

RETROPERITONEAL VS TRANSPERITONEAL LAPAROSCOPIC URETEROLITHOTOMY

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ABSTRACT

Objectives: To compare retroperitoneal versus transperitoneal laparoscopic ureterolithotomy in effectivity, pain scale and early complications. **Material & methods:** In this prospective comparison study from January 2013 to June 2014, 32 patients with proximal and mid ureteral stones underwent retroperitoneal laparoscopic ureterolithotomy or transperitoneal laparoscopic ureterolithotomy. The randomization occurred on consecutive sampling on a 1 : 1 basis. Group 1 and 2 consisted of patients who underwent retroperitoneal laparoscopic ureterolithotomy and transperitoneal laparoscopic ureterolithotomy, respectively. Demographic and clinical variable, operative time, length of stay, ureteral suturing, pain scale according to visual analog scale (VAS) and early complications data were collected and analyzed. Statistical analysis was performed with SPSS® version 17.0 using student T-test and Mann-Whitney U tests with p value < 0.05 considered statistically significant. **Results:** VAS on day 1 between the 2 groups was statistically significant, and was higher in group 2 (p < 0.05). According to the Clavien-Dindo classification of surgical complication all the patients were in grade 1 classification. The differences in operative time, length of stay, ureteral suturing, visual pain analog score on day 3, and early complications between the 2 groups were not statistically significant. **Conclusion:** Transperitoneal laparoscopic ureterolithotomy is significantly associated with pain than retroperitoneal laparoscopic ureterolithotomy in first day after surgery. Successful stone removal remains the same in both groups.

Keywords: Retroperitoneal laparoscopic ureterolithotomy, transperitoneal laparoscopic ureterolithotomy, pain scale, early complications.

ABSTRAK

Tujuan: Membandingkan retroperitoneal vs ureterolitotomi laparoskopik transperitoneal dalam efektifitas, skala nyeri dan komplikasi awal. **Bahan & cara:** Pada penelitian komparasi prospektif ini dari bulan Januari 2013 – Juni 2014, sebanyak 32 pasien dengan batu proksimal dan ureteral menjalani ureterolitotomi laparoskopik transperitoneal atau ureterolitotomi laparoskopik retroperitoneal. Randomisasi muncul pada sampel konsekutif pada basis 1 : 1. Kelompok 1 dan 2 terdiri dari pasien yang menjalani ureterolitotomi laparoskopik retroperitoneal dan ureterolitotomi laparoskopik transperitoneal, berurutan. Demografis dan variabel klinis, lama operasi, lama rawat inap, jahitan ureteral, skala nyeri berdasarkan visual analog scale (VAS) dan data komplikasi awal dikumpulkan dan dianalisa. Analisa statistik dilakukan dengan SPSS® versi 17.0 menggunakan student T-test dan tes Mann-Whitney U dengan nilai p < 0.05 dianggap signifikan secara statistik. **Hasil:** VAS pada hari pertama antara kedua kelompok secara statistik signifikan, dan lebih tinggi pada kelompok 2 (p < 0.05). Berdasarkan klasifikasi Clavien-Dindo tentang komplikasi bedah pada semua pasien adalah pada klasifikasi grade 1. Perbedaan lama operasi, lama rawat inap, jahitan ureteral, nilai analog nyeri visual pada hari ke 3, dan komplikasi awal antara kedua kelompok secara statistik tidak signifikan. **Simpulan:** Ureterolitotomi laparoskopik transperitoneal secara signifikan berkaitan dengan nyeri daripada dengan ureterolitotomi laparoskopik retroperitoneal pada hari pertama setelah operasi. Pengambilan batu yang berhasil, sama pada kedua kelompok.

Kata kunci: Ureterolitotomi laparoskopik transperitoneal, ureterolitotomi laparoskopik retroperitoneal, skala nyeri, komplikasi awal.

