WebLog Journal of Urology

Research Article
Published: 01 Jan, 2026

Ureteric Orifice Size in Primary Epispadias: A "New" Observation

More B[1], Patel RV[1], Jahur S[2] and Cuckow P[2]*

[1]*Department of Paediatric Urology, Nottingham Children's Hospital, Nottingham University Hospitals NHS Trust and Queens Medical Center, Nottingham, England, UK*

[2]*Department of Paediatric Urology, Great Ormond Street Hospital for Children NHS Trust, London, UK*

WebLog Open Access Publications
Article ID : wju.2026.a0105
Author : Mr. Bharat More, M.S.

Abstract

Objectives: To investigate the observation that children with primary epispadias frequently exhibit stenotic ureteric orifices, in contrast to patients with classic bladder exstrophy.

Design: Retrospective observational study.

Setting: Single tertiary paediatric urology centre.

Participants: Children with incontinent primary epispadias who underwent bladder reconstruction between January 2005 and December 2006.

Primary Outcome Measures: Ureteric orifice calibre, size of ureteric catheter successfully inserted, and presence or absence of upper tract dilatation on imaging.

Results: Eleven patients (8 males, 3 females; age range 12–68 months, mean 43 months) were included. Three patients (1 male, 2 females) had ureteric orifices that accepted 6F catheters without difficulty. In the remaining eight patients (6 males, 2 females), one or both ureteric orifices were too narrow to accept a 6F catheter during primary reconstruction. These orifices admitted only 3F–4F catheters, often after dilatation. Pre- and postoperative ultrasonography demonstrated no upper tract dilatation in any patient.

Conclusions: A ureteric orifice size of at least 6F is generally expected in children of this age group undergoing bladder reconstruction. The unexpectedly high prevalence of stenotic ureteric orifices in primary epispadias suggests a previously under-recognised anatomical association. This may reflect abnormal trigonal development, complementing the well-described continence abnormalities in this population. The contrast with bladder exstrophy highlights potential embryological differences between these conditions.

Keywords: Primary Epispadias; Ureteric Orifice Stenosis; Ureteric Catheterisation; Bladder Reconstruction; Trigonal Development; Paediatric Urology; Bladder Outlet Reconstruction; Embryological Anomalies; Ureteric Calibre; Bladder Exstrophy–Epispadias Complex

Summary Box

What is already known on this topic

- Primary epispadias is associated with abnormal bladder neck and trigonal development, contributing to urinary incontinence.
- In children undergoing bladder reconstruction, ureteric orifices typically accept 6F ureteric catheters without difficulty.
- In classic bladder exstrophy, ureteric orifices are usually patulous, not stenotic.
- Despite routine ureteric catheterisation during epispadias repair, the ureteric orifice calibre in primary epispadias has not been systematically described.

What this study adds

- This is the first study to document a high prevalence of stenotic ureteric orifices in children with primary epispadias.
- Most patients required 3F–4F catheters, indicating a significantly smaller orifice calibre than expected for age.

OPEN ACCESS

Correspondence:
Mr. Bharat More, M.S., Department of Paediatric Urology, Nottingham Children's Hospital, Nottingham University Hospitals NHS Trust and Queens Medical Center, Nottingham, England, UK, Mob: +447624841350, Phone/Fax: +441162893395; E-mail: bharat.more@nhs.net

Received Date: *23 Dec 2025*
Accepted Date: *30 Dec 2025*
Published Date: *01 Jan 2026*

Citation:
More B, Patel RV, Jahur S, Cuckow P. Ureteric Orifice Size in Primary Epispadias: A "New" Observation. WebLog J Urol. wju.2026.a0105. https://doi.org/10.5281/zenodo.18211810

- All patients had normal upper tract imaging, suggesting a developmental rather than obstructive phenomenon.
- The contrast with bladder exstrophy supports the hypothesis that primary epispadias follows a distinct embryological pathway, particularly affecting trigonal formation.
- These findings introduce a new anatomical association that may influence surgical planning and future developmental research.

Strengths and Limitations of This Study

- This is the first study to systematically document ureteric orifice calibre in primary epispadias.
- Operative findings were corroborated with radiological imaging.
- The cohort represents a consecutive series from a single surgeon and centre, reducing variability in technique and documentation.
- The sample size is small due to the rarity of primary epispadias.
- Lack of long-term functional follow-up limits conclusions regarding clinical implications of stenosis.

Introduction

Primary epispadias is a rare congenital anomaly characterised by dorsal urethral malformation, abnormal bladder neck development, and varying degrees of urinary incontinence [1]. While its relationship to bladder exstrophy is well recognised, emerging evidence suggests that primary epispadias may have distinct anatomical and embryological features.

