

## OUTPATIENT LAPAROSCOPIC PYELOPLASTY

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### ABSTRACT

**Objectives.** To assess the feasibility of ambulatory laparoscopic pyeloplasty. Laparoscopic pyeloplasty aims to reproduce the excellent functional outcomes of open pyeloplasty while diminishing procedural morbidity.

**Methods.** Six patients fulfilled specific inclusion criteria for outpatient laparoscopic pyeloplasty: informed consent, body mass index of 40 kg/m<sup>2</sup> or less, primary ureteropelvic junction obstruction, uncomplicated laparoscopic surgery completed by 12:00 PM, and postoperative pain control by oral analgesics. All patients had a double-J ureteral stent placed cystoscopically before laparoscopic access. No drains were placed postoperatively.

**Results.** All 6 patients successfully underwent laparoscopic dismembered pyeloplasty (3 left, 3 right) using the retroperitoneal (n = 5) or transperitoneal (n = 1) approach. The average patient age was 22 years. The mean surgical time was 223 minutes (range 165 to 270), the mean blood loss was 82 mL (range 10 to 250), and the mean postoperative hospital stay was 359 minutes (range 226 to 424). Postoperative analgesia comprised a mean of 6 mg morphine sulfate and 32 mg of ketorolac. No complications or readmissions occurred postoperatively. Intravenous urography and Lasix technetium-99m mercaptoacetyltriglycine renal scans documented resolution of obstruction. With long-term follow-up (mean 38.4 months), no recurrences have developed.

**Conclusions.** We report our initial series of ambulatory laparoscopic pyeloplasty. In this well-selected patient population, outpatient pyeloplasty was feasible and safe. *UROLOGY* 66: 41–44, 2005. © 2005 Elsevier Inc.

With increasing experience and technique refinements, select laparoscopic procedures across various surgical disciplines have been performed in an ambulatory setting. Laparoscopic gynecologic procedures such as pelvic adhesiolysis (including endometriosis surgery) and general surgical procedures such as laparoscopic cholecystectomy, inguinal herniorrhaphy, incidental appendectomy, and Nissen fundoplication have been performed in an ambulatory setting with good results.<sup>1–3</sup> In 2000, we reported our initial series of outpatient laparoscopic adrenalectomy.<sup>4</sup>

Open pyeloplasty, with its success rates consistently greater than 90%, has until recently been considered the reference standard treatment for

ureteropelvic junction (UPJ) obstruction. Although antegrade or retrograde endopyelotomy is a considerably less-invasive alternative, its success rates have only been 70% to 89% even in well-selected patients.<sup>5</sup> Laparoscopic pyeloplasty combines the excellent functional outcomes of open surgery with a 1 to 2-day hospital stay and diminished morbidity. We report our experience with outpatient laparoscopic pyeloplasty.

### MATERIAL AND METHODS

Six select patients underwent outpatient laparoscopic pyeloplasty. The inclusion criteria fulfilled by each patient are listed in Table 1. Specifically, each patient expressed an understanding of, and willingness to undergo, the proposed procedure in an outpatient setting. Each laparoscopic pyeloplasty was the first case in the morning (first round start), the procedure was technically uncomplicated, and was completed by 12:00 PM. All patients were hemodynamically stable intraoperatively and postoperatively. At the conclusion of the procedure, the operating surgeon (I.S.G.) confirmed with the staff anesthesiologist that the patient had no anesthesia-related contraindications to same-day discharge.

Between 2000 and 2004, we have performed 55 laparoscopic pyeloplasties for UPJ obstruction, 35 primary (64%)

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**TABLE I. Outpatient laparoscopic pyeloplasty inclusion criteria**

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Preoperative criteria
Patient and family agreeable to discharge plan
Primary UPJ obstruction
Body mass index $\leq 40$ kg/m <sup>2</sup>
Intraoperative criteria
First round start
No intraoperative complications
Surgery completed by 12:00 PM
Postoperative criteria
No postoperative complications
Hemodynamically stable
Ambulating without significant difficulty
Abdomen soft, tolerating liquids orally
Pain under control on oral analgesics

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KEY: UPJ = ureteropelvic junction.

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and 20 secondary (36%). Of these patients, 24 (53%) had their surgery performed as the first case of the day (first round start). Of the entire cohort, 13 patients had primary UPJ obstruction and were first round starts. Six of the 13 patients fulfilled all preoperative, intraoperative, and postoperative criteria for outpatient laparoscopic pyeloplasty.

Laparoscopic pyeloplasty was performed using a retroperitoneal (n = 5) or transperitoneal (n = 1) approach. A three to four-port technique was used to perform a dismembered Anderson-Hynes pyeloplasty (3 left, 3 right). All patients had a 4.7F, 26-cm double-J stent placed cystoscopically preoperatively. No drains or nephrostomy tubes were placed in any patient. All patients received prophylactic intravenous antibiotics and were discharged home with oral antibiotics and a Foley catheter in situ.

