Mini-Ureteroneocystostomy: A Safe and Effective Outpatient Treatment for Unilateral Vesicoureteral Reflux

Richard Ashley and David Vandersteen*

From the Department of Urology, Mayo Clinic, Rochester and Pediatric Surgical Associates (DV), Minneapolis, Minnesota

Purpose: Medically refractory vesicoureteral reflux is a common condition that can be cured by open surgery. Extravesical ureteroneocystostomy is a safe and effective surgical procedure. We determined whether this could be accomplished with limited dissection via an approximately 2 cm inguinal incision (mini-ureteroneocystostomy).

Materials and Methods: All patients with unilateral vesicoureteral reflux who underwent mini-ureteroneocystostomy from 2003 to 2007 were evaluated. We present preoperative characteristics, surgical technique and outcomes in this analysis.

Results: From 2003 to 2007, 57 children underwent mini-ureteroneocystostomy for unilateral vesicoureteral reflux. The group was predominantly female (48 of 57 patients or 84%) with median age of 4.8 years. Median vesicoureteral reflux grade was 3 (range 2 to 5). Duplication anomalies were present in 8 patients, while 5 had a Hutch diverticulum and 5 had a solitary kidney. A total of 47 patients (82%) underwent postoperative voiding cystourethrogram and surgical cure was achieved in all. De novo vesicoureteral reflux was identified in the contralateral ureter in 3 of 47 patients (6%). The procedure was performed on an outpatient basis in 47 of 57 patients (82%). Postoperative complications requiring surgical intervention developed in 2 children.

Conclusions: Mini-ureteroneocystostomy is an effective modified extravesical technique for vesicoureteral reflux. This procedure is safe and it can be performed on an outpatient basis with excellent results. It has become our standard of care in patients with unilateral vesicoureteral reflux.

Key Words: ureter, urinary bladder, vesico-ureteral reflux, cystostomy

Extravesical UNC for the surgical treatment of VUR has been recognized as a successful management strategy in children with this common problem. Since its initial introduction, the technique has gone through multiple modifications that have only served to improve outcomes and decrease patient morbidity.[1–6] This procedure provides excellent outcomes with minimal morbidity secondary to a decreased incidence of hematuria and bladder spasm. Groups at several centers have used this procedure in unilateral and bilateral procedures.[7,8] It has been touted as a technique that can be applied in an outpatient setting with excellent outcomes.[9]

We have also noted significant benefits for our patients who have undergone standard extravesical UNC. We have applied our modifications to the extravesical UNC and coined the term mini-UNC to denote decreased limits of dissection performed via an approximately 2 cm groin incision. This technique and our initial outcomes are described.

METHODS

All children from 2003 to 2007 who underwent unilateral mini-UNC were evaluated in this series. Resident physicians performed at least 50% of every case. All procedures were done using general anesthesia.

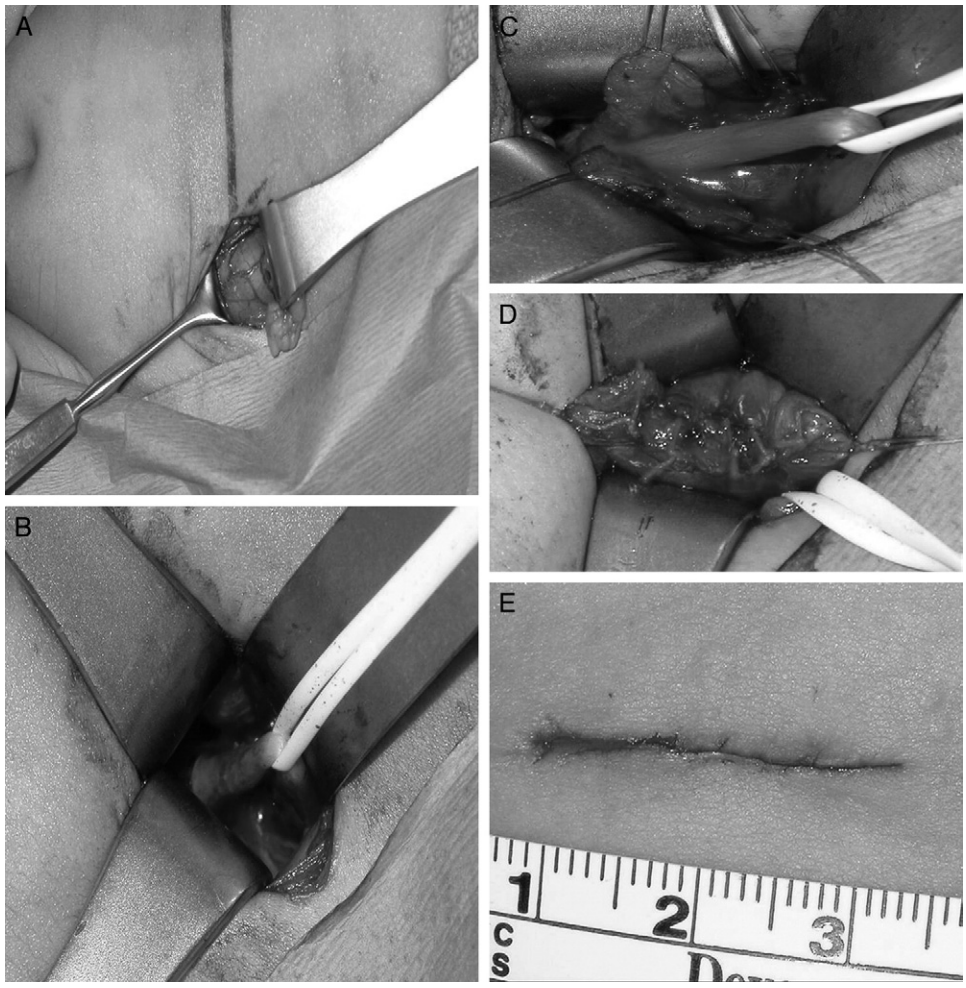
Similar to the procedure described by Chen et al,[2] we begin with a 2 cm groin incision and dissect lateral to the rectus belly, which is retracted medial. Dissection continues down to the UVJ (see figure). The ureter is then isolated using a vessel loop without ligating the obliterated umbilical artery or disrupting the bladder pedicles. The bladder is partially filled to define the segment adjacent to the ureter where the new detrusor tunnel will be created. The site for detrusorrhaphy is selected and marked with 3-zero polyglactin stay sutures. The detrusor is incised posterolateral beginning immediately cephalad to the UVJ. Detrusor flaps are elevated from the underlying mucosa using sharp and blunt dissection. Infrequently the mucosa is entered and immediately closed. The detrusor flaps are extended around the UVJ in a Y configuration. Thus, the ureteral hiatus is never disrupted. The lateral trigonal ridge and intertrigonal ridge (Mercier's bar) are left intact.

