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EXPERIENCE WITH ILEAL URETERS

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CONTINUITY of the interrupted ureter can be re-established by anastomosis to the contralateral ureter, to the bladder directly, or by means of a bladder flap. Ureterostomy and splinting of the ureter is the procedure of choice for pliable ureteral strictures. There are instances in which these techniques are unsuitable because of extent, location, or bilaterality of the disease process. In such cases the ileum is a suitable substitute for the ureter.

Anatomically, the lower ileum is singularly convenient for incorporation into the urinary tract. Its rich blood supply, mobility, and similarity to the ureter as a neuromuscular structure make it acceptable.

Experimental evidence suggests that an ileal loop may absorb an excess of potassium from the urine. However, there have been few clinical reports confirming such chemical imbalance. Absorption of urinary excretory

products in the presence of normal renal function usually causes no electrolyte disturbance. The procedure is contraindicated when renal function is poor or when outlet obstruction exists. Hyperchloremic acidosis and low levels of magnesium in the blood may result.

The urologic surgeon is often confronted with the problem of extensive loss of effective ureteral continuity. The small intestine is readily available as a closed system for urinary diversion in cases where more conservative methods of ureteral reconstruction are not applicable. The use of small intestine as replacement for the ureter has interested surgeons since the 19th century. In 1894 Finger proposed the use of a loop of small bowel without isolation from its mesentery for reconstruction of the ureter. The first such repair in man was performed by Shoemaker in 1906. The procedure was revived in the 1950s. Case reports were published by Baum,[1] Rack,[2] Ulm,[3] and Pyrah.[4,5] Wells reviewed 56 cases of ureteral substitution with ileum in British literature in 1956.[6] Goodwin reported 16 cases in which ileum was used for ureteral replacement.[7]

In 1967 we reported three cases of ureteral replacement with ileum.[8] We are reporting two additional cases of ileal ureters. Follow-up data on two previously reported cases are also presented.

Case No. 1

In 1967 a 52-year-old white woman underwent left nephroureterectomy for resistant renal tuberculosis. She remained well until January 1973, when she was found to have an extensive carcinoma of the rectum. An abdominoperineal resection and bilateral salpingo-oophorectomy were performed en bloc. On the seventh postoperative day diminishing urinary output and uriniferous drainage from the perineal wound were noted. An intravenous pyelogram (IVP) demonstrated extravasated dye from the right ureter at the level of the pelvic brim. An attempt at passage of a ureteral catheter was unsuccessful, and a right nephrostomy was performed. The patient was discharged with her nephrostomy in situ.

She was readmitted to the hospital in August 1973. An IVP and a retrograde pyelogram demonstrated an extensive right ureteral stricture from the level of the pelvic brim to the bladder. On September 4, 1973 an exploratory laparotomy was performed. The right ureter from the sacroiliac joint to the bladder was encased in dense fibrous tissue and could not be freed. A four-inch segment of ileum was used to fashion a right ureteroileocystostomy. An IVP one month postoperatively revealed