During reconstructive surgery for primary epispadias, the ureteric orifices are routinely inspected and catheterised to facilitate bladder outlet reconstruction and protect the upper urinary tract [2]. In typical paediatric bladder surgery, ureteric orifices in this age group generally accept 6F catheters without difficulty [3]. However, anecdotal intraoperative observations suggested that children with primary epispadias may have unusually narrow ureteric orifices, a feature not commonly encountered in bladder exstrophy.

This study aimed to systematically review operative findings and imaging to determine whether stenotic ureteric orifices are indeed associated with primary epispadias. Aim of study was to investigate whether children with primary epispadias have stenotic ureteric orifices, and how this differs from patients with classic bladder exstrophy.

Methods

Study Design and Population (Figure 1)

Retrospective review of children with incontinent primary epispadias undergoing bladder reconstruction (Jan 2005–Nov 2006). Majority underwent Kelly soft-tissue reconstruction of penis/clitoris and bladder outlet. Operative notes reviewed for: ureteric orifice calibre, catheter size accepted, need for dilatation. Pre- and postoperative ultrasound assessed for upper tract dilatation.

A retrospective review was conducted of all children with incontinent primary epispadias who underwent bladder reconstruction between January 2005 and December 2006 at a single tertiary centre. Patients with classic bladder exstrophy or prior ureteric surgery were excluded.

Study Flow Diagram (Figure 1)

Patients with incontinent primary epispadias (n = 11).

→ Excluded: none

→ Included in analysis (n = 11)

→ Normal ureteric orifices (n = 3)

→ Stenotic ureteric orifices (n = 8)

→ Upper tract dilatation: none

Surgical Technique (Figure 2)

Most patients underwent Kelly soft-tissue reconstruction of the penis or clitoris and bladder outlet. As part of the standard operative protocol, ureteric catheterisation was attempted bilaterally using 6F catheters. If unsuccessful, smaller catheters (3F–4F) were used, with or without gentle dilatation.

Data Collection (Figure 3)

Operative notes and radiological investigations were reviewed, focusing on:

- Ureteric orifice size
- Catheter size successfully inserted
- Need for dilatation
- Pre- and postoperative ultrasonography for upper tract dilatation

Ethics

As a retrospective review of routinely collected clinical data, formal ethics approval was not required under local policy.

Results (Figure 4)

Patient Characteristics

Eleven children were included (8 males, 3 females). Ages ranged from 12 to 68 months (mean 43 months).

Patient Characteristics

- Total: 11
- Males: 8
- Females: 3
- Age range: 12–68 months (mean 43 months)

Ureteric Orifice Findings

- Normal calibre: Three patients (1 male, 2 females) had ureteric orifices that accepted 6F catheters easily.
- Stenotic orifices: Eight patients (6 males, 2 females) had one or both ureteric orifices too narrow to accept a 6F catheter.
- These orifices admitted only 3F–4F catheters.
- Dilatation was required in several cases.
- Normal calibre (accepted 6F): 3 patients
- Stenotic orifices: 8 patients
- One or both orifices narrow
- Ultrasound: No upper tract dilatation pre- or post-operatively

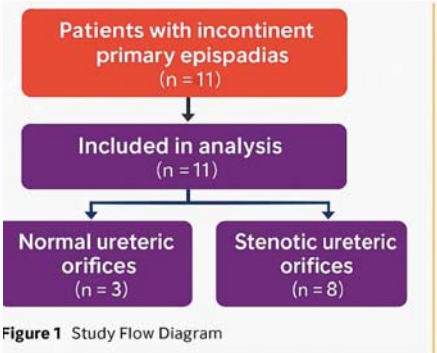

Figure 1 Study Flow Diagram

Figure 3 Schematic Comparison of Operative Findings

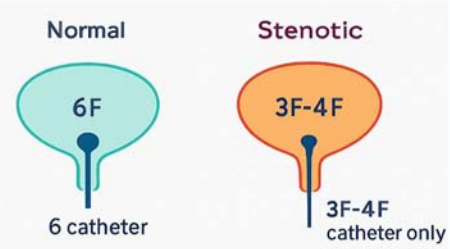

Figure 2 Ureteric Catheter Size Accepted at Surgery

Patient No.	Laterality of Assessment	Ability to Pass 6F Catheter	Dilatation Required
1	Bilateral	Yes	No
2	Bilateral	No	No
3	Bilateral	3-4F	6F
4	Bilateral	3-4F	3-4F
5	Bilateral	No	3-4F
6	Bilateral	Tes	No
7	Bilateral	3-4F	3-4F

Figure 4 Summary Table of Operative Findings

Figure 1: Study Flow Diagram.
Flowchart showing patient inclusion and analysis. Eleven children with incontinent primary epispadias were reviewed. Three had normal ureteric orifices; eight had stenotic orifices. No upper tract dilatation was observed.
Figure 2: Ureteric Catheter Size Accepted at Surgery.
Bar chart comparing smallest catheter size accepted during reconstruction. Eight patients required 3F–4F catheters; three accepted 6F catheters.
Figure 3: Schematic Comparison of Normal vs Stenotic Ureteric Orifice.
Illustration comparing typical paediatric ureteric orifice (accepting 6F catheter) with narrowed orifice seen in primary epispadias (accepting only 3F–4F).
Figure 4: Summary Table of Operative Findings.
Table showing catheterisation outcomes for all 11 patients, including laterality, smallest catheter passed, and whether dilatation was required.

