Ipsilateral Ureteroureterostomy in the Surgical Management of the Severely Dilated Ureter in Ureteral Duplication

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Purpose: Ipsilateral ureteroureterostomy for the surgical management of severely dilated ureter in ureteral duplication is well supported in the surgical literature but often not done. We evaluated our institutional experience with ureteroureterostomy in duplication anomalies to assess the feasibility and success of this procedure.

Materials and Methods: An 8-year retrospective review of the records of all patients with complete renal duplex anomalies was evaluated. Anatomical presentations, and operative and nonoperative treatment of these patients were evaluated.

Results: A total of 193 patients were identified with complete renal duplication. Associated anomalies included ureterocele in 24 patients, ectopic ureter in 38 and vesicoureteral reflux in 57. Of 193 patients 160 (83%) with duplex anomalies underwent surgical intervention with a total of 41 ureteroureterostomies performed in 39 patients with dilated donor ureters. A total of 11 ureteroureterostomies were performed primarily and 30 were performed in conjunction with ipsilateral ureteral reimplantation of the distal common segment below the ureteroureterostomy. Ten of the 39 patients had the contralateral side reimplanted for vesicoureteral reflux. In all children with ureteroureterostomy the anastomosis between the 2 ureters remained patent. Two of the 11 children who underwent ureteroureterostomy alone had de novo ipsilateral vesicoureteral reflux (1), which was treated with ureteral reimplantation, and subureteral injection (1). Two children who underwent concomitant ureteroureterostomy and reimplantation without indwelling stents had transient postoperative urinomas that required subsequent drainage. Additionally, 3 patients had persistent ipsilateral vesicoureteral reflux, which was treated with subureteral injection in 1 and observation in 2. One patient presented with transient ipsilateral urinary obstruction, which required percutaneous drainage and resolved spontaneously.

Conclusions: In cases of ureteral duplication with a severely dilated ureter requiring surgical intervention ipsilateral ureteroureterostomy is a viable option for reflux and/or obstruction. The procedure is rapid and technically feasible, and it offers excellent cosmesis. In addition, ureteroureterostomy has minimal morbidity and it facilitates early hospital discharge.

Key Words: abnormalities, ureter, stomas, ureterocele, vesico-ureteral reflux

Significant hydronephrosis associated with ureteral dilatation is not an uncommon congenital anomaly, especially with the use of prenatal ultrasonography.[1] Often the finding of ureteral dilatation is associated with duplicated systems with ureteral obstruction and/or VUR. The anomaly of complete ureteral duplication occurs in approximately 1/125 individuals.[2] Obstructive causes of ureteral dilatation are most often related to ureterocele or ectopic ureteral insertion anomalies. Reflux as a cause of ureteral dilatation stems from primary or secondary VUR.

Surgery for severe ureteral dilatation may be required for recurrent urinary tract infections, renal obstruction or urinary incontinence due to ureteral ectopia. There are various treatment options available for the severely dilated ureter associated with a duplicated system, including hemine-phrectomy, pyelopyelostomy, ureteropyelostomy, ipsilateral U-U and common sheath reimplantation.[3–5] In the past there was some concern about performing U-U with resultant donor ureter-to-recipient ureter drainage patterns, the so-called yo-yo effect. It was speculated that this yo-yo effect could place kidney function at risk and it might not ensure adequate drainage. However, this has not proved to be clinically significant.[4,6–8] We present our experience with ipsilateral U-U for the severely dilated ureter in complete ureteral duplication anomalies.

MATERIALS AND METHODS

A retrospective review was performed to identify patients with complete renal duplex anomalies who were evaluated at our institution between January 1998 and November 2005. Modes of presentation, associated anomalies and treatment modalities were noted. We then focused our review on patients with ureteral duplication anomalies with ureteral dilatation and grade 3–4 hydronephrosis who underwent U-U. Surgical outcomes in all children following U-U were assessed with RUS with or without nuclear scan, or with excretory urogram.

The figure shows the technique of ipsilateral U-U. The patient is placed supine on the operating table. Most cases can be performed through a modified Gibson or Pfannenstiel incision. Based on imaging if there is preoperative suspicion of 2 dilated ureters, cystoscopic stent placement is done

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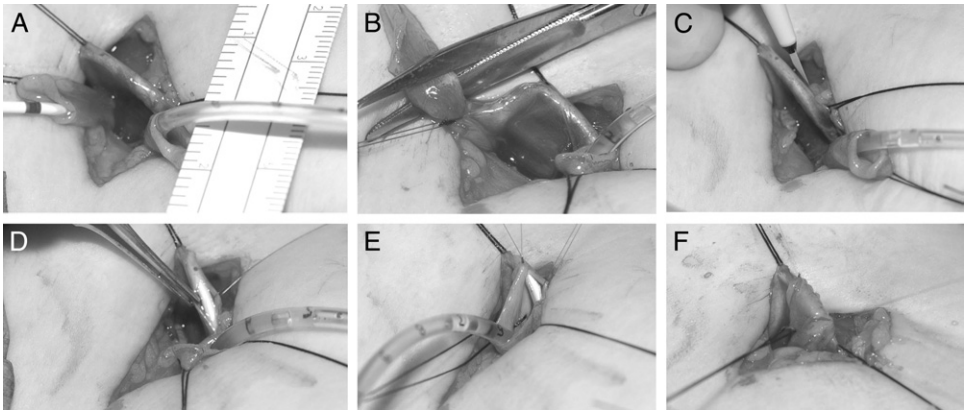

