SUCCESSFUL LONG-TERM OUTCOME USING EXISTING NATIVE CUTANEOUS URETEROSTOMY FOR RENAL TRANSPLANT DRAINAGE

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ABSTRACT

Purpose: We report our long-term experience with a preexisting native cutaneous ureterostomy via an ipsilateral transplant ureteral native ureterostomy for transplant drainage without native nephrectomy.

Materials and Methods: Between 1993 and 1998, 5 patients without a usable bladder had undergone previously urinary diversion via cutaneous ureterostomy. All patients had a well functioning cutaneous ureterostomy for a mean plus or minus standard deviation of 18 ± 12 years before renal transplantation. No patient had a history of stomal stenosis, recent urinary tract infection or pyelonephritis.

Results: All 5 patients continued to have a functioning renal transplant at last mean followup of 36 ± 6.6 months. Complications included stomal retraction due to postoperative weight gain requiring revision in 2 cases and ureteroureteral anastomotic stenosis treated with endopyelotomy in 1. Mean serum creatinine at last followup was 1.5 ± 0.6 mg./dl.

Conclusions: Of the complications that we present only 1 may be attributed to the singularity of our procedure. Our experience suggests that a preexisting native cutaneous ureterostomy may serve as a receptacle for transplant ureteral drainage in select patients with excellent long-term function.

KEY WORDS: kidney, ureter, ureterostomy, renal transplantation, urinary diversion

Many renal transplantation candidates with end stage renal disease have bladder or ureterovesical junction dysfunction. Before 1966 these patients were considered to be poor candidates for renal transplantation.[1] Currently many of them undergo urological reconstruction or repair before transplantation. Lower morbidity has been associated with ureteral undiversion[2] to a previously dysfunctional bladder with bladder augmentation[3] in renal transplantation compared to diversion procedures only. However, in many patients undiversion or bladder augmentation is not an option and they require urinary diversion before renal transplantation. Kelly et al presented 7 cases of urinary diversion with an ileal conduit and renal transplant.[4] Of the 7 patients 4 had a successful long-term outcome. Failure occurred in only 1 case secondary to the conduit and caused by a breakdown in the ileal ureteral anastomosis.

Since the original report of Kelly et al, ileal and colonic conduits have been created with various degrees of success.[5] In 1979 Levitt et al alternatively proposed urinary diversion of transplanted kidneys through a cutaneous ureterostomy.[6] They reported 2 cases of successful use of the distal remnant of a native cutaneous ureterostomy for allograft transureteroureterostomy after native nephrectomy. Subsequently McInerney et al created cutaneous ureterostomies after native nephrectomy and reported a long-term morbidity equivalent to that of conduits.[7] However, despite the comparable morbidity of cutaneous ureterostomy after native nephrectomy many clinicians have been hesitant to use this technique of urinary diversion because of the risk of distal stenosis, stricture and necrosis secondary to the fragile distal vasculature, and because the preoperative evaluation and procedure are not always simpler than conduit creation.[8]

The creation of conduits and transureteroureterostomy, which requires native nephrectomy, is often a major surgical procedure. Thus, a simpler alternative would be welcome. A solution to these concerns is to forgo native nephrectomy and transplant the allograft ureter into native cutaneous ureterostomy while leaving the native kidney in place. We report our long-term experience with preexisting native cutaneous ureterostomy via an ipsilateral transplant ureteral native ureterostomy for transplant drainage without native nephrectomy.

METHODS

Between 1993 and 1998, 2 males and 3 females underwent end (nonloop) cutaneous ureterostomy a mean plus or minus standard deviation of 18 ± 12 years before cadaveric (4) and living related (1) renal transplantation at our institution. In all 5 cases end stage renal disease had developed due to congenital urological anomalies with reflux secondary to a neuropathic or absent bladder in 3 and 2, respectively. No patient had a history of stomal stenosis, recent urinary tract infections or pyelonephritis after cutaneous ureterostomy creation. In all patients serial pre-transplantation lavage culture of the native kidneys and ureters to rule out the possibility of asymptomatic bacteriuria or subclinical pyelonephritis were negative. Thus, the rationale for safely leaving the native kidney(s) in place depended on a high degree of confidence that there was no renal or ureteral focus for ongoing infection after transplantation. Stomal size was 18 to 36Fr. These highly select patients elected to retain a cutaneous ureterostomy for urinary drainage for renal transplantation.

During the procedure the kidneys were placed in the upright normal position in each iliac fossa. The normal position of the allografts was not changed for successful completion of the transplant ureter-to-native ureter anastomosis. After ap-

propriate arterial and venous anastomoses of the transplanted kidneys were done the transplant ureters were spatulated distally and joined to a native ureter intraperitoneally with a running absorbable suture. Spatulation length was 2 to 3 cm. Stents were fixed in place, passed up to the renal pelvis of the transplanted kidney(s) and brought out through the cutaneous ureterostomy. Postoperatively all patients underwent retrograde ureterography or ureteroscopy to evaluate the neoureterostomy. All transplantation was performed by one of us (P. N. B.).

