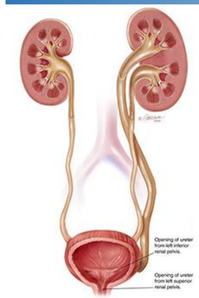
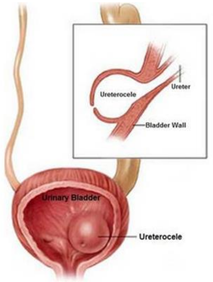
Surgical Management of Upper Pole Nonfunctioning Renal Moieties – the Timeless Debate

Kunj R Sheth[1,2], Jeffrey T. White[1,2], Abhishek Seth[1,2]

[1]Division of Pediatric Urology, Department of Surgery, Texas Children's Hospital, Houston, TX, [2]Scott Department of Urology, Baylor College of Medicine, Houston, TX

Duplex Renal Systems





Upper pole moiety
- Obstructive ureterocele
- Ectopic ureter
- Loss of function from obstruction

Lower pole moiety
- Vesicoureteral reflux (VUR)
- Reflux nephropathy

Treatment approach for upper pole nonfunctioning moiety
- Upper pole heminephrectomy
  - Traditionally the gold standard
  - Risk of damaging intact lower pole parenchyma
- Lower urinary tract reconstruction
  - Can address VUR and obstructive ureterocele at the same time
  - Concern for long-term sequelae of leaving a nonfunctioning moiety

Objective

To evaluate the clinical outcomes of different operative approaches to manage duplex renal systems with a nonfunctional upper pole moiety
- Upper pole heminephrectomy
- Lower urinary tract reconstruction with upper pole preservation

Methods

- IRB-approved retrospective chart review of patients undergoing surgical management for duplicated renal systems from 2012 to 2017
- Definition of upper pole nonfunctioning kidney:
  - <15% upper pole to lower pole differential renal function (DRF)
  - >15% DRF with urologist review of renal scans and ultrasound consistent with background artifact rather than true function
- Data collected:
  - Demographics
  - Anatomic variations
  - Imaging studies: US, VCUG, Renal scans
  - Surgical outcomes

Results

Over the 6-year period, 47 patients with nonfunctioning upper pole function underwent definitive surgery:
- Lower urinary tract reconstruction with upper pole preservation
  - 27 patients
- Upper pole heminephrectomy
  - 20 patients

Table 1: Demographics of patients with nonfunctioning upper pole moiety

	Upper Pole Heminephrectomy (n=20)	Upper Pole Preservation (n=27)	p value
Age	1.63 years	2.77 years	p = 0.16
Gender			
Female	14 (70%)	24 (89%)	p = 0.14
Male	6 (30%)	3 (11%)	
Laterality			
Right	10 (50%)	15 (56%)	p = 0.77
Left	9 (45%)	12 (44%)	
Bilateral	1 (5%)		
Ethnicity			
Caucasian	11 (55%)	10 (37%)	p = 0.25
Hispanic	5 (25%)	13 (48%)	
African-American	3 (15%)	3 (11%)	
Asian	1 (5%)	0 (0%)	
Unknown	0 (0%)	1 (4%)	
Insurance status			
Private insurance	13 (65%)	15 (56%)	p = 0.56
Medicaid	7 (35%)	12 (44%)	

Table 2: Comparison of preoperative characteristics of patients undergoing upper pole heminephrectomy versus upper pole preservation

	Upper Pole Heminephrectomy (n=20)	Upper Pole Preservation (n=27)	p value
Previous Transurethral Incision of Ureterocele	6 (30%)	10 (37%)	p = 0.14
Ectopic upper pole insertion	18 (90%)	17 (63%)	p = 0.76
Lower pole hydronephrosis			
None	8 (40%)	11 (41%)	p = 1.0
SFU Grade 1-2	9 (45%)	14 (52%)	
SFU Grade 3-4	3 (15%)	2 (7%)	
Vesicoureteral reflux			
Lower pole	5 (25%)	18 (67%)	**p = 0.008**
Upper pole	1 (5%)	2 (7%)	p = 1.0
Preoperative Febrile UTIs	7 (35%)	8 (30%)	p = 0.76

Table 3: Intraoperative and postoperative outcomes of patients undergoing upper pole heminephrectomy versus upper pole preservation

	Upper Pole Heminephrectomy (n=20)	Upper Pole Preservation (n=27)	p value
Lower urinary tract reconstruction			
Ureterocele excision	2 (10%)	16 (59%)	**p = 0.0007**
Uretero-ureterostomy	0 (0%)	12 (44%)	**p = 0.0004**
Lower pole reimplant	4 (20%)	4 (15%)	p = 0.71
Common sheath reimplant	0 (0%)	14 (52%)	**p = 0.0001**
Contralateral reimplant	1 (5%)	4 (15%)	p = 0.38
Bladder neck reconstruction	0 (0%)	1 (4%)	p = 1.0
Postoperative UTIs	3 (15%)	4 (15%)	p = 1.0
Additional urinary tract surgeries	2 (10%)	1 (4%)	p = 0.57
Duration of follow-up	21.4 months	17.7 months	p = 0.50

Upper pole heminephrectomy group
- Four patients had concomitant lower urinary tract procedure
  - 4/4 patients had a lower pole moiety reimplantation
  - 2/4 had a ureterocele excision
  - 1/4 had a contralateral ureteral reimplant
- Two additional patients had lower urinary tract procedure postoperatively

Upper pole preservation group
- One patient with new onset upper pole reflux after ureteroureterostomy
  - Intravesical reimplantation of lower pole recipient ureter

Conclusions

- Lower urinary tract reconstruction with upper pole preservation is a safe alternative to upper pole heminephrectomy
- Considering that 30% of patients undergoing upper pole heminephrectomy also require lower urinary tract procedures, it seems favorable to pursue upper pole preservation
- Further studies are needed to better delineate the best approach to lower urinary tract reconstruction
- At present, these complex cases still need to have an individualized approach

Texas Children's Hospital

Baylor College of Medicine

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