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Özgün araştırma / Original research

Laparoskopik Pyeloplasti Ve Pyelolitotomi Operasyonlarında Taş Çıkarılmasında Fleksible Sistoskop Kullanımı

Use of Flexible Cystoscope in Removal of Stone in Laparoscopic Pyeloplasty and Pyelolithotomy

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Abstract

Objective: Laparoscopic pyeloplasty and laparoscopic pyelolithotomy are widely used in the treatment of ureteropelvic junction (UPJ) obstructions and renal stones in the urology field. Flexible cystoscopy can be used simultaneously with these methods for removal of calyceal stones in patients with UPJ obstructions. The present study assessed the usefulness of these surgical procedures .

Material and Methods: Between February 2016 and October 2017, 7 patients underwent stone removal with a flexible cystoscope during laparoscopic pyelolithotomy and laparoscopic pyeloplasty. The durations of the operations and hospital stays, blood loss, preoperative and postoperative complications, and follow-up times were evaluated.

Results: Five of seven patients had renal stones with UPJ obstruction. Two patients had calyceal stones in the lower calyx , in addition to renal pelvic stones. The mean age of the patients was 36.8 (18–73) years. The stone-free rate was 85.7%. The mean duration of the operation was 153.5 (105–230) min, and the duration of the hospital stay was 4.4 (3–7) days. There were no intraoperative or postoperative complications.

Conclusion: Laparoscopic pyeloplasty and pyelolithotomy, with simultaneous use of flexible cystoscopy in UPJ obstruction patients with kidney stones and patients with multiple renal stones is a feasible treatment option, with a high success rate.

Keywords: Laparoscopic pyelolithotomy, laparoscopic pyeloplasty, fleksible cystoscopy

Özet

Amaç: Laparoskpik cerrahisinin üroloji alanından yaygınlaşması ile üreteropelvik bileşke darlığı (ÜPBD) ve böbrek taşlarının tedavisinde laparoskopik pyeloplasti ve laparoskopik pyelolitotomi yaygın olarak kullanılmaktadır. İlave kaliks taşlarının çıkarılmasında bu yöntemlerle eş zamanlı olarak fleksible sistoskop kullanılabilmektedir. Biz çalışmamızda bu cerrahi prosedürlerin kullanılabilirliğini değerlendirdik.

Gereç ve Yöntemler: Şubat 2016-Ekim 2017 tarihleri arasında 7 hastaya laparoskopik pyeloplasti ve laparoskopik pyelolitotomi esnasında fleksible sistoskop ile taş çıkarılması işlemi uygulandı. Hastaların operasyon süresi, kan kaybı, hastanede kalış süresi, peroperatif ve postoperatif komplikasyonlar ve takip süreleri değerlendirildi.

Bulgular: 7 hastanın 5'inde UPBD ile birlikte böbrek taşları mevcuttu. 2 hastada ise renal pelvis taşına eşlik eden alt kaliks taşları mevcuttu. Hastaların ortalama yaşları 36.8 (18-73) idi. Taşsızlık oranı % 85,7 olarak hesaplandı. Ortalama operasyon süresi 153,5 (105-230) dakika olup, hastanede kalış süresi 4,4(3-7) gün idi. İntraopratif ve postoperatif herhangi bir komplikasyon gelişmedi.

Sonuç: UPBD'na böbrek taşı eşlik eden hastalarda ve multipl böbrek taşı olan hastalarda laparoskopik pyeloplasti ve pyelolitotomi ile eş zamanlı fleksible sistoskop kullanımı yüksek başarı oranı ile kullanılabilir bir tedavi seçeneğidir.

Anahtar Kelimeler: Laparoskopik pyeloplasti, laparoskopik pyelolitotomi, fleksible sistoskopi

INTRODUCTION

In recent years, laparoscopic surgery has gained popularity due to an increased tendency for minimally invasive surgery in urological operations. In 1993, Schuessler et al. (1) performed the first laparoscopic pyeloplasty for the treatment of ureteropelvic junction (UPJ) obstructions, and similar successful results are obtained with open pyeloplasty today (2) A UPJ obstruction is one of the main causes of an upper urinary tract obstruction, and it may result in lithiasis, depending on the nature of urinary stasis underlying the obstruction. (3) Simultaneous pyelolithotomy with laparoscopic pyeloplasty can be performed in patients with UPJ obstructions and associated kidney stones (4, 5). Laparoscopic pyelolithotomy was first performed by Gaur et al. in 1994 (6). According to the guidelines of the European Association of Urology, laparoscopic surgery is warranted if extracorporeal shock wave lithotripsy (ESWL), ureterorenoscopy (URS), and percutaneous nephrolithotripsy (PNL) have failed or if there is a significant chance of failure in such cases (7). In addition, in some cases, such as renal pelvic stone accompanied by calyx stones, the use of a flexible cystoscope in laparoscopic pyelolithotomy is recommended for increasing stone free rate (8). Herein, we describe our experiences use of concomitant flexible cystoscopy for the removal of urinary calculi in laparoscopic pyeloplasty and laparoscopic pyelolithotomy surgeries.