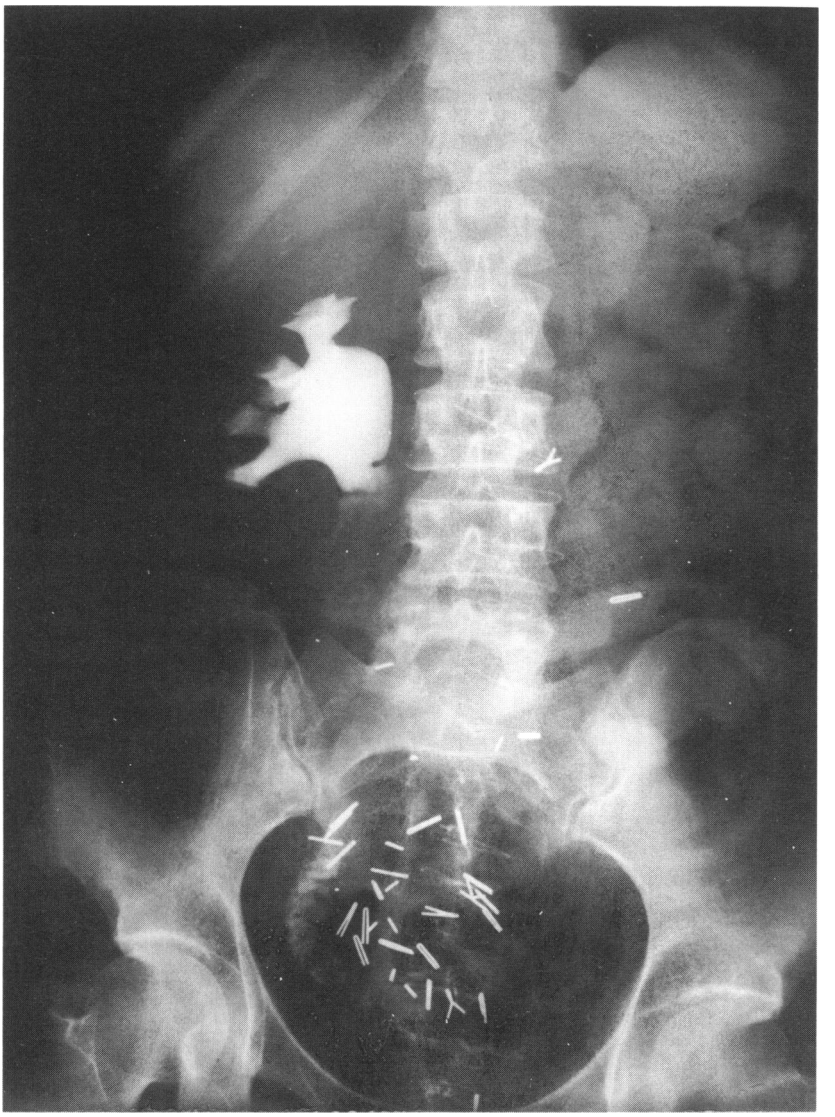

Fig. 1. Intravenous pyelogram one month postoperatively, case 1

prompt functioning of the right kidney with mild pyelectasis and rapid appearance of dye in the bladder (Figure 1). A gravity cystogram showed high pressure reflux. No low pressure reflux was present. The patient was discharged on Mandelamine therapy.