The ureteral tunnel and ureteral diameter are assessed to achieve a 5:1 ratio. Although the ureteral diameter is relatively constant, the length of the ureteral tunnel will be directly affected by the degree of bladder filling and tension on the bladder flaps. We close the detrusor flaps with the bladder emptied enough to prevent bulging of the mucosa through the detrusorrhaphy. With that degree of filling we have found the mini-UNC to be effective when 6 or 7 sutures are required to close the detrusor flaps.

Initially we placed a single ureteral advancing suture from the muscularis of the distal ureter to the inferomedial detrusor as an anchoring stitch. However, we stopped using that technique after the first 6 cases. Since then, the detrusor flaps have been closed over the ureter with interrupted 3-zero polyglactin sutures. Care is taken to ensure that the

* Correspondence and requests for reprints: 2525 Chicago Ave., Minneapolis, Minnesota 55404 (telephone: 952-835-9442; FAX: 952-835-9443; e-mail: dvandersteen@pediatricsurgicalassociates.com).

DOI:10.1016/j.juro.2008.04.081



Representative images of mini-UNC procedure. *A*, initial approach to bladder and UVJ through small groin incision. *B*, ureteral isolation in vessel loop with medial retraction of bladder and rectus belly. *C*, creation of new ureteral tunnel beneath thick detrusor flaps. *D*, detrusorrhaphy closure with 3-zero polyglactin. *E*, final skin closure.

ureter is not constricted at the neohiatus or entrapped by any detrusor sutures. The Foley catheter is removed at the end of the procedure. Most patients are discharged home on the day of surgery after an appropriate observation period.

Our patients were seen 6 weeks after surgery for physical examination and RUS, and at 3 months for repeat RUS and VCUG. Preoperative and postoperative imaging was independently interpreted by pediatric radiologists at our institution. Patients were considered to be cured if no persistent VUR was identified on the 3-month VCUG. We attempted to achieve 100% followup of the patients in our series. Certified letters and telephone calls were used to contact patients who failed to return for scheduled followup.

RESULTS

Patient Cohort

A total of 57 children with unilateral VUR underwent mini-UNC from 2003 to 2007. The group was predominantly female (43 girls and 9 boys) with a median age of 4.8 years (range 7 months to 16 years). All children in the study cohort had unilateral VUR alone and no history of contralateral VUR. Median VUR grade was 3 (range 1 to 5). Of 57 patients 25 (44%) and 18 (32%) demonstrated dysfunctional voiding and constipation, respectively. One child (2%) had urodynamically confirmed neurogenic bladder. In each scenario these children underwent maximal medical therapy before surgical intervention. Preoperatively all children with dysfunctional elimination syndrome were placed on stool softeners and/or laxatives, timed voiding schedules with a reward program and anticholinergic medications as necessary to decrease the need for surgery. Ureteral duplication anomalies were also present in the cohort, including complete duplication in 6 of 57 patients (10%) and incomplete duplication in 2 (3%). Solitary kidneys comprised 9% of the study group (5 of 57 cases). Hutch diverticula were present in 5 patients (8%).

Initial Management

Preoperative recurrent urinary tract infections or pyelonephritis was noted in 49 of 57 patients (86%) in this cohort. All children were treated for the initial infection with intravenous antibiotics and then placed on daily antibiotic prophylaxis for a median of 15 months (range 0 to 60). Breakthrough urinary tract infection, patient noncompliance, progressive VUR and reflux nephropathy or parent/guardian desire were the indications to proceed with mini-UNC. One child (2%) was treated with a Dx/HA injection before mini-UNC. No child underwent open UNC performed by another means before mini-UNC. No child had bilateral VUR in this study.