



Invited Review Article

Current management practices of the posterior urethral valve

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Abstract

The posterior urethral valve is a condition with a broad clinical spectrum. To understand the severity of bladder outlet obstruction, the different forms of valve need to be understood. Early diagnosis and treatment in both prenatal and postnatal periods improve renal outcome and may also benefit bladder function. Initial surgical intervention aims to eliminate outlet obstruction and restore renal function. However, long-term follow-up and treatment are also important especially for bladder dysfunction which can change during childhood and persist into adulthood. The treatment should include all of the modalities that assist bladder function in both filling and voiding phases.

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Introduction

The posterior urethral valve (PUV) is acknowledged as being the most common cause of obstructive uropathy in boys, with a prevalence of 2.1 per 10,000 births¹ with around one-third developing end-stage renal disease which eventually requires renal replacement therapy.² To achieve the best treatment outcome, the pathophysiology of PUV and affected organs needs to be understood. Intrauterine lower urinary tract obstruction (LUTO) leads to dilation of the bladder, bilateral hydronephrosis and oligohydramnios. The presentation, timing and severity differ in each patient and needs to be determined by the degree of obstruction caused by the PUV.

In severe cases, LUTO may cause stillbirth or downstream consequences after birth which are mostly related to significant kidney damage and

pulmonary hypoplasia. Long-term consequences are mainly related to bladder dysfunction, renal dysplasia and tubular dysfunction which is life-long, differs individually in the degree of severity and can change over time.

Valve Characteristics

Classification of the PUV was firstly described in 1919 by Hugh Hampton Young. PUV type 1 is most common type, among the three main types, and accounts for 95% of all cases. This classic classification describes the anatomical details of each valve and possible etiology for each of them but it does not mention the degree of obstruction which is directly related to the level of severity which ranges from a mild to life-threatening condition. In PUV type 1, which is described as obstructing mucosal folds extending from the verumontanum, there are different forms and

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severity observed from the endoscopic view. For example, some of them appear slit-like, parachute or subtle narrowing as shown in Fig. 1.

Mini-valves³ are described as subtle narrowing observed in endoscopy and may be unrecognized until childhood or adolescence. Common presentations are recurrent UTI or lower urinary tract symptoms in older boys.

Presentation

Between 39 and 71% of cases are diagnosed prenatally.⁴ Prenatal diagnosis with ultrasound screening permits intrauterine intervention in selected patients, postnatal proactive bladder decompression and early surgical intervention. According to vesico-amniotic shunting in the PLUTO trial (2013), the chance of newborn babies surviving with normal renal function is very low. However, a recent study by Rhiele et

al. (2026) showed early intervention before 16 weeks of gestation may have the benefit for renal function preservation.

Postnatally, approximately half of the patients are diagnosed in the neonatal period, with the other half presenting with urinary tract infections.⁷ Age at presentation was mostly within the first 3 months of life.⁴

Diagnosis and Evaluation

Ultrasound remains the most widely accepted screening tool for bladder outlet obstruction.⁸ A pathognomonic finding in prenatal ultrasound is the “keyhole sign”, commonly seen as a distended, thick-walled urinary bladder with a dilated posterior urethra.⁹ Postnatally, ultrasound still plays a role in screening for PUV particularly in the setting of recurrent UTI or LUTO in young boys. Ultrasound can also be used to detect per-