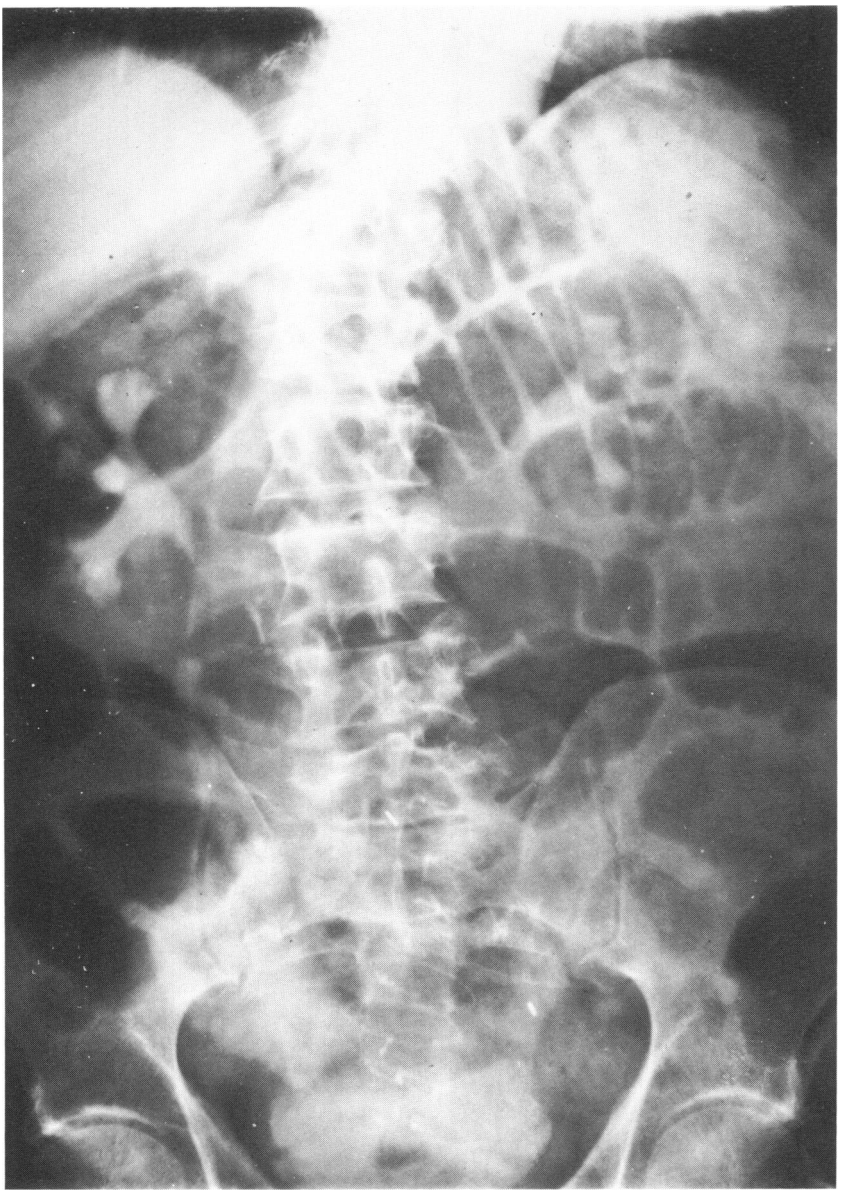

Fig. 2. Intravenous pyelogram one year postoperatively, case 2

CASE NO. 2

A white male 69 years of age was admitted to the hospital because of acute chest pain and hypertension. Examinations ruled out acute myocardial infarction. A blood urea nitrogen (BUN) level of 107 mg.% and creatinine level of 6.2 mg.% were noted. IVP revealed right hydronephrosis and nonfunctioning left kidney. Rectal examination revealed 2-3+ prostatic enlargement. Residual urine measured 60 cc. Foley catheter drainage was instituted. Ten days later the BUN was 94 mg.% and creatinine ranged between 4.7 and 5.2 mg.%.

Cystoscopy was performed. Because of severe bullous edema and prostatic enlargement, ureteral catheterization was unsuccessful.

Suprapubic cystotomy and intraoperative retrograde pyelography were performed. Bilateral lower ureteral strictures were noted. Retroperitoneal exploration of the ureters revealed both ureters to be encased in dense scar tissue from which they could not be removed. Biopsies revealed retroperitoneal fibrosis. One week later bilateral ureteroileocystostomy was performed, the Wallace technique being used for the ureteroileostomy. Ileovesical anastomosis was performed at the fundus of the bladder.

The patient had a gratifying postoperative course. The BUN fell to 38 mg.% and the creatinine decreased to 2.1 mg.%. An IVP prior to discharge revealed prompt bilateral function with moderate dilatation of calyces. Cystogram revealed reflux into the left collecting system. BUN was 29 mg.%.

In September 1974 the patient presented with urinary retention and underwent a transurethral prostatectomy. The postoperative course was uneventful. An IVP in August 1975 revealed normal pyelograms bilaterally (Figure 2).

CASE NO. 3

A 28-year-old Negro woman underwent radical hysterectomy for Stage I epidermoid carcinoma of the cervix. On the 14th postoperative day an IVP, performed because of right back pain and low grade fever, revealed right ureteropyelocaliectasis and obstruction of the ureter at its lower third. The fever and pain responded to conservative management with antibiotics and ureteral catheter drainage.

An IVP taken six weeks postoperatively disclosed progression of the right ureteropyelocaliectasis. A bulb pyelogram disclosed a three centime-

