0022-5347/95/1545-1693$03.00/0
THE JOURNAL OF UROLOGY
Vol. 154, 1693–1695, November 1995
Printed in U.S.A.

CHANGING TRENDS IN THE MANAGEMENT OF IATROGENIC URETERAL INJURIES

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ABSTRACT

Purpose: We evaluated changing trends in the management of late diagnosed iatrogenic ureteral injuries before and after the introduction of percutaneous nephrostomy.

Materials and Methods: The study included 44 patients of whom 24 were treated primarily by immediate reconstructive surgery from 1979 to 1984 and 20 were treated primarily by percutaneous nephrostomy tube insertion beginning in 1985.

Results: Six of the 24 patients underwent ureteroneocystostomy and 18 underwent end-to-end uretero-ureteral anastomosis to repair the injury. Postoperatively 18 patients had a urinary tract infection. Hospital stay after reconstructive surgery ranged from 14 to 35 days (average 18). Long-term followup showed a normal upper urinary tract in 22 patients and mild to moderate hydroureteronephrosis in 2. Of the 20 patients who underwent percutaneous nephrostomy 16 (80%) had complete spontaneous recovery of the injured ureter after 14 to 66 days (average 32). Hospital stay after the insertion of the percutaneous nephrostomy tube ranged from 3 to 5 days. Urinary tract infection developed in 4 patients and mild hydronephrosis was noted in 1 on long-term followup.

Conclusions: The primary management of ureteral injury by percutaneous nephrostomy resulted in significantly decreased reoperation and morbidity rates, and enabled spontaneous recovery of the injured ureter in the majority of patients.

KEY WORDS: ureter; nephrostomy, percutaneous; iatrogenic disease

A changing trend in the management of the injured ureter has been reported since the introduction of the percutaneous nephrostomy tube.[1] Previously ureteral injuries diagnosed after retroperitoneal or pelvic operations were managed primarily by immediate reconstructive surgery.[2] Following the introduction of percutaneous nephrostomy, a significant decrease in the reoperation rate was accompanied by spontaneous recovery of the injured ureters in a significant number of patients.[3] Our study was conducted to evaluate and compare the outcome of management of ureteral injury before and after the introduction of a percutaneous nephrostomy tube in 2 groups of patients who were diagnosed and treated during 14 years.

MATERIALS AND METHODS

A total of 38 women and 6 men with surgical ureteral injuries diagnosed postoperatively was included in this study. Patients were treated and followed at our institution between 1979 and 1992. Between 1979 and 1984, 24 consecutive patients were treated primarily by immediate reconstructive surgery and from 1985 on 20 patients were treated primarily by percutaneous nephrostomy tube insertion. Excluded from the study were patients in whom ureteral injuries were diagnosed and repaired intraoperatively. From 1985 on 2 patients with severe ureteral injuries that clearly would not resolve with percutaneous nephrostomy drainage alone were also excluded. Data collected from the hospital and outpatient clinic charts include the etiology and symptomatology of ureteral injuries, imaging techniques used for diagnosis, types of ureteral injury, management and complications following treatment, duration of hospital stay and results of therapy. From these data the outcomes of surgical repair and insertion of a percutaneous nephrostomy tube were evaluated and compared.

Accepted for publication April 7, 1995.
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RESULTS

Of the 44 patients 24 were treated between 1979 and 1984 primarily by immediate reconstructive surgery and 20 were treated from 1985 on primarily by insertion of percutaneous nephrostomy tubes. Ureteral injuries occurred during gynecological operations in 36 patients (82%), colon surgery in 6 (23%) and suprapubic prostatectomy in 2 (5%, table 1). Flank pain was the most common presenting symptom (36 patients, 82%). Fever was documented in 15 patients (34%) and 10 (23%) presented with a ureterovaginal fistula 5 to 17 days after gynecological procedures. Five patients (11.5%) pre-

TABLE 1. *Etiology of ureteral injuries*

	No.
Gynecological surgery (36 pts.):	
Abdominal hysterectomy	12
Abdominal hysterectomy and salpingo-oophorectomy	10
Cesarean section	4
Vaginal hysterectomy	4
Ovarian tumor	3
Ovarian cyst	3
Abdominal surgery (6 pts.):	
Anterior resection	3
Miles' operation	3
Suprapubic prostatectomy	2

sented with a ureterocutaneous fistula 8 to 25 days postoperatively (table 2).

Excretory urography (IVP) revealed unilateral hydronephrosis in all 44 patients and complete ureteral obstruction in 28. A ureterovaginal fistula was diagnosed in 4 patients, extravasation of urine to the retroperitoneum in 3 and a ureterosigmoid fistula in 1. Retrograde pyelography performed in 23 cases demonstrated complete ureteral obstruction in 19 and extravasation of urine to the retroperitoneum in 4. Renal ultrasonography performed in 35 cases showed hydronephrosis in 28 (80%) and normal kidneys in 7 (20%, table 3).

Of the 44 patients 24 were treated by surgical repair of the injured ureter between 1979 and 1984 of whom 18 underwent uretero-ureteral end-to-end anastomosis and 6 underwent ureteroneocystostomy (table 4). Hospital stay ranged from 14 to 35 days. A urinary tract infection developed in 18 patients during the immediate postoperative period (table 5). Prolonged urinary leakage through the incisional scar for 4 to 20 days occurred in 8 patients who underwent uretero-ureteral anastomosis. IVP 3 to 6 months after surgical repair showed normal kidneys in 22 patients and mild to moderate unilateral hydronephrosis in 2.