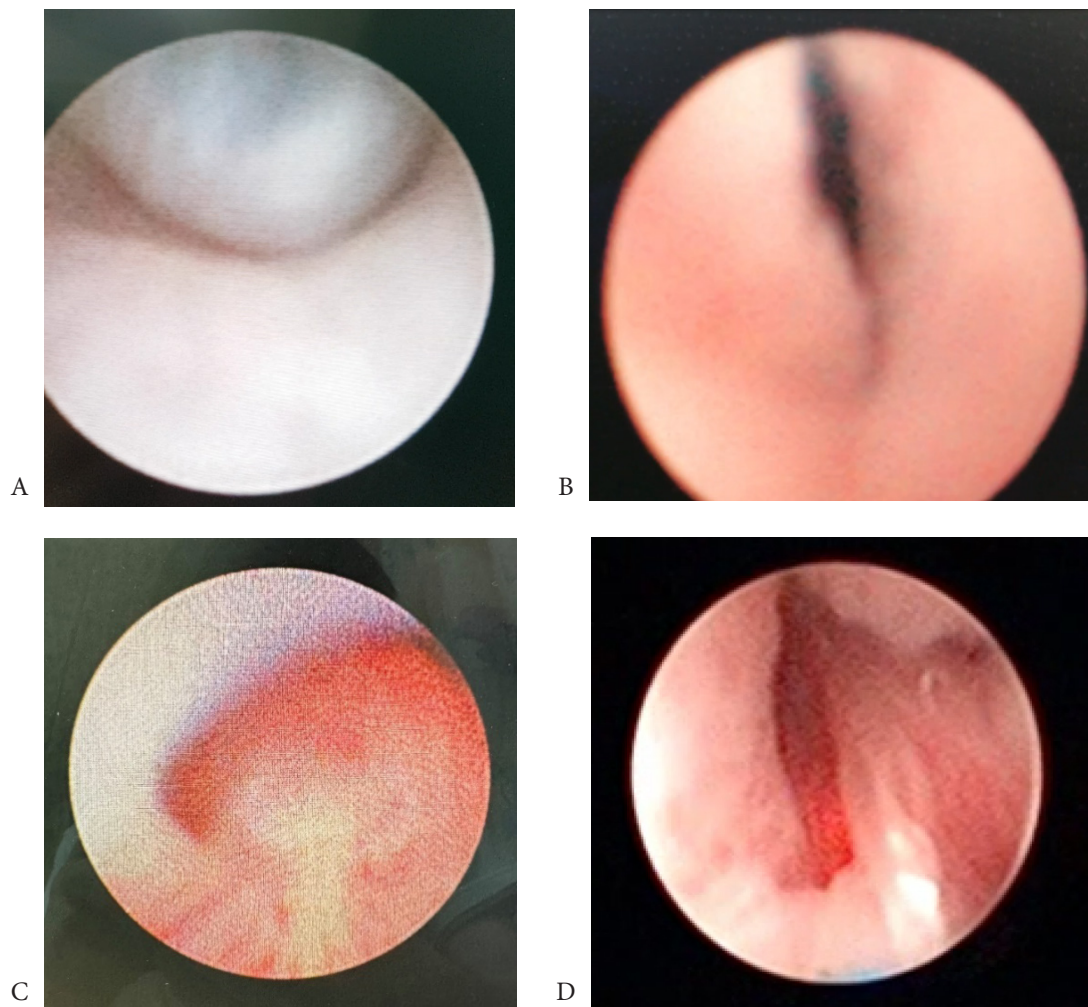


Figure 1. Example pictures of PUV type 1 showing differences in forms and degree of obstruction. A slit-like, B parachute, C and D show subtle narrowing with the valve predominantly at anterior part (C) or at folds from verumontanum (D)



inephric urinoma which presents as hypoechoic areas around the renal capsule.¹⁰

Voiding Cystourethrogram (VCUG) remains the “gold standard” modality in the diagnosis and evaluation of PUV. Confirmatory signs of PUV include a trabeculated bladder wall, a diverticulum with a dilated posterior urethra proximal to the PUV. Commonly, vesicoureteral reflux can be identified especially in the setting of persistently elevated storage pressures.⁹

However, it is important to note that radiologic evaluation can still yield false negative results despite causing high clinical suspicion. In such cases, cystourethroscopy is recommended and will give diagnostic certainty to the presence, severity, and type of PUV.

Initial Surgical Intervention

The main goals of initial management in PUV patients are stabilization and renal function preservation. A systematic review compared 530 patients who received primary endoscopic ablation with 397 patients who received urinary diversion. Patients in the primary endoscopic ablation group was less likely to have renal insufficiency at follow-up.¹¹ While most of the patients are successfully managed with primary endoscopic ablation, some may undergo urinary diversion which is influenced by patient characteristics and presentations such as too small urethra and unable to perform endoscopy, with worsening upper tract dilatation despite adequate bladder decompression.

Comparing long-term renal outcomes between patients with early and delayed presentation or between endoscopic ablation and urinary diversion are sometimes challenging because of the potential for bias. The patients who have delayed presentation and treatment may have resulting lower degrees of obstruction, with better bladder and renal function at the beginning. Conversely, the patients who underwent urinary diversion may have worse renal outcome because of their more severe upfront disease.

Bladder Dysfunction

Around half of PUV patients have bladder dysfunction persisting into adulthood⁴ with up to 40% requiring medication or clean intermittent catheterization. There are three bladder contractility patterns during childhood which may help

treatment planning before urodynamic study or during follow-up. These patterns are detrusor hyperreflexia in infancy and early childhood, improved bladder compliance in childhood, and increased bladder capacity with hypocontractility in adolescence.¹²

Early urodynamic studies in conjunction with optimal medications could reduce the incidence of bladder deterioration.¹³ Anticholinergic medication could be administered for patients with incontinence. Early administration of anticholinergics after successful valve ablation can improve bladder compliance and result in the lowering of high voiding pressure.¹⁴ Furthermore, it can also enhance improvement of upper tract dilatation.¹⁵ Alpha blockers could be administered in patients with persistent hydronephrosis or high residual urine. These treatments can result in improvement of obstructive symptoms with no side effects recorded after successful valve ablation.¹⁶