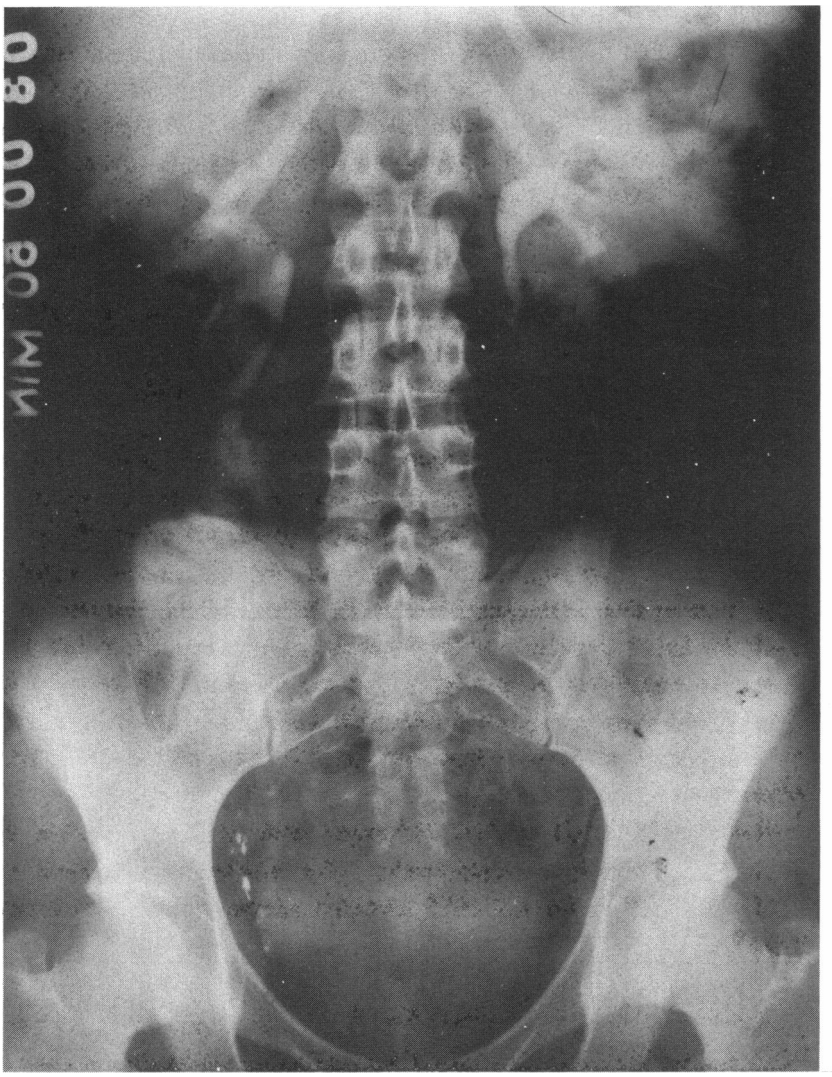

Fig. 3. Intravenous pyelogram eight years postoperatively, case 3

ter area of narrowing in the distal right ureter. A right nephrostomy was performed. Two months later right ureteral exploration was undertaken. The ureter was encased in a dense fibrous sheath with obstruction at the pelvic brim. A right ureteroileocystostomy was performed. Two months postoperatively an IVP revealed a well-functioning right kidney with

