Retrospective Comparison of Retroperitoneal Laparoscopic Versus Open Dismembered Pyeloplasty for Ureteropelvic Junction Obstruction

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Purpose: We evaluated the clinical value of retroperitoneal laparoscopic dismembered pyeloplasty for ureteropelvic junction obstruction compared with open surgery.

Materials and Methods: The clinical data of 56 patients who underwent retroperitoneal laparoscopic dismembered pyeloplasty were retrospectively compared with those of 40 patients who underwent open dismembered pyeloplasty through a retroperitoneal flank approach. The Student t test, Pearson chi-square test and Mann-Whitney rank sum test were applied for statistical analysis as appropriate.

Results: Patient demographic data were similar between the 2 groups. In the laparoscopic group operative time (80 vs 120 minutes), estimated blood loss (10 vs 150 ml), recovery of intestinal function (1 vs 2 days), analgesic requirements (diclofenac sodium suppository) (75 vs 150 mg), incision length (3.5 vs 21 cm) and postoperative hospital stay (7 vs 9 days) were better than in the open group ($p < 0.001$ for all). No intraoperative complications occurred in either group. The incidence of postoperative complications (2 of 56, 3.6% vs 3 of 40, 7.5%, $p = 0.729$) and success rates (55 of 56, 98.2% vs 39 of 40, 97.5%, $p = 0.058$) were equivalent in the 2 groups.

Conclusions: Retroperitoneal laparoscopic dismembered pyeloplasty is a minimally invasive, safe and effective therapy for ureteropelvic junction obstruction with low morbidity, shorter convalescence and excellent outcomes, and can be accomplished reasonably quickly in experienced hands.

Key Words: laparoscopy, kidney

With great advances in laparoscopic technique and associated technology as well as increasing experience with these techniques, the development of laparoscopic pyeloplasty has been a natural combination of laparoscopic and open techniques. Since first described by Schuessler et al in 1993,[1] laparoscopic pyeloplasty has emerged as a valid technique to correct UPJO. The feasibility of laparoscopic pyeloplasty, including Anderson-Hynes, Foley Y-V and Fenger pyeloplasty performed through a transperitoneal or retroperitoneal approach, has been evaluated.[2–9] Moreover, its potential advantages, including less postoperative pain, shorter hospital stay, shorter convalescence and improved cosmesis, have been demonstrated in some comparative studies.[10–13] However, as a new surgical approach, it was developed to not only convey some advantages aforementioned to the patient but duplicate the success rate of open dismembered pyeloplasty. With the highest long-term success rate, open Anderson-Hynes dismembered pyeloplasty remains the gold standard for the treatment of UPJO.[14] New techniques should be compared with this gold standard to confirm their true effectiveness and advantage. However, to our knowledge, comparative data exclusively comparing retroperitoneal laparoscopic dismembered pyeloplasty with open dismembered pyeloplasty through a retroperitoneal approach are limited.[10] We report our outcomes after 56 retroperitoneal laparoscopic dismembered pyeloplasties as retrospectively compared to the recent 40 open dismembered pyeloplasties.

PATIENTS AND METHODS

Between May 2000 and December 2004, 56 patients underwent retroperitoneal laparoscopic dismembered pyeloplasty. The clinical data were compared with those of 40 patients who underwent open dismembered pyeloplasty through a retroperitoneal approach from January 2003 to December 2004.

All patients were evaluated preoperatively with renal ultrasonography, IVP with high volume contrast medium, retrograde pyelography or magnetic resonance urography and the diagnosis of UPJO was confirmed. No patients had undergone previous renal surgery. The indications in both groups were mild to severe hydronephrosis with dilated

Submitted for publication November 7, 2005.

Supported by a grant from the key programs of clinical subjects of the Ministry of Health, People's Republic of China.

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See Editorial on page 866.

DOI:10.1016/j.juro.2006.04.073

extrasinusal renal pelvis and obvious stricture of UPJ segment demonstrated by radiological imaging.

All laparoscopic dismembered pyeloplasty was performed by the same surgeon, whereas the open dismembered pyeloplasty was performed by several surgeons who all work in the same department. The technique for retroperitoneal laparoscopic pyeloplasty has been previously described.[8] The patient was placed in the full lateral decubitus position after induction with general endotracheal anesthesia. A 3-port finger and balloon-dissecting retroperitoneal laparoscopic approach was used. The renal pelvis was partly divided from the most dependent part, cephalad toward the renal pelvis and keeping the most lateral extent of the renal pelvis undismembered before the most dependent part of the pyelotomy was sutured to the apex of the spatulated ureter. After the completion of the corner stitch, the renal pelvis and ureter were trimmed further, and the stenotic segment of the UPJ and the redundant renal pelvis were removed. To facilitate accurate placement of the first stay suture, a 6Fr ureteral catheter introduced through the port incision can be inserted into the open end of the spatulated proximal ureter to separate its anterior and posterior walls. The posterior ureteropelvic anastomosis was completed with a running suture, of which every 2 sutures were coupled with a lock-stitch suture. The remaining pyelotomy was closed with a running suture or interrupted suture. A transanastomotic double pigtail stent was inserted in an antegrade fashion. The anterior ureteropelvic anastomosis was closed with an interrupted suture. A closed suction drain was placed through the port incision in the midaxillary line into the perinephric space adjacent to the repair.