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INTRODUCTION

The treatment options for ureteric calculi consist of medical expulsive therapy to facilitate passage of ureteral stones, extracorporeal shock-wave lithotripsy, endoscopic manipulation, open surgery and laparoscopic ureterolithotomy.¹⁻⁴ Laparoscopic ureterolithotomy becomes treatment of choice to open surgery for the primary treatment of large, impacted, proximal or medial ureteral stones, and for failed cases of extracorporeal SWL and attempted URS of stones in these locations, anatomical abnormalities or morbid obesity.²⁻⁶

The advantages of laparoscopic ureterolithotomy compare to open surgery are lower post-operative morbidity, minimal analgesic requirements, shorter hospital stay and time to convalescence, and better cosmetic results with comparably good functional results.^{2,3,5,6} Laparoscopic ureterolithotomy increases the likelihood of removal of all stone in a single operation, in which economically profitable and shorten the operation time.² Laparoscopic ureterolithotomy can be preformed through transperitoneal or retroperitoneal and each technique has its own advantages and disadvantages.^{1-3,5}

In this study, we compared retroperitoneal laparoscopic ureterolithotomy versus transperitoneal laparoscopic ureterolithotomy in Hasan Sadikin Hospital Bandung and all procedures were done by single operator. Demographic and clinical variable, operative time, length of stay, ureteral suturing, pain scale according to visual analog scale (VAS) and early complications data were collected and analyzed.

OBJECTIVE

To compare retroperitoneal versus transperitoneal laparoscopic ureterolithotomy in effectivity, pain scale, and early complications.

MATERIAL & METHODS

A prospective comparison study was performed of 36 cases of upper or mid ureteral stones who required laparoscopic ureterolithotomy at Hasan Sadikin Hospital between January 2013 and December 2014. These patients underwent laparoscopic ureterolithotomy divided into transperitoneal approach (18 cases) and retroperitoneal approach (18 cases). The randomization occurred on consecutive sampling on a 1 : 1 basis. Group 1

consisted of patients who underwent retroperitoneal laparoscopic ureterolithotomy and group 2 consisted of those treated with retroperitoneal laparoscopic ureterolithotomy. All procedures were done by single operator. The procedure was indicated as primary treatment for impacted, large, upper or mid ureteral stones.

Apart from a clinical history and examination, complete blood count, renal function tests, urine culture and bacterial sensitivity, renal and bladder ultrasound, coagulation profiles, and kidney, ureter and bladder x-ray were performed. Excretory urography was obtained in cases of normal renal function. Informed written consent was obtained before surgical intervention.

The patients were placed in flank position with no flexion of the operating table. The Transperitoneal Laparoscopic Ureterolithotomy is performed through 3 ports, a 10 mm camera trocar inserted 2 fingerbreadth lateral and superior to the umbilicus, and 2 additional 5mm working ports inserted a handbreadth superior and inferior to the camera port. After reflection of the colon, the ureter is identified and stone is located and extracted. A JJ stent is inserted and the ureterotomy is closed with 4-zero vicryl sutures. Using a 5 mm scope, the stone is extracted in a sac through the 10 mm port and a small drain is inserted through the other 5 mm port.⁶

The patients were placed in the lateral decubitus (kidney) position with bridge at flank. The Retroperitoneal Laparoscopic Ureterolithotomy is performed, first incision was made just below the tip of the 12th rib.⁵ The transversalis fascia was incised. By blunt finger dissection the peritoneum was pushed anteriorly to create retroperitoneal space.² The space was further developed by balloon dilator or applied surgical glove.^{2,5} After the creation of pneumoperitoneum, a 10 mm port for camera was placed. Under vision a 5 mm and another 10 mm port were placed at the midclavicular and posterior axillary lines. After identifying the ureteral stone, the ureter was incised directly over the stone longitudinally, and the stone was removed using a grasping forceps.⁸ The ureterotomy was closed by 4-zero vicryl as an interrupted suture. An 18 Fr drain was inserted and post site closure was completed.

Intravenous ceftriaxone were administered for 2 days and continue with oral antibiotic. Analgesic (tramadol) were administered on patient demand. Visual analog scoring was recorded on postoperative days 1 and 3. An abdominal X-ray was taken to check the position on JJ stent and residual

stones. The drainage tube was removed if 24-hour output was less than 50 ml. The JJ stents was removed 1 month after initial operation.