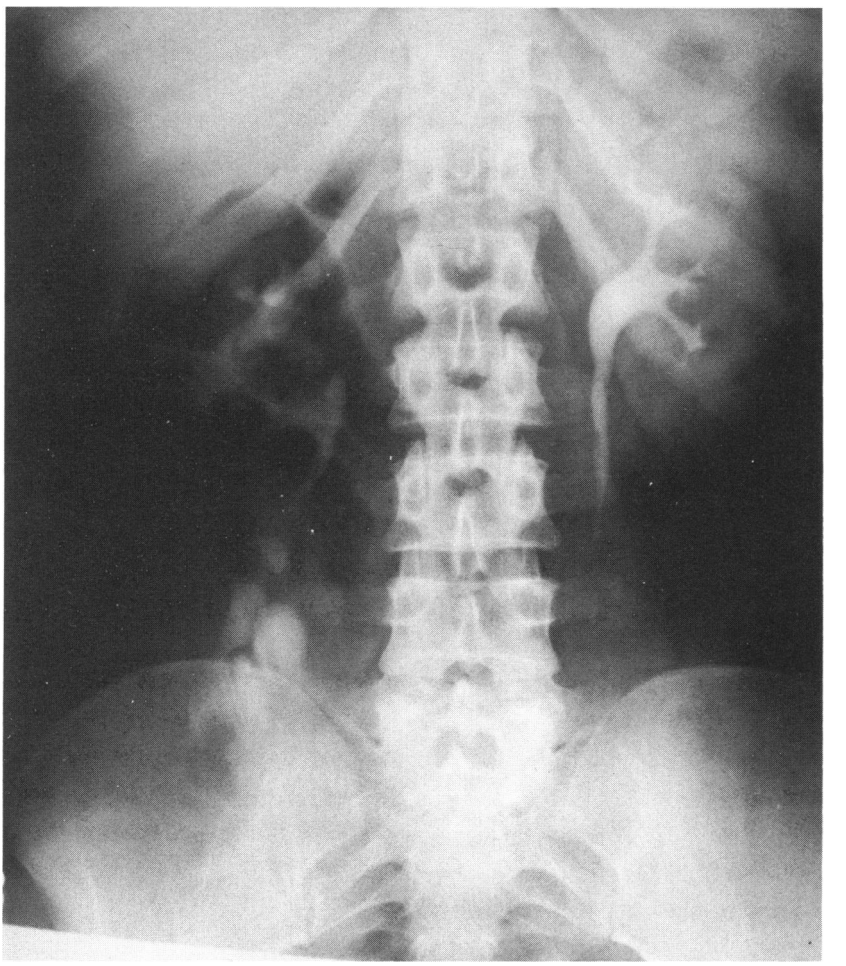

Fig. 4. Intravenous pyelogram eight years postoperatively, case 4

absence of pyelocaliectasis (Figure 3). BUN, serum creatinine, and electrolyte levels were all normal.

Over the intervening eight years the patient has been followed with annual IVPs, urine cultures, and chemical analyses of the blood. BUN and creatinine remain within normal limits. A urine culture in August 1973 was sterile. An IVP performed in April 1974 revealed prompt functioning of the kidneys and Grade I ureteropyelocaliectasis (Figure 4). Two episodes of pyelonephritis were easily controlled. Hospitalization was not required. The only medication taken at the present time is Mandelamine.

Case No. 4

A 24-year-old Negro male was admitted because of pain in the right flank and vomiting. An IVP revealed right pyelocaliectasis and an obstructing calculus at the right ureteropelvic junction. The right ureter was not visualized. A retrograde ureterogram disclosed a normal distal ureter. At operation an impacted calculus was discovered at the ureteropelvic junction, with a 2 cm. stricture of the upper ureter. A right ureterolithotomy was performed along with a Davis intubation ureterostomy. Nephrostomy drainage was instituted. The splinting ureteral catheter was removed on the 14th postoperative day and an antegrade pyelogram revealed total obstruction of the right ureter. Attempts at retrograde catheterization were unsuccessful and the patient was discharged with his nephrostomy tube in situ. Eight weeks later another antegrade pyelogram revealed no new changes. The patient's right ureter was reexplored on May 3, 1965. Marked retroperitoneal fibrosis was noted from the renal pelvis to the bladder. A right pyeloileocystotomy was performed. An IVP nine months postoperatively was normal. BUN was 12 mg.%. Electrolytes were normal.

The patient was not seen again until April 1973. He had not taken any antibiotics during the intervening eight years. He complained of mild pain in the right flank. Physical examination was normal except for a well-healed surgical scar. The BUN was 16 mg.%, serum creatinine was 1.0 mg.%. A culture of the urine was sterile. An IVP performed at the time revealed prompt functioning kidneys bilaterally with mild right pyelectasis. The patient takes no medicine at present.

Summary

Four cases of ureteral substitution with ileum were presented. Indications for the ileal ureter were discussed. This technique is useful in selected cases where ureteral continuity cannot be restored by simpler means.

Women with severe urological complications following extensive pelvic operations for cancer constitute the largest group of candidates for the ileal ureter. This is illustrated by the two cases in which radical pelvic procedures resulted in compromise of the ureter. Ileal substitution for the defective ureter was the only available modality for restoration of effective ureteral continuity and was a happy alternative to nephrostomy or nephrectomy.

In the second case, the extensive retroperitoneal fibrosis precluded the use of ureterolysis. In addition, the bilaterality of the diseases militated against the use of transureteral procedures. Ureteral substitution with ileum was considered preferable to the use of an ileal conduit.

In the last case, ureterostomy and splinting were performed for repair of a ureteral stricture. Failure to relieve the stricture and postoperative fibrosis of the ureter necessitated complete ureteral replacement; the ileum provided an ideal substitute.

Goodwin has used ileum as an adjunct to the ureter in patients with multiple recurrent branched renal calculi.[9] The anastomosis is made to the lower calyces in order to provide a large-caliber drainage tube to the bladder, thus preventing the recurrence of stones. The technique of Goodwin for ureteral substitution was used with certain minor modifications.[10]

The ileal ureter can serve as a valuable adjunct to the repertoire of the urologist. This operation is not indicated when ureteral continuity can be restored by simpler means.

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