RESULTS

The table shows that all patients had a well functioning cutaneous ureterostomy for 6 to 38 years (mean 18 ± 12, median 16) before renal transplantation. They underwent surgical diversion via cutaneous ureterostomy at age 2 to 13 years (mean 7) and received pre-transplantation dialysis a mean of 23.4 ± 7.5 months. Transplantation was done at a median age of 26 years (mean 23) and mean followup was 36 ± 6.6 months. All 5 patients continued to have a functioning renal transplant at the last followup (100% actuarial graft survival at 3 years). Mean serum creatinine in all patients at last followup was 1.5 ± 0.6 mg/dl. (normal 0.6 to 1.2). There were post-transplantation complications in 3 patients. Mean postoperative time to a complication was 14 ± 9 months. Two patients with no complications postoperatively had a well functioning ureterostomy at the last followup at 33 (fig. 1) and 32 (fig. 2) months, respectively.

COMPLICATIONS: CASE HISTORIES

Case 1. A 34-year-old male was born with spina bifida and vesicoureteral reflux that necessitated bilateral cutaneous ureterostomy diversion at age 13 years. Residual renal function was stable until age 30 years, when progressive end stage renal disease required right cadaveric renal transplantation. Intraoperatively fluid gram stain and cultures of the native ureter were negative. Postoperatively the patient had a 30 lb. weight gain while on prednisone during year 1, causing retraction of the stoma and contributing to excoriation of the skin around the stoma as well as stomal stenosis. Cutaneous dilation was done 10, 11 and 12 months postoperatively until the patient presented with urosepsis, and bilateral native and transplant hydroureteronephrosis at 14 months. At that time he underwent native nephroureterectomy and ileal conduit construction rather than local stomal repair because of ongoing and progressive weight gain. At 3-year followup the patient was doing well with no further complications.

Case 2. A 24-year-old female with spina bifida and vesicoureteral reflux underwent right cutaneous ureterostomy and left nephrectomy at age 6 years. End stage renal disease developed requiring cadaveric renal transplantation at age 23 years. Stomal stenosis necessitated revision of the cutaneous stoma 20 months postoperatively secondary to significant weight gain presumed to be due to post-transplantation prednisone therapy.

Weight stabilized and the stoma was revised. Since then, there have been no further complications.

Case 3. A 43-year-old male born with exstrophy and epispadias had bilateral hydronephrosis at age 4 years, requiring left cutaneous ureterostomy with right transureteroureterostomy. A left staghorn calculus later necessitated left nephrectomy without removal of the cutaneous ureterostomy (fig. 3, *A*). Subsequently end stage renal disease developed and living related renal transplantation was done. Urinary tract infections developed at 1 and 11 months but resolved successfully. At 10 months ureteroureteral distal anastomotic stenosis was treated with endopyelotomy (fig. 3, *B*). There have been no further complications at last followup at 31 months (fig. 3, *C*). The patient has been stent-free for the last 2 years.

DISCUSSION

Before the report of Kelly et al[4] urological anomalies were considered a contraindication to renal transplantation. Although it has been suggested that bladder undiversion is the method of choice for transplanting ureters, it is not always feasible. Our 5 patients had a bladder that was absent or unusable and all had a cutaneous ureterostomy in place. Traditionally cutaneous ureterostomy has had limited use because of the risk of a comparative increase in susceptibility to infection and urosepsis as well as suspicions of the viability of the distal ureteral vasculature. In previous studies in which cutaneous ureterostomies were retained during transplantation all cases involved nephrectomy and reconstruction of the distal hub of the ureteral stoma. MacGregor et al described 3 cases of native nephrectomy with cutaneous ureterostomy creation during renal transplantation.[2] One patient later underwent conversion to an ileal conduit for unspecified reasons. Santiago-Delpin et al reported on 1 patient[9] and Levitt et al reported on 2[6] in whom the transplanted ureter was attached to the stump of a previous cutaneous end ureterostomy. Followup was minimal.