Statistical analysis was performed with SPSS® version 17.0. Demographic data were summarized using descriptive statistics (mean, standard deviation). Clinical data were compared using student T-test and Mann-Whitney U tests with p value < 0.05 considered statistically significant.

RESULTS

The demographic characteristics of the 2 groups are shown in table 1. From the data shown in table 1, there was no significant difference between the 2 groups based on age, sex, stone location and size of the stone.

VAS on day 1 between the 2 groups was statistically significant, and was higher in group 2 (table 2). According to the Clavien-Dindo

classification of surgical complication, all the patients were in grade 1 classification. The differences in operative time, length of stay, ureteral suturing, visual pain analog score on day 3, and early complications between the 2 groups were not statistically significant (table 3).

DISCUSSION

Since the introduction of SWL and ureteroscopy for the management of ureteric calculi, the routine use of an open surgical approach for removal of ureteric calculi has rapidly declined. However, large ureteric calculi pose significant challenge for modern endourologic techniques, often requiring several endoscopic procedures as well as ESWL sessions. ESWL is found to be suitable for managing ureteric stones of < 1 cm. As the stone size increases, the chance of clearance decreases and of the need for multiple sessions

Table 1. Demographic data.

	Group 1 (Retro)	Group 2 (Trans)	p value
Patient Age (years)	54.75 ± 10.621	53.437±5.69	0.676
Male : Female	12 : 4	14 : 2	0.365
Prox : Media	15 : 1	14 : 2	0.157
Stone size (mm)	22.687±9.265 x 10.812±4.019	19.118±5.178 x 11.471±4.103	0.446

Table 2. Clinical variables.

	Group 1 (Retro)	Group 2 (Trans)	p value
Mean operative time (min)	88.25 ± 30.378	120.312 ± 66.555	0.305
Mean VAS day 1	3.187 ± 1.775	4.187 ± 1.845	0.038
Mean length of stay (days)	4.187 ± 1.379	4.75 ± 1.479	0.290
Mean VAS day 3	1.437 ± 0.496	1.812 ± 0.634	0.099
Mean ureterotomy suturing (min)	11.437 ± 2.249	9.312 ± 2.056	0.463
Inserted JJ stent : not inserted	13 : 3	13 : 3	1.000

Table 3. Early complications.

	Group 1 (Retro)	Group 2 (Trans)	p value
No. paralytic ileus (absent of bowel sound more than 36 hrs)	0	0	1.000
No. post operative febrile	0	0	1.000
No. port site infection	0	0	1.000
Subcutaneous surgical emphysema	0	0	1.000

increases.³ Cases with very large, impacted, and/or multiple ureteral stones in which ESWL and URS have either failed or are unlikely to succeed, laparoscopic ureterolithotomy is a better alternative than open surgery.^{2,3,6}

Laparoscopic surgery is now being used to remove ureteric stones in certain situations, including complex stone burden, failed previous ESWL and/or endourological procedures, anatomical abnormalities or morbid obesity.^{2,6} In other words, laparoscopy is a method that reproduces the steps of open surgery and may be indicated as an alternative in cases of therapeutic failure using less invasive methods.⁶ Laparoscopic ureterolithotomy can be carried out using either retroperitoneal or transperitoneal access. Laparoscopy is associated with lower postoperative morbidity, shorter hospital stay and time to convalescence, and better cosmetic results with comparably good functional results.^{2,3,6}

Wickman et al reported the first laparoscopic retroperitoneal ureterolithotomy in 1979. The first transperitoneal laparoscopic ureterolithotomy was performed by Raboy et al in 1992,⁷ and revealed its advantage in better working space and clearer anatomic landmark.⁵ However, the transperitoneal approach may compromise the peritoneum because its need to mobilize the colon, eventually urine may leak into the peritoneal cavity.⁵ The retroperitoneal approach may be more difficult to approach due to its narrower working space but it still has benefit in the aspect of urine leakage confined in the retroperitoneal space.^{5,8,9}

