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Examining trends in the treatment of ureterocele yields no definitive solution

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Summary

Introduction
The surgical management of ureteroceles is extremely variable. Some have hypothesized that if these patients were treated with 'definitive' staged surgical intervention, the need for further revision surgery would be eliminated.

Objective
The present study sought to determine if the rate of revision surgery differed among patients who have undergone different surgical approaches for the ureterocele complex.

Study Design
A large retrospective chart review was conducted, identifying all patients having undergone ureterocele surgery at a single institution over the past 41 years. The cohort was divided into four groups based on surgical approach: upper tract approach (UTA), lower tract reconstruction (LTR), simultaneous upper and lower tract approach (ULTA), and staged lower tract reconstruction (SLTR). Demographics, the presence of preoperative/postoperative VUR, postoperative morbidity and the need for revision surgery were compared using the Chi- squared test, Fisher's exact test, Kruskal-Wallis test, Mann-Whitney U test (Bonferroni correction), logistic regression modeling and survival analyses (Kaplan-Meier and Cox proportional Hazards regression with unplanned revision operation as the outcome event).

Results
Between 1969 and 2010, 180 patients were identified as having undergone surgical management of ureteroceles, of which 120 had complete demographic data available for analysis. The median age at the time of initial surgical intervention was 5.8 months and the majority of patients (83.3%) were female. The median follow-up was 33.1 months. Surgical management was as follows: 18 (15.0%) patients underwent UTA, 47 (39.2%) underwent LTR, 23 (19.2%) underwent ULTA, and 32 (26.6%) underwent SLTR. Among these groups, the only difference in median age was between the LTR and SLTR groups (6.3 months vs 3.7 months, $P=0.012$). Additional revision surgery was required in: nine (50.0%) of UTA, ten (21.3%) of LTR, four (17.4%) of ULTA, and three (9.4%) of SLTR. The only statistically significant difference in unplanned revision surgery was noted in the UTA group versus each of the other groups with VUR as the predominant indication (88.9%). The likelihood of requiring revision surgery in comparison to the SLTR group was significantly increased in the UTA group (OR 9.67, CI 2.15-43.56), but not in the LTR (OR 2.61, CI 0.66-10.37) or the ULTA group (OR 2.04, CI 0.41-10.13). Obstruction, recurring UTIs and VUR were the main indications for revision surgery overall.

Discussion
There is a large body of literature examining the surgical management of ureteroceles. It most recently primarily focuses on an endoscopic approach to the lower tract. The present retrospective review examined the need for re-operative intervention by comparing four different surgical approaches, and found that there is no panacea. Although heminephrectomy (UTA) was a definitive procedure in some patients without reflux at presentation, many who underwent heminephrectomy, went on to require later bladder surgery for either recurrent UTI or persistent reflux.

The present study has multiple limitations. Although VUR was an indication for revision surgery in the early part of the series, the current treatment of VUR is not necessarily as stringent. In addition, no distinction was made between an orthotopic or ectopic ureterocele, although some authors have reported differing outcomes in these two groups. However, it is felt that given the large data set of a relatively uncommon condition, the lack of superiority of one approach is apparent.

Conclusion
There is no definitive surgical repair for the ureterocele complex. All groups except UTA had statistically similar rates of revision surgery. The widespread variability in current management echoes the lack of one superior approach found in this comprehensive series.

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Table Demographics, Interventions, and Revisions.

