Minimally Invasive Techniques for Management of the Ureterocele and Ectopic Ureter

Upper Tract Versus Lower Tract Approach

Matthew D. Timberlake, MD*, Sean T. Corbett, MD

KEYWORDS

• Ureterocele • Ectopic ureter • Pyeloureteral duplication • Minimally invasive • Ureterocele incision • Ipsilateral ureteroureterostomy • Heminephrectomy

KEY POINTS

- Evidence-based management for children with ureterocele and complete pyeloureteral duplication is not possible and treatment should be individualized.
- Management requires a tailored approach that involves consideration of renal function, severity of hydronephrosis and obstruction, drainage of the contralateral ureter and bladder outlet, and associated vesicoureteral reflux.
- Endoscopic decompression is best suited for (1) prompt decompression of ureteroceles in the setting of infection or obstruction, and (2) elective treatment of intravesical ureteroceles.
- For children with ectopic ureterocele undergoing heminephrectomy, the presence or absence of preoperative reflux is the key.
- Current data indicate that laparoscopic retroperitoneal heminephrectomy carries a higher risk of open conversion, significant urine leak, and innocent pole loss compared with a laparoscopic intraperitoneal approach.

Videos of robotic-assisted laparoscopic ureteroureterostomy and robotic-assisted laparoscopic partial nephrectomy accompany this article at http://www.urologic.theclinics.com/

INTRODUCTION

A ureterocele is a congenital cystic dilatation of the intravesical ureter that may occur as an isolated anomaly, but most commonly affects the superior moiety (SM) of a complete pyeloureteral duplication (**Fig. 1**).[1] Classification of ureteroceles is shown in **Box 1**. Associated anatomic and pathophysiologic features (**Table 1**) include intravesical ureteral obstruction, dysplasia or obstructive nephropathy of the ureterocele-associated moiety (40%–70%), and vesicoureteral reflux (VUR) to the ipsilateral inferior moiety (IM) (50%) or contralateral renal unit (25%).[2] A tense ureterocele may mechanically obstruct the ipsilateral IM ureter, contralateral ureteral orifice, or bladder neck, although this is rare.

In the past, children with ureteroceles presented in early infancy with febrile urinary tract infection (UTI). Most cases are now discovered in the

University of Virginia Children's Hospital, University of Virginia, 118 Roy's Place, Charlottesville, VA 22902, USA
* Corresponding author. 118 Roy's Place, Charlottesville, VA 22902.
E-mail address: mdt4r@virginia.edu

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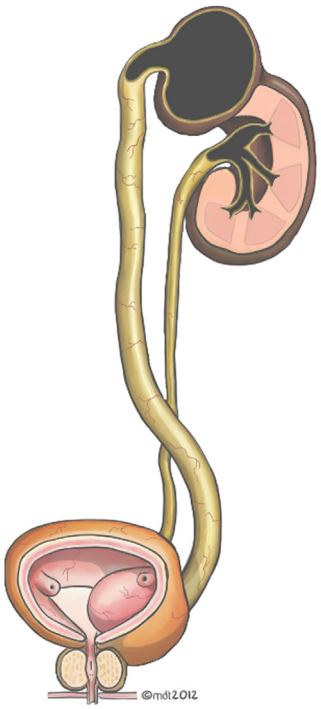

Fig. 1. Complete pyeloureteral duplication with upper moiety–associated ureterocele.

antenatal or neonatal period during routine ultrasonography evaluation, and the natural history of patients diagnosed in the modern era is largely undefined.[3–6]

The goals of management for children with ureteroceles and pyeloureteral duplication (**Box 2**) are clear and include prevention of renal damage associated with obstruction or VUR and UTI, promotion of continence, and minimization of surgical morbidity.[7] However, the means of accomplishing these objectives remain a significant challenge in modern pediatric urology. Practice patterns are widely variable and no randomized controlled trials exist to guide management decisions.[8] Selection of a treatment modality can therefore only be based on the balance between potential risks inherent to the condition and the summation of published results for a multitude of therapeutic alternatives.[3]

There is particular disagreement regarding the optimal management of patients with duplex system ureteroceles, especially in the presence of significant vesicoureteral reflux.[9–11] Current trends are away from single-stage open reconstruction (SM heminephrectomy, ureterocele excision, bladder base/neck reconstruction, and IM ureteral reimplantation) and toward conservative management and minimally invasive approaches.

This article discusses minimally invasive approaches for treatment of children with ureterocele and ectopic ureter. It addresses (1) nonoperative management before detailed discussion of (2) lower tract approaches (endoscopic ureterocele incision and ipsilateral ureteroureterostomy [IUU])

Table 1
Ureterocele classification and definitions

Intravesical	Cyst contained completely within bladder
Extravesical	Any portion extends into urethra or bladder neck
Cecoureterocele	Ureteral orifice in bladder, some tissue bulges beyond bladder neck
Ectopic	Orifice caudal to normal position of insertion on trigone
Stenotic	Small orifice
Sphincteric	Orifice within sphincter

Box 1
Anatomic and pathophysiologic associations of ureteroceles

- Intravesical ureteral obstruction
- Dysplasia or obstructive nephropathy of the ureterocele-associated moiety (40%–70%)
- Vesicoureteral reflux (VUR) to the ipsilateral inferior moiety (IM) (50%) or contralateral renal unit (25%)
- Mechanical obstruction of the ipsilateral lower pole ureter, contralateral ureteral orifice, or bladder neck

Box 2
Goals of therapy for children with ureterocele and pyeloureteral duplication

- Prompt decompression of obstruction with infection
- Elimination of recurrent infection
- Relief of obstruction
- Elimination of clinically significant reflux
- Preservation of renal function (including functional moiety of a duplex system)
- Restoration and maintenance of continence
- Minimize surgical morbidity/minimize number of surgical procedures