Valve Bladder Syndrome

Mitchell proposed the concept of valve bladder syndrome which originated from bladder outlet obstruction, increased voiding pressure and impaired bladder compliance. When bladder and renal function deteriorate, bladder insensitivity, residual urine volume and polyuria cause more damage in a vicious circle. Treating this condition after valve ablation is challenging and treatment strategies need to include the monitoring of residual urine, and voiding pressure, voiding habit adjustment, optimal medications, CIC and overnight drainage.¹⁷

Conclusion

PUV management is challenging in both the prenatal and postnatal period. Currently, it still has high rate of an association with end-stage renal disease. Early intrauterine or postnatal management showed some benefits in renal outcome. Multimodality therapy is important to optimize patient outcome especially in challenging conditions including valve bladder syndrome.

References

1. Malin G, Tonks AM, Morris RK, Gardosi J, Kilby MD. Congenital lower urinary tract obstruction: a population-based epidemiological study. *BJOG* 2012;119:1455-64.

2. Heikkilä J, Holmberg C, Kyllönen L, Rintala R, Taskinen S. Long-term risk of end stage renal disease in patients with posterior urethral valves. *J Urol* 2011;186:2392-6.
3. Shekar PA, Dumra A, Reddy D, Patel H. Posterior urethral mini-valves causing urinary tract infection: A report of 3 cases. *Indian J Urol* 2021;37:283-5.
4. Yadav P, Rickard M, Weaver J, Chua M, Kim JK, et al. Pre-versus postnatal presentation of posterior urethral valves: a multi-institutional experience. *BJU Int* 2022;130:350-6.
5. Van Mieghem T, Ryan G. The PLUTO trial: a missed opportunity. *Lancet* 2013;382:1471-3.
6. Riehle N, Kohl T. Risks and benefits of vesicoamniotic shunting for lower urinary tract obstruction (LUTO) after early, intermediate and late onset of therapy-A monocentric study of 104 treated cases. *Biomedicine* 2026;14:182.
7. Thakkar D, Deshpande A, Kennedy S. Epidemiology and demography of recently diagnosed cases of posterior urethral valves. *Pediatr Res* 2014;76:560-3.
8. Lissauer D, Morris RK, Kilby MD. Fetal lower urinary tract obstruction. *Semin Fetal Neonatal Med* 2007;12:464-70.
9. Shukla AR, Srivinasan A. Posterior urethral valves. In: Dmochowski RR, Kavoussi LR, Peters CA, Cooper CS, Porten S, Gomelsky A, editors. *Campbell-Walsh-Wein Urology*. 13th ed. Philadelphia: Elsevier; 2021. p. 877-99.
10. McLeod DJ, Flores VX. Posterior urethral valves and other congenital urethral obstruction in AUA core curriculum. [Internet]. 2026 [cited 2016 Jun 1] Available from: <https://auau.auanet.org/core/updatelist.cfm>
11. Khondker A, Chan JY, Malik S, Kim JK, Chua ME, Henderson B, et al. Primary ablation versus urinary diversion in posterior urethral valve: Systematic review and meta-analysis. *J Pediatr Urol* 2023;19:408-17.
12. De Gennaro M, Capitanucci ML, Mosiello G, Cai-one P, Silveri M. The changing urodynamic pattern from infancy to adolescence in boys with posterior urethral valves. *BJU Int* 2000;85:1104-8.
13. Puri A, Grover V, Agarwala S, Mitra D, Bhatnagar V. Initial surgical treatment as a determinant of bladder dysfunction in posterior urethral valves. *Pediatr Surg Int* 2022; 18:438-43.
14. Casey JT, Hagerty JA, Maizels M, Chaviano AH, Yerkes E, Lindgren BW, et al. Early administration of oxybutynin improves bladder function and clinical outcomes in newborns with posterior urethral valves. *J Urol* 2012;188:1516-20.
15. Abdelhalim A, El-Hefnawy AS, Dawaba ME, Bazeed MA, Hafez AT. Effect of Early Oxybutynin Treatment on Posterior Urethral Valve Outcomes in Infants: A Randomized Controlled Trial. *J Urol* 2020;203:826-31.
16. Aboulela WN, Eladawy MS, Latif AA. The effect of use of alpha-blockers in posterior urethral valve pediatric patients postvalve ablation in the absence of further outlet obstruction. *Urol Ann* 2024;16:218-20.
17. Nguyen MT, Pavlock CL, Zderic SA, Carr MC, Canning DA. Overnight catheter drainage in children with poorly compliant bladders improves post-obstructive diuresis and urinary incontinence. *J Urol* 2005;174:1633-6.