MATERIAL AND METHODS

Between February 2016 and October 2017, data on seven patients from whom stone were removed under flexible cystoscopy in our clinic while performing laparoscopic pyeloplasty and laparoscopic pyelolithotomy were examined retrospectively. In preoperative evaluations, the patients underwent screening tests, including a clinical history, complete blood count, urinary culture, coagulation profile, and kidney function, in addition to a physical examination. All the patients also underwent radiological imaging with ultrasonography, intravenous urography, and computed tomography (CT). Diuretic renal scintigraphy was used to evaluate degree of obstruction and kidney function. Stone size was measured by calculating the largest diameter of the largest calculus in a calyx group under CT. Postoperative direct urinary system graphy or CT was performed to detect residual stone. The success of UPJ obstruction removal was reviewed in the postoperative 3rd month using diuretic renal scintigraphy.

In the retrospective analysis, the following patient data were examined: the length of the operation, blood loss, hospital stay time, preoperative and postoperative complications, and length of follow-up. A transperitoneal laparoscopic approach was applied in all the patients. Laparoscopic pyeloplasty was performed in five patients, and laparoscopic pyelolithotomy was performed in the other two patients. One of the patients operated for kidney stones had a retrocolon. The other patient had an ectrarenal pelvis and calyceal neck stenosis. Percutaneous nephrolithotomy for these two patients may lead to surgical failure and / or complications. For this reason, we decided to perform laparoscopic pyelolithotomy on these two patients.

All procedures are performed under general anesthesia. A nasogastric tube, urinary catheter, and compression stockings are placed routinely. With the patient in the lateral decubitus position, a pneumoperitoneum was then created using a Veress needle until 14 mmHg pressure was reached. After placing the 10 - mm camera port lateral to the umbilicus, the 10-mm second port was placed under the direct vision of the spina iliac anterior superior to the umbilicus in the 1/3 lateral of the line and 5 mm in the third port midclavicular line 1-2 cm below the costal border. In one patient, an additional 5 mm incision was made for liver retraction. Intra-abdominal pressure was reduced to 12 mmHg after the ports were checked. During dissection, harmonic scalpel (Ethicon Endosurgery, Cincinnati, OH) and LigaSure systems (Valleylab Inc., Boulder, Colorado, USA) were used as energy sources. The ureter was found after medialization of the colon, and the renal pelvis was reached by following the ureter. In the pyelolithotomy surgeries, immediately after the renal pelvis was incised using a hook and opened, pelvic calculi were removed with a laparoscopic grasper. In the pyeloplasty surgeries, the ureter was cut from the bottom of the stricture region and spatulated. It was then inserted into the collecting system with a 16 Fr flexible cystoscope through a 10 mm port in all cases. (Fig. 1). Continuous irrigation was performed to obtain

Table 1. Patient demographics and perioperative data

Variables	Values
Number of patient (n)	7
Male:Female	4:3
Mean age,years (range)	36.8(18-73)
BMI	24.1(19.8-28.5)
Right/Left	2/5
Mean number of stones (range)	2.4(1-8)
Mean stone size,mm (range)	9.2(5-12)
Mean operative time, min (range)	153.5(105-230)
Mean estimated blood loss, ml (range)	52.8(20-150)
Mean hospital stay, days (range)	4.4(3-7)
Complications	0
Stone free rate	6/7 (%85.7)
Mean follow-up, months (range)	15.7(5-25)

a good endoscopic view. To aspire the irrigation fluid in the surgical region, an aspirator device was placed under the renal pelvis, and excess fluid was aspired. Stones in the calyx were removed with the help of a nitinol basket and a flexible cystoscope (Fig. 2). In one case, as the stone could not pass through the neck of the calyx, it was first fragmented using a Holmium YAG laser 400 μm fiber (Medilas H20, Dornier Medical Systems, Inc., Marietta, GA, USA). and then removed with the help of the basket. The extracted stones were put into a special bag made of glove fingers. Afterwards, pelvic reduction in pyeloplasty surgeries was performed. Anastomosis was performed using a D-J catheter, with a 4/0 absorbable suture. In the pyelolithotomy surgeries, the renal pelvis was sutured one by one using 4/0 absorbable sutures. The surgeries were finished by placing silicon drain. The ureteral stents were removed 4–6 weeks after surgery. All surgical operations were performed by the same team.