All 20 patients with ureteral injuries diagnosed from 1985 on were treated primarily by percutaneous nephrostomy insertion, including 12 with complete ureteral obstruction, 4 with a ureterovaginal fistula, 3 with retroperitoneal extravasation of urine and 1 with a ureterosigmoid fistula (table 4). Of the 20 patients 16 (80%) had complete spontaneous recovery of the injured ureter after 14 to 66 days (table 5). Hospital stay for these 16 patients after insertion of the percutaneous nephrostomy tube ranged from 3 to 5 days. A urinary tract infection developed in 4 patients and blocked tubes were replaced in 2. None of the patients had deterioration of renal function due to a poorly draining percutaneous nephrostomy. At followup moderate hydronephrosis was noted in 1 patient. In 4 patients treated primarily by percutaneous nephrostomy the ureteral injury persisted after 68 to 92 days (ureterovaginal fistula in 2, ureterosigmoid fistula in 1 and ligation of the ureter after hysterectomy in 1). Subsequently 3 of these patients underwent ureteroneocystostomy and 1 underwent uretero-ureteral anastomosis. Followup IVP was normal in all cases.

TABLE 2. *Presenting symptoms*

	No. Pts. (%)
Flank pain	36 (82)
Urinary leakage:	15 (34)
Ureterovaginal fistula	10 (23)
Retroperitoneal extravasation	5 (11.5)
Fever	15 (34)
Asymptomatic	1 (2.3)

TABLE 3. *Radiological findings in 44 cases*

	No. Pts./Total No. (%)
IVP (44 pts.):	
Hydroureteronephrosis	44/44 (100)
Complete ureteral obstruction	28/44 (64)
Ureterovaginal fistula	3/44 (9)
Retroperitoneal extravasation	3/44 (7)
Ureterosigmoid fistula	1/44 (2.2)
Renal ultrasonography (35 pts.):	
Hydronephrosis	28/35 (80)
Normal	7/35 (20)
Retrograde pyelography (23 pts.):	
Complete ureteral obstruction	19/23 (82)
Urinary leakage	4/23 (18)

TABLE 4. *Management of ureteral injuries*

	Surgical Repair		Percutaneous Nephrostomy No. Pts. (%)
	Management	No. Pts. (%)	
Complete obstruction	End-to-end anastomosis	16 (66)	12 (60)
Ureterovaginal fistula	Ureteroneocystostomy	6 (25)	4 (20)
Retroperitoneal extravasation	End-to-end anastomosis	2 (9)	3 (15)
Ureterosigmoid fistula			1 (5)
Totals		24 (100)	20 (100)

TABLE 5. *Clinical and followup data of patients with ureteral injuries*

	No. Pts. (%)	
	Surgical Repair	Percutaneous Nephrostomy
Spontaneous recovery		16 (80)
Urinary tract infection	18 (75)	4 (20)
Followup IVP:		
Normal	22 (92)	19 (95)
Mild hydronephrosis	2 (8)	1 (5)

DISCUSSION

Iatrogenic injury to the ureter may occur during surgical procedures performed in the retroperitoneal space or pelvis. It may complicate 10 to 30% of radical hysterectomies,[4] 3.7% of abdominal perineal resections[5] and 0.1% of cesarean sections.[6] Occasionally the intraoperative ureteral injury is overlooked and, therefore, the diagnosis is delayed for days or weeks postoperatively. Symptoms of the late diagnosis of ureteral injury are usually nonspecific, and include abdominal or flank pain and fever or nausea. In some patients urinary leakage through the surgical incision is noted days or weeks after partial or complete ureteral transection.[7] Harshman et al suggested that ureteral obstruction following gynecological procedures is due to entrapment or ligation of the ureter by a suture, which is eventually absorbed and may be best treated by proximal drainage alone.[8] They treated 3 patients with ureteral injury in whom insertion of a percutaneous nephrostomy tube resulted in complete recovery. Lang et al reported on 5 patients with ureteral injuries, including 4 with ureterovaginal fistula, who were treated successfully by percutaneous nephrostomy only.[1] Dowling et al reported on 15 patients treated by proximal drainage alone of whom 11 (73%) had complete recovery.[3]

Our series of 44 patients from a single institution compares the outcome of immediate surgery with the insertion of a percutaneous nephrostomy tube after ureteral injury. Hospital stay of the 24 patients who underwent immediate reconstructive surgery ranged from 14 to 35 days, mainly because at this time T-drains were used routinely for ureteral drainage. Stents were left intact for 14 to 21 days depending on the extent of the ureteral injury and patients were hospitalized until the T-drains were removed. Postoperatively a urinary tract infection was noted in 18 patients (75%) and urinary leakage in 8 (33%). For the 20 patients treated with percutaneous nephrostomy a significantly shorter hospital stay of 3 to 5 days was noted with a significantly lower rate of urinary tract infection (4 patients, 20%). Complete spontaneous recovery of the injured ureter occurred in 16 patients (80%).

In conclusion, primary management of ureteral injuries by insertion of a percutaneous nephrostomy tube resulted in significantly decreased reoperation and morbidity rates, and enabled spontaneous recovery of the injured ureter in a significant number of patients.

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