The choice of the primary anesthetic agent, dependent on the staff anesthesiologist, included propofol in 3 patients and isoflurane in 3. Preemptive analgesia was not given. Bupivacaine (2%) was instilled subcutaneously around the port sites before port placement and at the conclusion of the procedure. Ketorolac 30 mg intravenously was administered in the operating room before completing the procedure. In the postanesthesia care unit, standard monitoring, administration of parenteral analgesics and antiemetics, and discharge to the step-down observation unit were done at the discretion of the staff anesthesiologist. In the step-down observation unit, liquids were provided orally and patients ambulated. Analgesia included parenteral ketorolac supplemented with oral oxycodone as necessary. In each instance, the operating surgeon evaluated the clinical status 3 to 4 hours postoperatively and consulted with the patient and family before deciding on discharge from the hospital. In the study group, 3 patients were from the Cleveland area and 3 lived outside Cleveland. The patient was given a telephone and/or pager number to directly contact the operating surgeon in case of an emergency. The operating surgeon spoke with each patient by telephone on the night of hospital discharge to ensure continued well-being. Patients were required to contact the surgeon or a designated clinical nurse on the first postoperative day to provide an update on their clinical status. The patient was instructed on how to remove the Foley catheter on the second postoperative day. The double-J stent was removed 1 month postoperatively, and a Lasix technetium-99m mercaptoacetyltriglycine renal scan was obtained 2 months postoperatively to document upper tract drainage. Patients were asked to rate their pain on a scale of 0 to 10.

## RESULTS

Six patients fulfilled the inclusion criteria for ambulatory laparoscopic pyeloplasty. None of the 6 patients experienced any complications or required readmission. All 6 patients were males aged 12 to 48 years (mean 22). Three patients had a crossing vessel. The mean surgical time was 223 minutes (range 165 to 270), and all procedures were completed by 12:00 PM.

The mean postoperative hospital stay (from admission into the postanesthesia care unit to hospital discharge) was 5.9 hours (range 3.7 to 7). The mean analgesia requirements comprised 6 mg morphine sulfate and 32 mg ketorolac. The 3 patients from the Cleveland Clinic area were discharged to home, and the 3 patients from outside Cleveland were discharged to an adjacent, geographically free-standing guesthouse. At 6 weeks of follow-up, flank pain had improved in all patients. Pain had completely resolved in 3 patients and was rated as 2 in 2 patients and 3 in 1 patient. Lasix technetium-99m mercaptoacetyltriglycine radionuclide renal scan at 2 months postoperatively confirmed resolution of obstruction in each patient. During a median follow-up of 38.4 months, no patient reported recurrence of symptoms.

## COMMENT

Several minimally invasive alternatives for repair of UPJ obstruction have been developed to minimize the usual postoperative morbidity associated with major open flank surgery. Open pyeloplasty has been considered the reference standard for the correction of UPJ obstruction, with success rates exceeding 90%. Although percutaneous antegrade and ureteroscopic retrograde endopyelotomy are associated with a shorter hospital stay and more rapid recovery, these endourologic techniques have lower success rates (76% to 90%), even in selected patients.<sup>6</sup>

Depending on the availability of expertise, laparoscopic pyeloplasty is now a viable alternative for patients with UPJ obstruction. Jarrett *et al.*<sup>7</sup> reported a 96% success rate with laparoscopic pyeloplasty in 100 cases, with a mean clinical and radiographic follow-up of 2.7 and 2.2 years, respectively. Similar to open surgery, laparoscopic pyeloplasty is capable of addressing various clinical situations of UPJ obstruction, including severe hydronephrosis, redundant pelvis requiring reduction, concomitant renal pelvic calculi, high ureteral insertion, crossing renal vessels, secondary UPJ after prior failed intervention, and UPJ obstruction in anatomic variants such as horseshoe and pelvic kidneys. Notably, laparoscopic dismembered flap pyeloplasty has been performed success-

fully even for a recalcitrant, scarred, obstructed UPJ that had failed open pyeloplasty.<sup>8</sup>

We first reported on ambulatory laparoscopic adrenalectomy.<sup>4</sup> Our series included 9 carefully selected patients with a mean age of 53 years and average adrenal tumor size of 2 cm. The mean surgical time was 2.3 hours, and the mean blood loss was 53 mL. The average postoperative hospital stay was 416 minutes (range 300 to 570). The only complication was a local abscess requiring delayed drainage at 2 weeks. Ambulatory adrenalectomy was feasible and safe, and resulted in high patient satisfaction.

