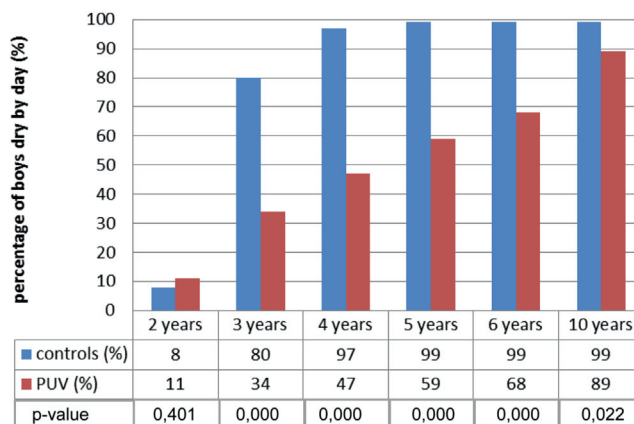


Figure 1. Comparison of daytime incontinence between patients with PUVs and controls.

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