Comparison of Laparoscopic With Open Approach for Ureterolysis in Patients With Retroperitoneal Fibrosis

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Purpose: The surgical management of retroperitoneal fibrosis has traditionally involved open ureterolysis. We compared laparoscopic and open ureterolysis to determine if the minimally invasive approach offered advantages with respect to perioperative morbidity and treatment efficacy.

Materials and Methods: We reviewed our retroperitoneal fibrosis database at a single institution to identify all patients who underwent open or laparoscopic ureterolysis between 1995 and 2005. Clinical, perioperative and outcome data were prospectively collected and compared between the open and laparoscopic ureterolysis cohorts. Subgroup analysis was performed on patients with primary retroperitoneal fibrosis comparing outcomes in open and laparoscopic ureterolysis groups.

Results: We identified 36 (51.4%) patients who underwent open ureterolysis and 34 (48.6%) who underwent laparoscopic ureterolysis. Conversion to open surgery was required in 17.6% of the laparoscopic ureterolysis cohort. The etiology of obstruction was primary idiopathic retroperitoneal fibrosis in 35 (50%) patients, whereas the remainder had secondary retroperitoneal fibrosis, largely related to gynecological malignancy. There was no difference between the 2 groups when comparing operative time, estimated blood loss, length of hospital stay, complications, transfusion requirements and postoperative resolution of ureteral obstruction. Subgroup analysis limited to patients with primary idiopathic retroperitoneal fibrosis demonstrated that those who underwent laparoscopic ureterolysis had a shorter hospital stay (3.4 vs 10.8, $p < 0.001$) and were less likely to require transfusion (3.7% vs 13.7%, $p = 0.007$) compared to patients who underwent open surgery.

Conclusions: Laparoscopic ureterolysis is an excellent option for patients with retroperitoneal fibrosis of all causes with morbidity and efficacy comparable to open surgery. In patients with primary idiopathic retroperitoneal fibrosis laparoscopy offers the added advantages of shorter hospital stay and reduced transfusion requirements.

Key Words: laparoscopy, retroperitoneal fibrosis, treatment outcome

Retroperitoneal fibrosis resulting in extrinsic bilateral ureteral obstruction and renal failure was first described by Ormond in 1948.[1] It is well established that a wide spectrum of retroperitoneal pathology, benign and malignant, can result in ureteral obstruction.[2] Retroperitoneal fibrosis is typically divided into primary and secondary groups. Primary or idiopathic retroperitoneal fibrosis is characterized by a dense fibrous sheet involving the retroperitoneum without an obvious inciting cause. Associations have been reported between this and other idiopathic fibrosing conditions like sclerosing cholangitis, sclerosing mediastinitis and Riedel's thyroiditis.[3] Other etiological possibilities reported in the literature are drugs like methysergide and beta blockers.[2] There is more recent evidence that idiopathic retroperitoneal fibrosis could be secondary to an immune reaction against ceroid, a lipoprotein polymer present in atherosclerotic plaques in the aorta.[4] Primary retroperitoneal fibrosis, although rare, is the most common cause of retroperitoneal fibrosis, followed by ovarian pathologies.[1,2] SRF is a result of previous surgery, infection, bleeding, malignancy or radiotherapy involving the retroperitoneum.

One of the treatment options for retroperitoneal fibrosis with ureteral obstruction is ureterolysis, involving the release of adhesions around the ureters with or without intraperitonealization and omental wrapping. Traditionally this has been done as an open procedure with considerable morbidity and mortality.[5,6] Laparoscopic ureterolysis was first reported by Kavoussi et al in 1992.[7] Here we report the largest series in the published literature of ureterolysis, comparing open and laparoscopic techniques with respect to morbidity and treatment efficacy.

MATERIALS AND METHODS

Between August 1995 and January 2005 clinical, operative and followup data were prospectively recorded on all patients with evidence of retroperitoneal fibrosis who presented for ureterolysis at our single institution. Patients were diagnosed by computerized tomography, excretory urogram, retrograde pyelogram and/or a Whitaker's test. Renal function was assessed with a furosemide renogram. Patients

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with uremia were emergently treated with ureteral stent and/or nephrostomy tube placement, and renal function was optimized before surgery. Patients in whom imaging disclosed a discrete mass underwent percutaneous biopsy and, if negative for malignancy, proceeded to ureterolysis. If imaging showed findings consistent with idiopathic retroperitoneal fibrosis or nonmalignant etiology, biopsy with frozen section was done at the time of open or laparoscopic surgery. Patients with primary retroperitoneal fibrosis were initially given medical treatment, and if treatment failed they were offered surgery. History of prior surgery, infection, stent or nephrostomy tube placement, and patient characteristics such as age, gender and comorbidities were recorded.