In patients who present with an existing cutaneous ureterostomy a transplant transureteral native ureterostomy may be the operation of choice and often the most uncomplicated procedure. In previous studies of renal transplants the distal segment of the ureters has been used after ipsilateral native nephrectomy based on evidence in animal models that revascularization of an isolated ureter occurs from the surrounding tissue when a terminal loop is used to construct the cutaneous ureterostomy.[10] Garrison et al reported success with loop cutaneous ureterostomy with distal ureteral stenosis in only 1 of 20 transplant cases,[11] although in our series all cases involved end cutaneous ureterostomy. Nevertheless, it may be less morbid to leave the ipsilateral kidney in place. There are advantages to using a preexisting cutaneous ureterostomy. When an existing cutaneous ureterostomy is not used, more complicated and potentially morbid creation of a conduit is required with the native kidney(s) removed during or before renal transplantation. If diversion is performed before transplantation, the recovery phase would signifi-

| Pt. No. — Age — Sex	Transplant Type	Total Mos. Followup	Last Followup Serum Creatinine (mg./dl.)	End Stage Renal Disease	Age at Transplantation (yrs.)	Age at Cutaneous Ureterostomy (yrs.)	Cutaneous Ureterostomy (yrs.)	Pre-Transplantation Dialysis (mos.)	Complications
1 — 42 — M	Living related	31	1.9	Exstrophy	40	2	38	16	Ureteroureteral stenosis
2 — 24 — F	Cadaveric	47	1.1	Myelomeningocele + neurogenic bladder	19	6	13	20	Stomal retraction from wt. gain
3 — 34 — M	Cadaveric	38	2.1	Spina bifida + neurogenic bladder	29	13	16	22	Stomal retraction from wt. gain, urosepsis
4 — 23 — F	Cadaveric	33	0.7	Urogenital sinus	22	5	17	23	None
5 — 21 — F	Cadaveric	32	1.9	Nonneuropathic + neurogenic bladder	15	9	6	36	None
Mean ± SD		36.2 ± 6.6	1.54 ± 0.6		25 ± 9.8	7 ± 4.1	18 ± 12	23.4 ± 7.5	
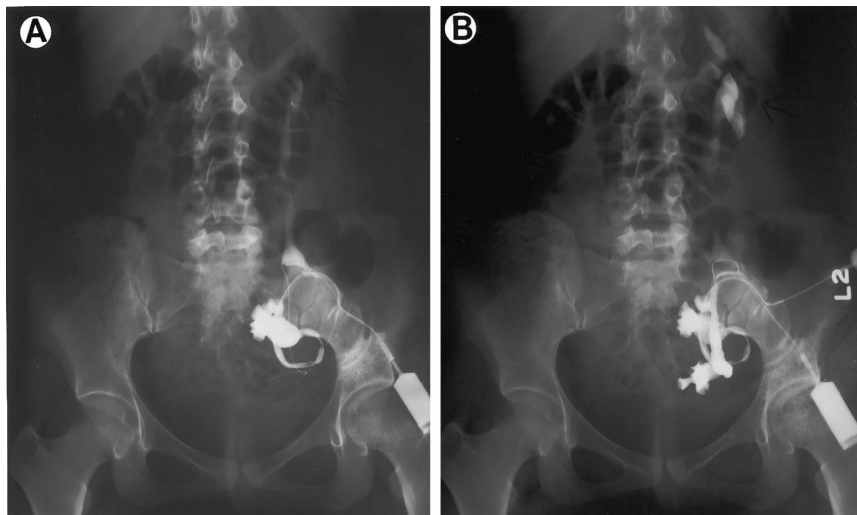
FIG. 1. Retrograde cutaneous ureterography. *A*, native solitary left kidney and superior unit of pediatric en bloc donor kidneys. *B*, inferior and superior units of pediatric en bloc donor kidneys with stents in place. Transplant ureters were anastomosed to distal portion of native ureter without disturbance of ipsilateral native kidney, enabling use of existing, well functioning cutaneous ureterostomy.
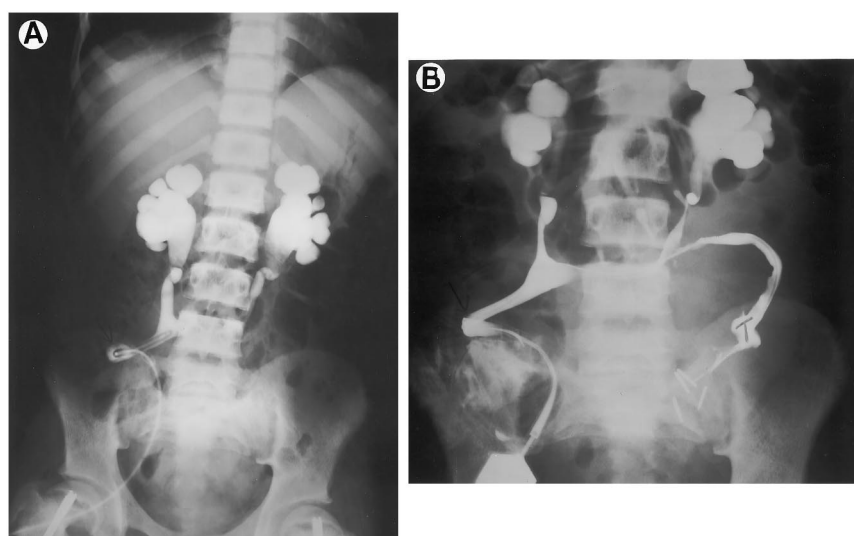