Retroperitoneoscopic surgery has an advantages over transperitoneal access include avoidance of contamination of the peritoneal cavity, rapid and straight access to ureter, no shoulder tip pain, and there is a lower incidence of long-term complications, such as port site hernia and bowel obstruction. In addition, bowel mobilization and retraction is not required thus the risk of bowel injury and paralytic ileus is minimized and retraction of the solid viscera is not required.^{2,3,11}

Keeley described the advantages of laparoscopic ureterolithotomy as high probability of removing the entire stone in one procedure.¹⁰ The high stone free rate allow patients to be return in regular activities quickly.^{10,12} Other authors advocated the transperitoneal approach for it has an advantage of providing a larger working space, while other authors preferred the retroperitoneal approach due to its direct access to the urinary tract and avoids manipulation and contact of urine with intraperi-

toneal organs.¹²

Routine ureteral stenting after laparoscopic ureterolithotomy is debatable. The intracorporeal suturing of ureterotomy and routine internal stenting have reduced complications such as urinary leak and prolonged hospital stay.² In a study on transperitoneal laparoscopic ureterolithotomy for upper ureteral stones, Nualyong and Taweemonkongsap showed that urinary leak remains the cause of a longer hospital stay. Urinary leak postoperatively happened on patients whom ureterotomy neither sutured nor stented. The authors concluded that intracorporeal ureterotomy closure decreases postoperative urine leak and hospital stay.¹³

Hamady et al compared 52 patients with stent placement and 52 patients without stent placement for proximal ureteral stones larger than 1 cm after retroperitoneal laparoscopic ureterolithotomy. They concluded that laparoscopic ureterolithotomy without stent placement for upper ureteral stone is safe, cost effective, has less operative time and needs no auxiliary procedures when compared with the use of stent placement which adds costs and discomfort for the patients.¹⁴

Demirci et al have observed that suturing of the ureter is more effective than placement of JJ stent into the ureter to reduce urine extravasation.¹⁵ Similar observation was also reported by Kijvikai and Patcharatkul in a study on retroperitoneal laparoscopic ureterolithotomy.¹⁶ They performed ureterotomy suturing without a stent. They recommended the selective insertion of stents in cases with severe ureteral mucosal inflammation, ulceration and inappropriate ureterotomy suturing.¹⁶ In our study, most of the patients were inserted JJ stents because all of those cases with large and impacted stones and severe ureteral mucosal inflammation. From our study, we did not found any urinary leakage from all the patients treated with or without ureteral stenting.

Singh et al compared 48 cases of upper and mid ureteral stones that had been performed transperitoneal laparoscopic ureterolithotomy (24) and retroperitoneal laparoscopic ureterolithotomy (24). They found that transperitoneal laparoscopic ureterolithotomy is associated with pain, ileus, greater analgesic requirements and longer hospital stay compared to retroperitoneal laparoscopic ureterolithotomy. They found that pain according to VAS on postoperative day 1 and 2 was statistically significantly different between the two groups which is higher in transperitoneal group.²

Another study performed by Kongchareonsombat et al reported that transperitoneal laparoscopic ureterolithotomy is significantly associated with morbidity such as prolonged drainage compared to extraperitoneal laparoscopic ureterolithotomy.⁵ Lee and Hsieh reported that retroperitoneal laparoscopic ureterolithotomy for impacted upper ureteral stones with a history of previous extracorporeal SWL or failed endourological procedures is associated with a lower analgesic requirement and a comparatively shorter hospital stay.¹⁷

In our study there was no difference between the 2 groups in operative time, length of stay, and ureterotomy suturing. There was a significance difference between the two groups in VAS day 1, which was higher in the transperitoneal group (p value < 0.05). Higher VAS day 1 in transperitoneal group attributed to mobilization and retraction of bowel and solid viscera leading to more postoperative pain. We did not found any early complications in the present study.

CONCLUSION

Transperitoneal laparoscopic ureterolithotomy is associated with pain according to VAS in day 1 after surgery compared to retroperitoneal laparoscopic ureterolithotomy. Successful stone removal remain the same in both approaches. We suggested retroperitoneal laparoscopic ureterolithotomy become procedure of choice for impacted proximal and mid ureteral stones.

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