Radiological Findings

All pre- and postoperative renal ultrasonography demonstrated:

- No hydronephrosis
- No ureteric dilatation
- Preserved upper tract morphology

Ultrasound Findings Pre- and Post-operatively

Summary of renal ultrasonography showing absence of hydronephrosis or ureteric dilatation in all patients before and after reconstruction. These findings support that the stenotic orifices represent a developmental feature rather than functional obstruction.

Discussion

Primary epispadias is a rare congenital anomaly affecting urethral and trigonal development. Ureteric catheterisation is routinely performed during reconstruction [4]. In typical pediatric bladder surgery, ureteric orifices usually accept 6F catheters. Surgeons observed unusually narrow orifices in primary epispadias — a feature not described in the literature.

This study identifies a strikingly high prevalence of stenotic ureteric orifices in children with primary epispadias. In routine paediatric bladder surgery, a 6F catheter is typically considered the minimum expected calibre for ureteric orifices in this age group. The finding that most primary epispadias patients required significantly smaller catheters suggests a genuine anatomical association rather than technical variation.

Embryological Considerations

The trigone and bladder neck derive from mesodermal tissue that undergoes complex folding and incorporation of the mesonephric ducts [5]. Abnormal trigonal development is a recognised contributor to urinary incontinence in epispadias. The presence of stenotic ureteric orifices may represent an additional manifestation of this developmental disturbance.

Contrast with Bladder Exstrophy

In classic bladder exstrophy, ureteric orifices are typically patulous rather than stenotic [6-8]. This contrast supports the hypothesis that primary epispadias and bladder exstrophy, although related, may diverge embryologically earlier than previously assumed.

Clinical Implications

Although no upper tract dilatation was observed, the narrow orifices encountered intraoperatively may have implications for:

- Catheterisation during reconstruction
- Postoperative surveillance
- Understanding continence mechanisms in epispadias

Larger multicentre studies are needed to determine whether this anatomical feature has long-term functional consequences [9-12].

This study presents a novel anatomical observation: the unexpectedly high prevalence of stenotic ureteric orifices in children with primary epispadias, in contrast to the patulous orifices typically seen in classic bladder exstrophy. Although ureteric catheterisation is a routine component of reconstructive surgery, the calibre of the ureteric orifice in primary epispadias has not previously been systematically documented. Our findings suggest a potential developmental association involving the trigone, offering new insights into the embryological divergence between epispadias and bladder exstrophy. The manuscript is based on a consecutive series of patients treated at a single tertiary centre, with operative findings corroborated by radiological imaging. The work is original and observations new.

