Laparoscopic pyeloplasty with simultaneous pyelolithotomy using a flexible ureteroscope

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Laparoscopic pyeloplasty is rapidly becoming the gold standard in the repair of adults with uretero-pelvic junction obstruction. Renal calculi are a recognized complication of uretero-pelvic junction obstruction and their presence has often been used to justify percutaneous nephrolithotomy and endopyelotomy as primary treatment. Stones developing secondary to uretero-pelvic junction obstruction have been removed through simultaneous laparoscopic pyeloplasty and pyelolithotomy, but with rigid laparoscopic instruments access is limited to the renal pelvis. As exemplified within this report, endourologic techniques such as flexible ureteroscopy can be combined with laparoscopic pyeloplasty to deal with complex stone disease and to provide optimal treatment of the patient with a uretero-pelvic junction obstruction.

Key Words: kidney, calculi, laparoscopy, pyeloplasty, pyelolithotomy

Introduction

Over a century after the first open pyeloplasty in 1892, laparoscopic pyeloplasty is evolving to be the gold standard treatment for repairing uretero-pelvic junction obstructions in the symptomatic adult patient. This procedure combines the decreased pain and morbidity of minimally invasive surgery with the high success rate of dismembered pyeloplasty. Success rates of over 90%,[1,2] essentially matching that of open surgery, have now been reported in multiple series.[2-4] Problems arise when a uretero-pelvic junction obstruction coexists with multiple renal calculi, especially if they are mobile or located in the periphery of the kidney. In this case report we review a patient with over 20 stones who underwent laparoscopic pyeloplasty with extraction of the bulk of the stones using the laparoscope and forceps, and where the stones located more peripherally were removed using a flexible ureteroscope.

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Case report

A 62 year-old man was referred with a 4-month history of increasing bilateral flank pain and hematuria. The patient presented with no previous history of fevers, chills or dysuria. Although describing bilateral flank pain, the patient indicated escalating discomfort on the left side. There was no history of renal stone disease. He had been previously diagnosed with

diabetes mellitus and hypertension that have been well controlled by glyburide and nifedipine, respectively.

Physical examination revealed left costovertebral tenderness. An abdominal film demonstrated a group of approximately 20 calculi projected within the lower pole calyces and pelvis of the left kidney Figure 1a. The largest of these was 1.2 cm. Intravenous pyelography indicated evidence of a left uretero-pelvic junction obstruction with good function but marked dilatation of the renal pelvis Figure 1b. Abdominal ultrasound showed severe left-sided hydronephrosis with thinning of the cortex. Lasix Renogram confirmed the obstruction and demonstrated that the differential function was 55:45 per cent for R:L. The stones were mobile in the left renal collecting system. Urinalysis showed microhematuria but urine culture was negative.

Figure 1a. Preoperative plain x-ray of kidneys, ureters and bladder reveals numerous calculi located within the lower pole calyces and pelvis of the left kidney.

Figure 1b. Preoperative intravenous pyelography of kidneys, ureters and bladder demonstrating a left uretero-pelvic junction obstruction with marked dilatation of the left renal pelvis.

Method

Pneumoperitoneum was established and a 10 mm port placed at the umbilicus and in the left lower quadrant. Two further 5 mm ports were placed. After the colon was reflected and the uretero-pelvic junction exposed, the pelvis and ureter were incised and the stenotic segment of the upper ureter was removed. Most of the stones were removed by using the Maryland grasping forceps. The more peripheral stones were removed by passing an ACMI-Dura8 Elite flexible ureteroscope through the 10 mm port in the left lower quadrant into the renal pelvis, and the stones were removed using Microvasive Gemini 2.8 French basket. Although all stones were small enough to be removed using the flexible ureteroscope, the holmium laser was available in the operating room to disrupt any stones too large to be removed through the trochar. During the flexible ureteroscopy, a suction was passed through the lateral 5 mm port into the uretero-pelvic junction in order to remove

the irrigation fluid. After completion of the pyelolithotomy, the ureteroscope was removed and an Anderson-Hynes dismembered pyeloplasty was completed using 4.0 vicryl suture. A stent (6 Fr., 26 cm.) was placed using an antegrade technique, and a Jackson Pratt drain was inserted.