	Upper/lower tract (ULTA) (N = 23)	Lower tract (LTA) (N = 47)	Upper tract (UTA) (N = 18)	Staged (SLTR) (N = 32)	p-value
Median age (IQR), months	5 (2.6–25.8)	6.3 (3.8–16.4)	5.6 (1.3–10.3)	3.7 (1.2–8.1)	0.025
Age group					0.733
<6 months	12 (52.2%)	22 (46.8%)	10 (55.6%)	19 (59.4%)	
≥6 months	11 (47.8%)	25 (53.2%)	8 (44.4%)	13 (40.6%)	
Female	18 (78.3%)	39 (83%)	13 (72.2%)	30 (93.8%)	0.210
Side					0.235
Left	14 (60.9%)	26 (55.3%)	8 (44.4%)	12 (37.5%)	
Right	9 (39.1%)	20 (42.6%)	10 (55.6%)	17 (53.1%)	
Bilateral	0	1 (2.1%)	0	3 (9.4%)	
Lower tract surgery					
None	0	0	18 (100%)	0	
Marsupialization	17 (73.9%)	35 (77.8%)	0	1 (3.1%)	
Ureterectomy	4 (17.4%)	8 (17.8%)	0	0	
TUI/Incision	1 (4.3%)	1 (2.2%)	0	28 (87.5%)	
Other	1 (4.3%)	1 (2.2%)	0	3 (9.4%)	
Upper tract surgery					
None	0	47 (100%)	0	32 (100%)	
Heminephrectomy	23 (100%)	0	18 (100%)	0	
Revision required	4 (17.4%)	10 (21.3%)	9 (50%)	3 (9.4%)	0.009
1 Revision	2 (8.7%)	7 (14.9%)	8 (44.4%)	2 (6.3%)	
2 or greater revisions	2 (8.7%)	3 (6.4%)	1 (5.6%)	1 (3.1%)	

Introduction

Ericsson first described and defined the ectopic ureterocele in 1954 [1]. Over the ensuing 60 years there have been many different surgical approaches to the problem, and yet there still is no consensus among pediatric urological surgeons regarding the optimal surgical strategy. In 2010, Merguerian et al. surveyed pediatric urologists to determine practice patterns in the management of intravesical ureteroceles arising from the upper pole of a duplicated system. They found significant variation in practice and also noted that most respondents saw fewer than 10 cases per year [2]. There are relatively few large series of these cases and even fewer with long-term outcomes. Consequently, optimal management is still undecided.

Over the past 40 years the management of ectopic ureteroceles has changed, this is based largely on the thoughts regarding optimal management at the time of treatment. Initially, it was thought that upper pole partial nephrectomy alone was optimal, or, in rare cases, nephrectomy if the entire kidney was essentially nonfunctioning. Over time many of these patients required further surgery, leading to the adoption of a single stage upper pole partial nephrectomy, total ureterectomy of the upper pole ureter, ureterocelectomy or marsupialization, and unilateral or bilateral ureteroneocystostomy based on the involvement of each ureter in the ureterocele.

Based on the observation that incorporating a nonfunctioning lower pole into the upper pole system in cases of lower pole reflux treated with ureteroureterostomy did not lead to problems, an approach was developed in which only the transvesical portion of a repair was necessary. This consisted of a transvesical marsupialization of the ureterocele and either a commonsheath reimplantation or a ureteroureterostomy of the upper pole to the lower pole ureter just above the bladder with a reimplantation of the distal portion of the lower pole ureter.

The hypothesis of the present study was that the use of primary lower urinary tract reconstruction presented an opportunity for definitive therapy of ureteroceles with decreased morbidity because there was only one incision.

Endoscopic puncture of the ureterocele was initially proposed to be a definitive procedure, but subsequent studies have shown this was often not the case [3]; however, it was very effective when used as a temporizing measure in cases of bilateral obstruction or infection, followed by lower tract reconstruction. This is considered to be a planned staged approach to the problem.

The literature is unclear as to whether any single approach is superior to others. Recognizing that there was a relatively large cohort of patients followed for a significant amount of time to determine outcomes, the experience with ectopic ureteroceles treated over a 41-year period was retrospectively reviewed. It was sought to determine if the rate of unplanned additional surgery was decreased among any group of patients who had surgical management. Some of these patients were included in previous reports from this institution and are also included in the present report [4].

Methods

A retrospective chart review was conducted; all patients who had undergone surgery for ureterocele at the present