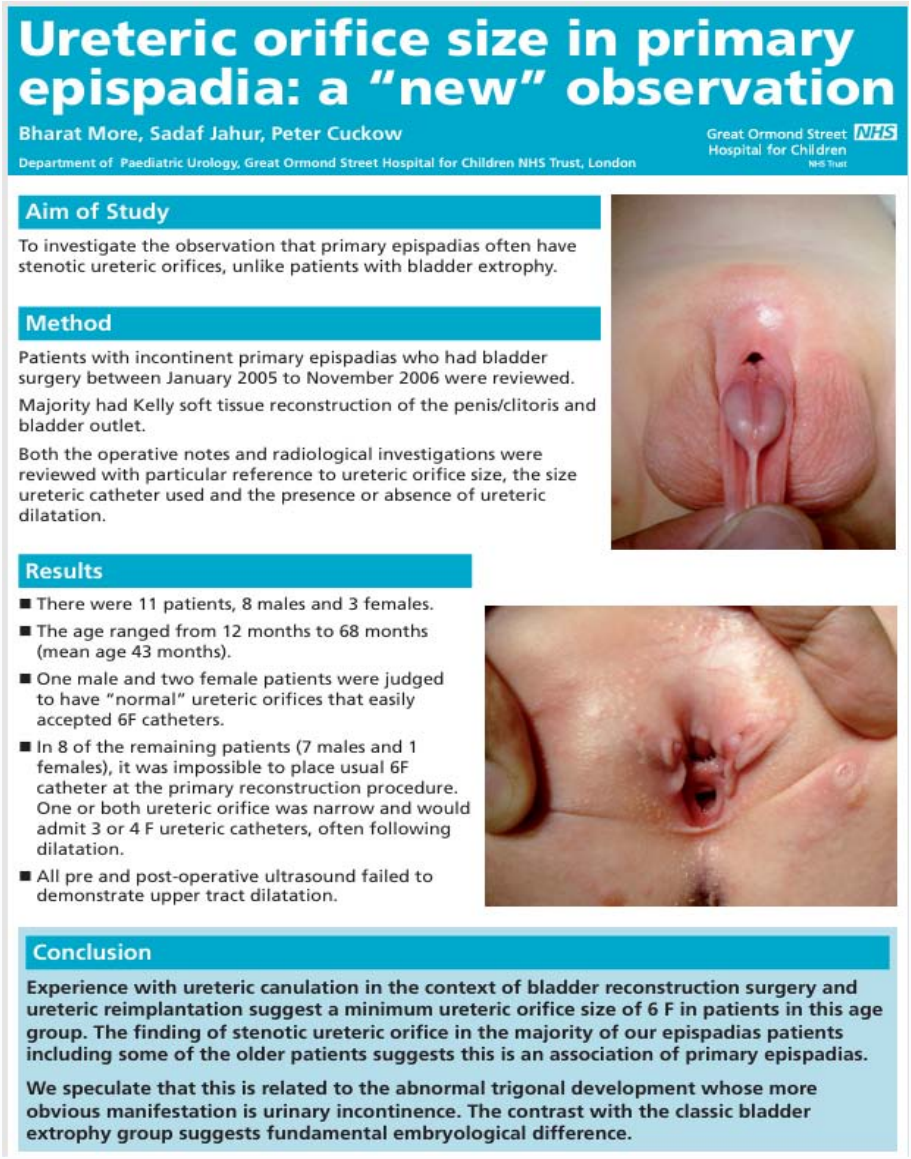

Figure 5: Poster presentation at the conference.

We believe this study will be of interest to clinicians and researchers in paediatric urology, paediatric surgery, and developmental anatomy. It highlights an under-recognised anatomical feature that may have implications for surgical planning, understanding continence mechanisms, and future embryological research.

Conclusion

This study highlights a previously under-recognised association between primary epispadias and stenotic ureteric orifices. The consistent inability to pass 6F catheters in the majority of patients suggests a genuine anatomical variant linked to abnormal trigonal development. The contrast with bladder exstrophy underscores potential embryological differences between these conditions. Further research is warranted to explore developmental mechanisms and clinical significance.

- A minimum ureteric orifice size of 6F is expected in this age group.
- Most primary epispadias patients had significantly narrower orifices, a previously unreported association.
- Likely reflects abnormal trigonal development, complementing known continence issues.
- Contrast with bladder exstrophy suggests distinct embryological pathways.

Key Messages

- Stenotic ureteric orifices appear to be characteristic of primary epispadias.
- This finding may influence surgical planning and developmental understanding.
- No evidence of upper tract obstruction despite narrow orifices.

References

1. Gearhart JP, Jeffs RD. Exstrophy–epispadias complex and bladder anomalies. Campbell-Walsh Urology. 10th ed. Philadelphia: Elsevier;

2012. p. 3270–3305.

2. Ebert AK, Reutter H, Ludwig M, Rösch WH. The exstrophy–epispadias complex. Orphanet J Rare Dis. 2009; 4: 23.
3. Grady RW, Mitchell ME. Complete primary repair of exstrophy. J Urol. 1999;162(4):1415–20.
4. Borer JG, Bauer SB, Peters CA, Diamond DA, Atala A, Retik AB. Ureteral reimplantation in children: surgical considerations and outcomes. J Urol. 1998;160(3 Pt 2):1187–92.
5. Baskin LS, Erol A, Li YW, Cunha GR. Anatomical studies of the urethra and perineum in human embryos. J Urol. 1998;160(3 Pt 2):1192–7.
6. Gearhart JP, Mathews R. Embryology of the bladder and urethra. Urol Clin North Am. 2002; 29(3): 497–509.
7. Woodhouse CRJ. Epispadias and bladder exstrophy. BJU Int. 2001; 88(7): 739–43.
8. Inouye BM, Tourchi A, Di Carlo HN, Young EE, Gearhart JP. Contemporary management of the exstrophy–epispadias complex. Curr Urol Rep. 2013; 14(4): 359–68.
9. Koff SA. The ureterovesical junction: clinical and developmental considerations. Urol Clin North Am. 1995; 22(1): 63–71.
10. Mitchell ME. Reconstruction of the bladder outlet in epispadias. J Urol. 1981; 125(3): 313–7.
11. Baskin LS, Ebbers MB. Hypospadias and epispadias. Pediatr Clin North Am. 2006; 53(3): 409–19.
12. Husmann DA. Upper urinary tract changes associated with bladder outlet obstruction in children. J Urol. 1992; 148(2 Pt 2): 672–5.