A, ureteral complex is identified through modified Gibson or Pfannenstiel incision. *B*, donor ureter is ligated and excess distal ureter is excised. *C*, recipient ureter is incised to correspond with donor ureter diameter. *D*, stay sutures are placed. *E*, U-U anastomosis is performed. *F*, completed U-U.

before incision to help identify the UP and LP ureters. In cases of only 1 enlarged ureter an intraoperative stent is placed before completing the anastomosis. The stent is usually placed across the anastomosis.

Ureteral complex identification is facilitated by focal dissection along the bladder wall just inferior to the obliterated umbilical artery. Each ureter is identified and then isolated above the common distal blood supply. The ureteral length needed to perform the anastomosis is obtained proximal on the ureters to minimize perivesical dissection and its associated autonomic innervation. The dilated donor ureter is then transected diagonally and ligated distally. The ureteral stump is partially excised as much as possible with care taken not to interrupt the common distal blood supply. The recipient ureter is then opened lengthwise to match the diameter of the donor ureter. The ureteral anastomosis is performed end to side with 7-zero polydioxanone absorbable suture. Extravesical ureterocele excision and recipient ureter reimplantation can be performed through this incision since surgery is at the bladder level. The ureterocele is dissected from the detrusor by dissecting along the ureteral wall until the confluence of the ureterocele is identified with the intravesical trigonal/bladder neck mucosa. The entire ureteral stump and associated ureterocele can then be excised and the mucosa defect can be reconstructed to receive a UP ureter for reimplantation. With the described careful dissection extravesical ureteral reimplantation can be performed to avoid anterior cystotomy. If a Penrose drain is placed, it is usually brought out inferior to the incision.

RESULTS

During the study period 193 patients were diagnosed with complete renal duplex anomalies, of whom 142 (73%) with duplex anomalies were treated surgically, including 39 of 160 (24%) who underwent a total of 41 U-Us. There were 8 males and 31 females with a mean age of 31 months (range 3 months to 15 years). Mean ± SD operative time was 124 ± 48.1 minutes. Mean hospital stay was 1 day for all patients. Other surgical procedures performed in patients with ureteral duplication without concurrent U-U were common sheath ureteral reimplantation in 64, UP heminephrectomy in 8, LP heminephrectomy in 2, pyelopyelostomy in 6, ureterocele puncture only in 12 and subureteral injection of the refluxing duplex system in 12.

In the 39 patients identified a total of 41 U-Us were performed. Two patients were treated with bilateral U-Us. A total of 11 U-Us alone were performed. Five patients had an ectopic UP ureter that underwent UP-to-LP U-U. Three patients had a UP ureterocele, for which UP-to-LP U-U was done. In 1 patient the ureterocele was incised before U-U. The remaining 3 patients underwent LP-UP U-U for LP VUR, including 2 who also underwent contralateral reimplantation for VUR.

The remaining 28 patients underwent a total of 30 ipsilateral U-Us with ipsilateral reimplantation. Six patients underwent ureterocele incision with postoperative VUR and were treated with U-U and ipsilateral reimplantation. One of these patients underwent bilateral U-U with reimplantation. Eight patients with ectopic UP and VUR of the LP underwent UP-LP U-U with reimplantation. In 1 patient ectopic UP and LP VUR were treated with LP-UP U-U with reimplantation. Six patients had an UP ureterocele and LP reflux, which were treated with UP-to-LP U-U with ipsilateral reimplantation. Of note, 1 patient received bilateral treatment with U-U and ipsilateral reimplantation. Five patients had VUR of the UP and LP, which was treated with U-U and ipsilateral reimplantation. Ten of these 27 patients had contralateral VUR, which was treated with concomitant contralateral reimplantation (see table).

Two of the 11 children with U-U alone showed de novo ipsilateral VUR, which was treated with ureteral reimplantation and subureteral injection in 1 each. Of the children who underwent concomitant U-U and reimplantation 2 without indwelling stents had transient postoperative urinomas, which required subsequent drainage. Additionally, 2

Diagnosis	No. U-U	No. U-U + Reimplantation
Ureterocele	2	7
Ureterocele + incision	1	9
Ectopic UP	5	0
LP VUR	3	0
UP + LP VUR	0	3
Ectopic UP + LP VUR	0	11
Totals	11	30
Contralat reimplantation	10	2