Two surgeons performed all the procedures in this study group. Choice of open and laparoscopic surgery was by surgeon preference, and both procedures were performed during the entire study period. Open surgery was performed via midline laparotomy incision. The retroperitoneum was entered and both ureters were identified. In select cases at the discretion of the surgeon ureteral catheters were placed for easier identification of the ureters. Ureterolysis was performed with or without intraperitonealization and omental wraps based on surgeon preference and the etiology of the obstruction. Additional procedures including Boari flap, ileal interposition and nephrectomy were performed as indicated. The laparoscopic technique for ureterolysis has been previously reported.[7] Comparison was then made between patients who underwent open ureterolysis and laparoscopic ureterolysis. Statistical analysis was performed using SPSS® software. Normally distributed variables were analyzed using the independent sample t test, and nonnormally distributed variables were analyzed using Mann-Whitney U and chi-square nonparametric tests. Cohorts were compared based on an intent to treat analysis. Similar comparative analysis between the open and laparoscopic technique was performed in the subgroup of patients with PRF.

RESULTS

We identified 70 patients who underwent ureterolysis and nearly half of them were treated laparoscopically (34, 48.6%). There were 35 (50%) patients who had PRF and 35 (50%) who had SRF. A comparison of patients who underwent OU and LU is presented in table 1. Mean age was 48.4 years in the OU cohort and 52 years in the LU cohort. PRF was more common in men (20, 57%) as previously described in the literature. Of the OU cohort 80% (29) were women vs 47% (16) in the LU cohort ($p = 0.008$). The majority of patients had unilateral disease (45, 64%) with the left side more commonly involved than the right side. Preoperative renal function normalized in all patients in both groups before surgery with appropriate treatment. Preoperative ureteral stenting was performed in 19 (55.9%) patients who underwent LU which was significantly higher than in those who underwent OU (19.4%). More than 75% of patients in the open and laparoscopic groups had significant past abdominal, gynecological and/or urological surgical history. Additional procedures besides lysis of adhesions were performed for 22 patients (31.4%) including nephrectomy (1), hysterectomy (4), salpingo-oopherectomy (7), renal cyst decortication (2), bowel resection including appendectomy (4), psoas hitch (1), Boari flap (2) and ileal ureter (1 patient).

The overall conversion rate for laparoscopic to open surgery was 17.6% (PRF 14.8%, SRF 28.6%, p not significant). Omental wraps were performed in equal frequency in both groups (41% vs 42%, p not significant). Complications were infrequent in the OU (3, 8.3 %) and LU (3, 8.8%) patient cohorts with no mortalities in either group. Postoperative morbidity in these patients included port site infection (1), urinary tract infection (1), renal insufficiency that resolved before discharge (1), prolonged ileus (2), and in a patient who underwent LU intraoperative bleeding due to iliac vein injury that required conversion to laparotomy and transfusion. Early operative outcomes were similar in both cohorts including operative time, EBL, transfusion requirements and LOS. Postoperative imaging confirmed an excellent outcome with resolution of obstruction in the OU (35, 97.1%) and LU (32, 94.3%) patient populations (p not significant).

Subgroup analysis of patients with PRF was performed comparing the 2 techniques and is presented in table 2. Preoperative variables were comparable between the 2 cohorts. Comparison of operative outcomes reveal a significantly shorter hospital stay (3.4 vs 10.8, $p < 0.001$) and lower transfusion rates (3.7% vs 13.7%, $p = 0.007$) in the LU group compared to the OU group. There was complete resolution of

TABLE 1. *Comparison of open and laparoscopic approach for ureterolysis in patients with all causes of retroperitoneal fibrosis*

	Laparoscopic		Open		Significance
No. pts	34		36		
Mean pt age (SEM)	52	(2.1)	48.4	(2.2)	Not significant
No. female (%)	16	(47)	29	(80.6)	0.008
Mean American Society of Anesthesiologists score (SEM)	2.19	(0.1)	2.73	(0.2)	0.02
No. symptom acuity (%):					
Acute	10	(29.4)	2	(5.6)	0.007
Chronic	23	(67)	34	(94)	
No. abdominal surgical history (%)	25	(73.5)	22	(61.1)	Not significant
No. bilaterality (%)	15	(44.1)	10	(27.8)	0.05
No. omental wraps (%)	14	(41)	15	(42)	Not significant
No. transfusion (%)	1	(2.9)	5	(13.9)	Not significant
Median mg/dl preop creatinine (IQR)	1.15	(1, 2)	0.85	(0.6, 1.3)	<0.001
Median mg/dl postop creatinine (IQR)	1	(0.85, 1.3)	0.9	(0.6, 1.3)	Not significant
No. preop stent (%)	19	(55.9)	7	(19.4)	0.002
No. preop nephrostomy tube (%)	6	(17.6)	7	(19.4)	Not significant
Mean operating room mins (SEM)	304.25	(26.7)	330.8	(47.3)	Not significant
Median days LOS (IQR)	3	(3, 5)	4	(2, 7.75)	Not significant
Median ml EBL (IQR)	300	(100, 425)	300	(150, 500)	Not significant
No. complications (%)	3	(8.8)	3	(8.3)	Not significant
No. resolution of ureteral obstruction (%)	32	(94.3)	35	(97.1)	Not significant