In this study, we extended this concept to outpatient laparoscopic pyeloplasty. Each patient was required to fulfill all preoperative, intraoperative, and postoperative inclusion criteria to qualify for outpatient discharge (Table 1). The operating surgeon counseled each patient preoperatively regarding the laparoscopic pyeloplasty experience, with emphasis on patient expectations of the outpatient discharge criteria. Of the 13 patients who fulfilled the preoperative inclusion criteria, 7 (54%) did not fulfill the intraoperative and/or postoperative criteria for the following reasons: pain control issues in 4, nausea in 2, and intraoperative drain placement in 1. These 7 patients were discharged home after a mean hospital stay of 30 hours.

Ambulatory laparoscopic surgery expresses a natural evolution of minimally invasive surgery. However, some important points must be kept in mind. Patient safety should be the paramount consideration at all times. Patient selection must be judicious, and strict inclusion criteria should be developed. Older or higher risk surgical patients requiring a prolonged operative time should be excluded. Laparoscopic cholecystectomy in high-risk patients (American Society of Anesthesiologists class greater than 3) resulted in a greater hospital admission rate than in those at lower risk (28% versus 14%).<sup>9</sup> Similarly, laparoscopic cholecystectomy in patients older than 70 years resulted in a 70% hospital admission rate.<sup>1</sup> The same study reported that the hospital admission rate after laparoscopic procedures lasting longer than 1 hour was four times greater than after those lasting less than 1 hour. Thus, standard and objective intraoperative and discharge criteria for outpatient surgery should be developed and implemented. These criteria should also consider subjective issues, such as individual motivation and preference and the geographic distance of the patient's place of residence from the hospital. Immediate access to the operating surgeon and meticulous follow-up with a designated study nurse and/or the referring physician are imperative to diminish the risk of delayed diagnosis and management of postoperative complications.<sup>10</sup>

Outpatient laparoscopic surgery may offer some advantages for a select group of patients. With financial costs assuming increasing importance, minimizing the hospital stay should lead directly to decreased treatment costs. The cost of laparoscopic herniorrhaphy was approximately \$2000 less when performed at an ambulatory surgical center instead of a hospital setting.<sup>11</sup> Intuitively, earlier patient ambulation and discharge should decrease postoperative complications, such as atelectasis, nosocomial infection, thrombophlebitis, and deep vein thrombosis. However, a prospective randomized comparison of ambulatory versus overnight laparoscopic pyeloplasty is necessary to determine whether these potential benefits materialize and are statistically and clinically significant.

## CONCLUSIONS

With an experienced laparoscopic surgeon at a medical center accustomed to a high volume of laparoscopic procedures, outpatient laparoscopic pyeloplasty is feasible and safe. Meticulous patient selection, careful evaluation before hospital discharge, and close follow-up are mandatory.

## REFERENCES

1. Fiorillo MA, Davidson PG, Fiorillo M, *et al*: 149 ambulatory laparoscopic cholecystectomies. *Surg Endosc* 10: 52–56, 1994.
2. Evans DS, Ghanesh P, and Khan IM: Day-case laparoscopic hernia repair. *Br J Surg* 83: 1361–1363, 1996.
3. Jain A, Mercado PD, Grafton KP, *et al*: Outpatient laparoscopic appendectomy. *Surg Endosc* 9: 424–425, 1995.
4. Gill IS, Hobart MG, Schweizer D, *et al*: Outpatient adrenalectomy. *J Urol* 163: 717–720, 2000.
5. Van Cangh PJ, Wilmart JF, Opsomer RJ, *et al*: Long-term results and late recurrence after endoureteropyelotomy: a critical analysis of prognostic factors. *J Urol* 151: 934–937, 1994.
6. Motola JA, Badlani GH, and Smith AD: Results of 212 consecutive endopyelotomies: an 8-year followup. *J Urol* 149: 453–456, 1993.
7. Jarrett TW, Chan DY, Charambura TC, *et al*: Laparoscopic pyeloplasty: the first 100 cases. *J Urol* 167: 1253–1256, 2002.
8. Kaouk JH, Kuang W, and Gill IS: Laparoscopic dismembered tubularized flap pyeloplasty: a novel technique. *J Urol* 167: 229–231, 2002.
9. Votik AJ: Is outpatient cholecystectomy safe for the higher-risk elective patient? *Surg Endosc* 11: 1147–1149, 1997.
10. Cuschieri A: Day-case (ambulatory) laparoscopic surgery. Let us sing from the same hymn sheet. *Surg Endosc* 11: 1143–1144, 1997.
11. Skattum J, Edwin B, Trondsen E, *et al*: Outpatient laparoscopic surgery: feasibility and consequences for education and health care costs. *Surg Endosc* 18: 796–801, 2004.

## EDITORIAL COMMENT

The authors should be congratulated on a well-executed pilot study demonstrating the feasibility of performing laparoscopic pyeloplasty as an outpatient procedure. The issue of outpatient laparoscopic pyeloplasty is salient as, at centers