FIG. 2. *A*, right cutaneous lower quadrant ureterostomy with transplant retrograde pyelogram. *B*, cadaveric renal transplant (*T*) ureter was anastomosed to left native ureter that drained via transureteroureterostomy into right native ureter. Latter ureter formed well established and functioning cutaneous ureterostomy.

cantly prolong the wait for a kidney and increase patient time on dialysis. Significantly higher morbidity may be anticipated by urinary diversion creation during transplantation. Other advantages of preserving the native cutaneous ureterostomy include the immediate availability of a well functioning drainage system, low incidence of reflux that limits future damage to the transplanted kidney, and limitation of metabolic derangements and mucous production that often develop in patients with a conduit.

To our knowledge we present the first report of preservation of a cutaneous ureterostomy without native nephrectomy. Of our 5 patients 3 had complications that were readily corrected and did not lead to significant long-term morbidity or allograft compromise. A stomal retraction required dilation and urosepsis necessitated conversion to an ileal conduit because of continued weight gain in 1 case each. The latter patient was not considered a candidate for local stomal revision because of continued progressive weight gain. In another patient stomal stenosis responded to stomal revision and in the remaining patient ureteroureteral anastomotic stenosis was successfully treated with endopyelotomy. No mortality was

associated with these complications and the renal graft remained functional throughout, limiting morbidity only to that associated with a further procedure.

The advantages of transureteroureterostomy without removal of the native kidney are theoretical and practical. One may anticipate that the ureteral blood supply is better preserved when the proximal renal blood supply is intact. Practically the extent of the operation is significantly circumscribed to relatively straightforward ureteroureteral anastomosis, which may be attributed to the singularity of our procedure. The complications associated with nonnephrectomy cutaneous ureterostomy for transplant drainage are easily corrected with no associated long-term morbidity.

CONCLUSIONS

Our experience with 5 cases suggests that a preexisting native cutaneous ureterostomy may serve as a receptacle for transplant ureteral drainage with excellent long-term function. This procedure should be considered rather than the use of ileal conduits in select cases.
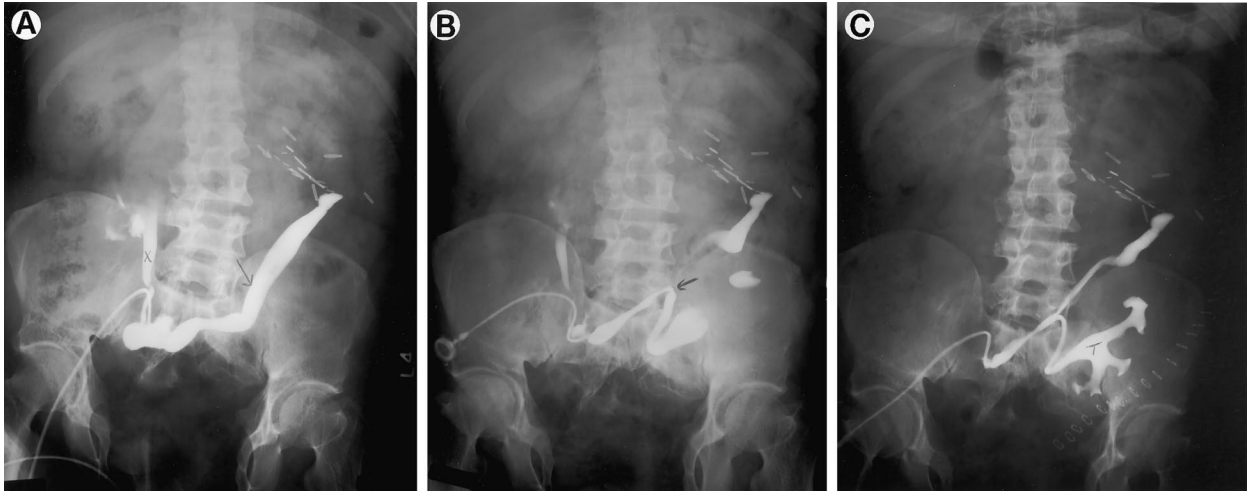
Fɪɢ. 3. Retrograde cutaneous ureterography. *A*, before transplantation right native ureter (*X*) drains into dilated left native ureter (arrow), which forms right lower quadrant cutaneous ureterostomy. Left nephrectomy had been performed 20 years previously, enabling neovascularity of larger left ureter from surrounding tissues. Transplant ureter was connected to this left native ureter (arrow). *B*, anastomotic stenosis (arrow) developed 10 months after transplantation and required endopyelotomy. *C*, followup film shows well drained transplant kidney (*T*) without stenosis.

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