

# Outcomes of Endoscopic Incision for the Treatment of Ureterocele in Children at a Single Institution

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## Abbreviations and Acronyms

DSU = duplex system ureterocele  
SSU = single system ureterocele  
TUI = transurethral incision  
UTI = urinary tract infection  
VCUG = voiding cystourethrogram  
VUR = vesicoureteral reflux

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**Purpose:** We assessed outcomes in children with ureterocele after transurethral incision at our institution between 2001 and 2014, focusing on end points of vesicoureteral reflux, improvement of hydronephrosis and need for second surgery.

**Materials and Methods:** We performed chart reviews of 83 patients, collecting information including age at transurethral incision, gender, renal anatomy, ureterocele location, indication for transurethral incision, and preincision and postincision vesicoureteral reflux and hydronephrosis status. Patients were divided into those with single system and duplex system ureteroceles, and intravesical and extravesical location for analysis. Statistical evaluations were performed with the Wilcoxon rank test and Fisher exact test.

**Results:** Transurethral incision was performed at a mean age of 34.2 months in patients with single system ureterocele and 8.9 months in those with duplex system ureterocele ( $p < 0.0001$ ). Cure rates (improvement of hydronephrosis and absence of vesicoureteral reflux) were 55.6% in patients with single system ureterocele and 14.9% in those with duplex system ureterocele ( $p = 0.0031$ ). Rates of de novo reflux into the ureterocele moiety were 27.8% for patients with single system ureterocele and 56.2% for those with duplex system ureterocele ( $p = 0.0773$ ). Patients with single system ureterocele required significantly fewer second surgeries (3.8%) than those with duplex system ureterocele (73.7%,  $p < 0.0001$ ).

**Conclusions:** Patients with single system ureterocele may benefit from endoscopic incision. Transurethral incision was definitive in all such patients except 1 in our study. Although most patients with duplex system ureterocele will need a second operation, transurethral incision remains of value in this population in instances of sepsis or bladder outlet obstruction, or to facilitate planned reconstruction when the child is older.

**Key Words:** endoscopy, kidney diseases, patient outcome assessment, ureterocele, urethra

URETEROCELES occur in association with a single or duplicated collecting system and are classified as intravesical (orthotopic) or extravesical (ectopic), in which a portion of the ureterocele is situated permanently at the bladder neck or in the urethra.<sup>1</sup>

Reflux may occur in any moiety or combination of moieties. Presentation can be symptomatic (eg infection) or asymptomatic (hydronephrosis). Goals of ureterocele management include decompression, avoiding vesicoureteral reflux, preventing urinary

tract infection, and minimizing the number and invasiveness of operative interventions. Variations in ureterocele anatomy and mode of presentation can pose a clinical dilemma regarding management, and the optimal approach remains controversial. Transurethral incision is an attractive treatment option, given its relative ease and noninvasiveness.

We reviewed the records of patients who underwent transurethral incision to assess postoperative outcomes. Primary end points were improvement in hydronephrosis, de novo reflux into ureterocele moiety, cure (defined as improved hydronephrosis and no reflux postoperatively) and need for secondary surgery. We hypothesized that children with single system or intravesical duplex system ureteroceles would have less post-transurethral incision reflux and undergo fewer second procedures than children with extravesical duplex system ureteroceles, as reported previously.<sup>2,3</sup>

## MATERIALS AND METHODS

We conducted an institutional review board approved retrospective chart review of all patients who underwent TUI at our institution between 2001 and 2014. Incision was made using either a Bugbee™ electrode or resectoscope (16 and 67 patients, respectively). Demographic information, including age at TUI, gender and type of ureterocele (DSU or SSU and intravesical or extravesical), was collected for each patient. Ureterocele size, indication for TUI, preincision and postincision VUR status, and preincision and postincision hydronephrosis status of each moiety were recorded. TUI was considered curative if patients demonstrated improved hydronephrosis and no VUR postoperatively.

A total of 83 children (median age 3.5 months) underwent TUI of 98 ureteroceles between 2001 and 2014. This cohort represents 36.4% of 228 children presenting to our clinic for initial evaluation of ureterocele during this period. Mean length of followup after TUI was 23.9 months. Objective size information was available for 70 ureteroceles, and revealed a range of 3.9 to 43 mm in maximal dimension (mean 15, median 13). Indications for transurethral incision were UTI with sepsis and/or fever in 27 patients, UTI with no mention of sepsis or fever in 5, hydronephrosis/preservation of renal function in 48 and acute renal failure, bladder outlet obstruction and abdominal pain in 1 each. Objective functional data were not obtained in all patients preoperatively. Therefore, the validity of operating for renal function preservation was unclear in several patients.

Of 83 patients 22 underwent preoperative dimercaptosuccinic acid scan, of whom 20 had DSU. Only 2 patients had a nonfunctional upper pole. Patients with hydronephrosis, documented salvageable function in the ureterocele moiety and no associated VUR underwent TUI for a potentially definitive procedure, while other patients underwent TUI with the understanding that open reconstruction might be required subsequently. In general

salvageable function was considered to be greater than 10% of function on the affected side.

Patients were divided into 2 groups for further analysis, ie those with SSU and those with DSU. Statistical evaluations were performed with the Wilcoxon rank test and Fisher exact test (2-tailed) using SAS®, version 9.3. Findings were considered statistically significant at  $p < 0.05$ .

## RESULTS

Patients with SSU underwent surgical intervention at a mean age of 34.2 months. Patients with DSU were younger on average, undergoing TUI at a mean age of 8.9 months (table 1). The SSU group contained approximately 3 times more males than females, while the inverse was true for the DSU group. Because the management of ureterocele is controversial and dependent on several factors, the consultants at our institution did not use a standard followup protocol after TUI. However, almost all patients (78 of 83, 94%) underwent postoperative ultrasound, and the majority of patients (67 of 83, 80.7%) underwent postoperative VCUG to check the reflux status of each moiety and to further characterize the ureterocele after incision. A total of 22 patients underwent postoperative dimercaptosuccinic acid scan.

### Single System Ureteroceles

Bilateral ureteroceles were present in 42% of children with SSU and 7% of those with DSU. All single system ureteroceles were intravesical. Of 26 patients in the SSU group 24 had preoperative and postoperative ultrasound available for review, with 87.5% showing improvement or resolution of hydronephrosis and 12.5% displaying stable hydronephrosis (table 2). TUI was curative in 56% of patients with SSU for whom preoperative and postoperative ultrasound and postoperative VCUG data were available.

De novo reflux was seen in 28% of patients with SSU with preoperative and postoperative VCUGs

**Table 1.** Patient demographics

	SSU	Intravesical DSU	Extravesical DSU	Overall
Av age at TUI (mos)*	34.2	3.6	15.3	8.9
Median age at TUI (mos)	9.7	2.7	2.2	2.5
No. gender:†				
Male	19	7	6	13
Female	7	24	20	44
No. bilat/total No. (%)‡	11/26 (42.3)	2/31 (6.5)	2/26 (7.7)	4/57 (7.0)

\* SSU vs DSU  $p < 0.0001$  and intravesical vs extravesical DSU  $p = 0.6711$  (both Wilcoxon rank test).

† SSU vs DSU  $p < 0.0001$  and intravesical vs extravesical DSU  $p = 1$  (both Fisher exact test).

‡ SSU vs DSU  $p = 0.0003$  and intravesical vs extravesical DSU  $p = 1$  (both Fisher exact test).

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