RESULTS

All the surgeries were completed laparoscopically. Five of the seven patients had urinary stones and UPJ obstructions. The other two patients had a stones in the lower calyx, accompanied by a renal pelvic stone (43 mm and 50 mm, respectively). Four of the seven patients were males, and the average age was 36.8 (18–73) years. One patient had eight stones in the lower calyx. In this patient, one stone (4 mm) could not be reached. The stone free rate was 85.7%. The mean length of surgery was 153.5 (105–230) min, and none of the patients had bleeding that required a blood transfusion. There were no intraoperative or postoperative complications. Demographic and perioperative data of the patients are shown in Table 1. The mean hospital stay was 4.4 (3–7) days. There was no sign of obstruction in the postoperative 3rd month on diuretic renal scintigraphies. No late complications occurred during follow-up of 15.7 (5–25) months.

DISCUSSION

A UPJ obstruction is a congenital disease that may result in the development of hydronephrosis and kidney function loss (9). Depending on the nature of the UPJ obstruction, the stone incidence rate is approximately 20% (10). UPJ obstructions raise a dilemma for surgeons regarding the type of treatment. Classic clinical standard treatment for a UPJ obstruction accompanied by urinary stones is open pyeloplasty and pyelolithotomy, which has a 90% success rate (11). However, this treatment has a number of disadvantages, such as flank incision, long-term postoperative pain, long-term healing times, and risks of developing an incisional hernia. These disadvantages have led surgeons to search for minimally invasive treatments, including antegrade endopyelotomy and PNL techniques. However, antegrade endopyelotomy has a low success rate in comparison with that of open and laparoscopic pyeloplasty (12). In addition, a variety of factors, such as the existence of crossing veins, length of the obstruction, and degree of hydronephrosis, affect the success of endopyelotomy (13). Bleeding and urosepsis, in addition to the risk of colon or pleura scarring, during PNL are considered additional disadvantages (14).

Since it was first performed in 1993, laparoscopic pyeloplasty has become commonplace, with a 96–98% success rate and minimal morbidity rate (1, 15-17). With developments in laparoscopic pyeloplasty, flexible endoscopic devices began to be used for the treatment of UPJ obstructions and calculi. Rankumar et al. (18) used flexible cystoscopy to perform laparoscopic pyeloplasty with concomitant pyelolithotomy on 19 patients. They removed stones in the calyx and reported an 80% stone free rate. Ball et al. (19) removed all stones with the help of a basket in six of seven patients by performing pyeloli-

thotomy, with the help of laparoscopic pyeloplasty and a flexible cystoscope. Srivastava et al. (5) performed laparoscopic pyeloplasty and pyelolithotomy in 20 patients who had UPJ obstructions, accompanied by urinary stones. They removed pelvic stones using a grasper and removed stones in the calyx using flexible or rigid cystoscopy and fluoroscopy. They reported a 75% success rate in their series. Zheng et al. (20) performed pyelolithotomy in nine patients using robotic pyeloplasty and a rigid nephroscope and reported an 88.9% stone free rate. However, postoperative urinary leakage occurred in two patients. They attributed this to the failure of the ureteral stent to reach the bladder and reported that urinary leakage was resolved by pulling the stent into the bladder (20). Kouriefs et al. reported that stones were removed in two of six patients who underwent pyeloplasty and pyelolithotomy using flexible cystoscopy and fragmentation by a laser because of the large size of the stones. They reported a stone free rate of 100% (21). We performed laparoscopic pyeloplasty and pyelolithotomy using a flexible cystoscope in five patients in our clinic. Three of the patients had a single stone in the lower calyx. All the calculi were removed with the help of a nitinol basket and flexible cystoscopy. One patient had two stones, one in the pelvis and one in the lower calyx. In this case, the pelvic stone was removed using a laparoscopic grasper, and the stone in the lower calyx was removed with the help of a nitinol basket. In another case, there were multiple stones, the largest of which was 1 cm. All these stones were removed with the aid of a basket. It was not possible to reach one stone (4 mm).