The total operating time was 4.5 hours and the estimated blood loss was minimal. The Foley catheter and drain were removed on postoperative day 2 and the patient discharged from hospital on postoperative day 3. The double pigtail stent was removed 14 days after the surgery, and subsequent radiological examination indicated that the left kidney was stone free. An ultrasound at 6 weeks showed significant improvement in the degree of hydronephrosis. An intravenous pyelogram showed marked improvement in the function and drainage of the left kidney and a repeat renogram is pending.

Discussion

Laparoscopic pyeloplasty is rapidly becoming the gold standard for repair of obstruction of the uretero-pelvic junction in adults. It offers the advantages of minimally invasive surgery in terms of morbidity, but with the success and equivalent cost-effectiveness of dismembered pyeloplasty.[5] Such minimally invasive surgery significantly decreases post-operative pain while decreasing the post-operative convalescence. Success rates in early series match those of open pyeloplasty.[6] Longterm complications such as flank hernias and intercostal neuralgias are eliminated. In a situation where a crossing vessel is present, the success rate of laparoscopic pyeloplasty may be greater than that of endopyelotomy without the risk of hemorrhage and blood transfusion.[2]

It is important to determine that the uretero-pelvic junction obstruction is not due to the calculi or from edema secondary to the stones. In those situations where this is a concern percutaneous stone extraction allowing visual inspection of the uretero-pelvic junction and then subsequent endopyelotomy if indicated may be a better approach.

Several types of pyelotomies and pyeloplasty incisions can be performed with plans for concomitant pyelolithotomy. An alternative method includes a Foley Y-V plasty, which can be used when the ureter inserts at the superior aspect of the uretero-pelvic junction. The Culp-Deerd spiral flap may be valuable with a very large renal pelvic stone or a long upper ureteral stricture. However, if there are crossing vessels at the uretero-pelvic junction, Anderson-Hynes dismembered repairs are more straightforward, highly successful and allow for better use of ureteroscopic stone removal. The latter approach is the most commonly used and widely described.[4,7]

We have combined laparoscopic techniques with endourology in developing a method of placement of stents during laparoscopic pyeloplasty. To date, we have performed flexible ureteroscopy to remove stones within the renal pelvis in this and three other patients. The flexible ureteroscope passes easily through the 10 mm port and is guided into the renal pelvis after the uretero-pelvic junction is resected. Irrigation is collected concurrently with a suction device passed through one of the 5 mm ports. Although other authors have described the use of the laparoscope and grasping forceps to remove renal stones, the use of the flexible ureteroscope allows access to the periphery of the kidney and especially lower calyceal stones.

A contraindication to the use of this technique would be where active infection is present or where the history or x-ray findings suggest a struvite calculus. There is a risk of developing intra-abdominal sepsis and/or abscess formation in these patients. When stones significantly larger than the ones described herein are detected concominantly with uretero-pelvic junction obstruction, clinical judgment and previous laparoscopic experience must be considered but the option of extending the incision in the renal pelvis is available to allow for removal of a large stone.

Further applications of combining endourologic techniques and laparoscopic surgery are currently in development. □

References

1. Scardino PT, Scardino PL. Obstruction at the ureteropelvic junction. In: The Ureter, 2nd ed. Edited by H. Bergman. New York: Springer-Verlag;1981:697.
2. Bauer JJ, Bishoff JT, Moore RG, Chen RN, Iverson AJ, Kavoussi LR. Laparoscopic versus open pyeloplasty: assessment of objective and subjective outcome. *J Urol* 1999;162(3):692-695.
3. Micali S, Moore RG, Averch TD, Adams JB, Kavoussi LR. The role of laparoscopy in the treatment of renal and ureteral calculi. *J Urol* 1997;157(2):463-466.
4. Ramakumar S, Lancini V, Chan DY, Parsons JK, Kavoussi LR, Jarrett TW. Laparoscopic pyelolithotomy with concomitant pyelolithotomy. *J Urol* 2002;167:1378-1380.
5. Hemal AK, Goel R, Goel A. Cost-effective laparoscopic pyeloplasty: Singe center experience. *Int J Urol* 2003;10(11): 563-568.
6. Jarrett TW, Chan DY, Charambura TC, Fugita O, Kavoussi LR. Laparoscopic pyeloplasty: The first 100 cases. *J Urol* 2002;167(3):1253-1256.
7. Chen RN, Moore RG, Kavoussi, LR. Laparoscopic pyeloplasty. Indications, technique, and long-term outcome. *Urol Clin Noth Am* 1998; 255:323.