A standard retroperitoneal approach through the supracostal 12th rib incision was used in open dismembered pyeloplasty.[15]

Postoperative management was similar in both groups. Prophylactic antibiotics (third generation cephalosporin) were routinely prescribed. The Foley catheter was removed 2 or 3 days postoperatively. The closed suction drain was subsequently removed if the drainage output had not increased and was less than 10 ml in 24 hours after Foley catheter removal. IVP and renal ultrasonography were performed 3 and 6 months postoperatively. Thereafter, yearly followup was performed with either IVP or renal ultrasonography.

The perioperative parameters including operative time, intraoperative estimated blood loss, incision length, bowel recovery, analgesic use, postoperative hospital stay, complications and success rates were compared for both groups. The operative time was recorded from the time of the initial skin incision to the final skin suture. Postoperatively most patients were given oral analgesia (diclofenac sodium suppository) for pain control; however, some patients received patient controlled analgesia for about 24 hours. To facilitate the comparison of the analgesic use in both groups, for patients who used patient controlled analgesia the amount of analgesic use on postoperative day 1 was converted to 100 mg diclofenac sodium suppository. Analgesic use was described in terms of total cumulative mg of diclofenac sodium suppository administered as required. Success was considered as improvement in radiographic appearance, including a patent or visible ureteropelvic junction and less hydronephrosis.

All statistical analysis was performed with SPSS® 13.0 statistical software package. Numerical data from a normal distribution were expressed as a group mean with the standard deviation and compared using Student's t test. Numerical data from a nonnormal distribution were expressed as a group median and quartiles (25th [Q1] and 75th [Q3] percentiles) and evaluated using Mann-Whitney rank sum test. Pearson's chi-square test was used to compare categorical data. Statistical significance was defined as $p < 0.05$.

RESULTS

The demographic data of the patients in the laparoscopic and open dismembered pyeloplasty groups are shown in table 1. The 2 groups were comparable with regard to age, sex, affected side, body mass index and the American Society of Anesthesiologists' classification of physical status.

Intraoperative and postoperative data for the 2 groups are presented in table 2. All laparoscopic procedures were completed successfully with no conversions to open surgery and all open procedures were performed as planned. There was no mortality in either the laparoscopic or open group. Compared to open dismembered pyeloplasty through a retroperitoneal approach, retroperitoneal laparoscopic dismembered pyeloplasty was associated with a shorter operative time (80 vs 120 minutes, $p < 0.001$), less estimated blood loss (10 vs 150 ml, $p < 0.001$), shorter incision (3.5 vs 21 cm, $p < 0.001$), quicker bowel recovery (1 vs 2 days, $p < 0.001$), decreased analgesic use (75 vs 150 mg, $p < 0.001$) and shorter postoperative hospital stay (7 vs 9 days, $p < 0.001$) (table 2).

There was no significant difference in the incidence of complications between laparoscopic (2 of 56, 3.6%) and open groups (3 of 40, 7.5%) ($p = 0.729$). Two major postoperative complications (urine leak) developed in the laparoscopic group. After a prolonged duration of the suction drain in the retroperitoneal space (1 for 6 days and another for 11), the urine leak ceased spontaneously. However, the latter patient had recurrent UPJO after ureteral stent removal 4 months postoperatively and underwent open dismembered pyeloplasty. The reason for the recurrent obstruction was a fibrotic scar around the UPJ caused by the earlier urine extravasation. IVP and renal ultrasonography demonstrated a patent UPJ anastomosis and resolution of hydronephrosis in this patient at 2 years of followup. Two major and 1 minor postoperative complication occurred in the open group. The 2 major complications consisted of 1 urine leak which subsided spontaneously with a prolonged duration

TABLE 1. *Demographic data of retroperitoneoscopic and open surgery groups*

	Retroperitoneoscopy	Open Surgery	p Value
No. pts	56	40	
Mean pt age ± SD	24.0 ± 10.0	28.0 ± 11.0	0.066 (Student's t test)
No. males/females	33/23	30/10	0.102 (Pearson's chi-square test)
No. lt/rt side	29/27	26/14	0.197 (Pearson's chi-square test)
Mean body mass index ± SD	22.4 ± 1.3	22.2 ± 1.4	0.375 (Student's t test)
No. American Society of Anesthesiologists score (I/II)	49/7	33/7	0.494 (Pearson's chi-square test)