The size and location of stones and patient-related factors play a role in decision making regarding clinical treatment for urinary stones (7). Endoscopic treatment has become common for large urinary stones due to the availability of minimally invasive techniques, such as ESWL, URS, and PNL. As a result, open surgery for urinary stones has almost disappeared (22-24). According to the guidelines of the European Association of Urology, PNL is recommended as the first option in the treatment of urinary stones larger than 2 cm. However, PNL-related complications, such as bleeding requiring a transfusion, sepsis, a pneumothorax, and colon injury, should be kept in mind (25). For patients with large and multiple stones in different calyces, multiple entrance points and URS procedures may be required. Multiple entrances may increase the risk of complications and reduce stone free rates (8). Laparoscopic pyelolithotomy can be performed in cases of previously failed endourologic attempts, complex stones, and ectopic kidneys, accompanied by UPJ obstructions in developing countries with a lack of endourologic equipment (26). Recent studies reported an 88.9–100% success rate for stones removal using laparoscopic pyeloplasty in the treatment of solitary renal pelvic stone (27, 28). When compared with PNL, laparoscopic pyelolithotomy was associated with less blood loss and reduced postoperative fever rates (28). A flexible or rigid endoscope can be used to remove stones not only during laparoscopic surgery and pyeloplasty but also during laparoscopic ureterolithotomy and laparoscopic pyelolithotomy (29,30). Pastore et al. (29) performed laparoscopic pyelolithotomy in nine patients, using flexible cystoscopy and a laser to fragment stones (average size of 7.2

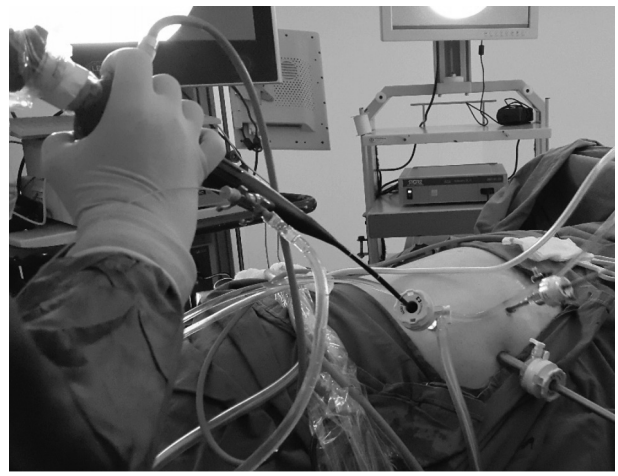

Figure 1. Insertion of flexible cystoscope through trocars

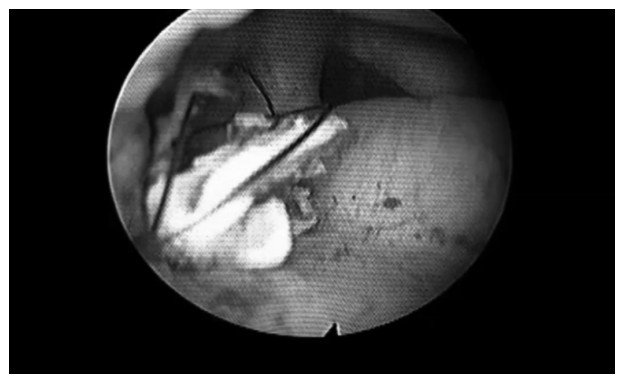

Figure 2. Removing the stone in the collecting system with a stone basket

cm). They reported that only one 9-mm residual stone was left in one patient, and this stone was later passed following ESWL treatment. (29). Researchers from the Cleveland Clinic reported 80% stone free rate using flexible cystoscopy and a laparoscopic grasper during laparoscopic pyelolithotomy (4). We applied laparoscopic pyelolithotomy to two patients in our series. Both patients had a large stone in the extrarenal pelvic area (43 mm and 50 mm, respectively), and each had one stone of 1 cm in the lower calyx. Both stones in the pelvis were removed using a laparoscopic grasper. In one patient, the stone in the lower calyx was removed with the aid of a nitinol basket and flexible cystoscopy. In the other case, the stone was fragmented using a Holmium YAG laser because the stone could not pass through the neck of the calyx. We think that the use of a grasper when removing stones from the calyx may cause damage to the calyx. Thus, it may be more appropriate to remove such stones using a basket and laser, aided by flexible cystoscopy under direct vision. The limitation of this study was its retrospective design and relative low number of patients.

In our experience, patients with UPJ obstructions and kidney stones and patients with renal pelvic and calyx stones not suitable for PNL treatment can be treated safely and successfully using laparoscopy and flexible cystoscopy. However, more prospective studies with larger patient samples are needed for this approach to gain acceptance.

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