

Open Ureterolithotomy Via Lumbotomy Incision vs Laparoscopic Ureterolithotomy for Upper Ureteric Calculi

Chaeyong Nualyong, M.D.*

Abstract : To compare the efficacy and morbidity of laparoscopic ureterolithotomy and open ureterolithotomy via the posterior lumbar approach.

Materials and Methods : A retrospective study was performed by reviewing patient records. Ten patients in the laparoscopic ureterolithotomy group were compared with 15 patients in the open ureterolithotomy via lumbotomy incision group. Twelve patients who had flank ureterolithotomy comprised a control group. Details of age, sex, size and site of the stone, haematocrit, blood urea nitrogen, serum creatinine, degree of hydronephrosis of the affected kidney, contralateral renal function, operative time, operative complication, the amount of postoperative analgesics and length of hospital stay were all compared. Statistical analysis was carried out by the Chi-square test, Anova and LSD multiple comparisons.

Results : The preoperative status of the three groups were similar. When the ureterolithotomy via lumbotomy group was compared with the control group (flank ureterolithotomy) the results were similar except that ureterolithotomy via lumbotomy required less analgesics postoperatively (mean 50 mg vs 104, $p < 0.001$). Ureterolithotomy via lumbotomy patients required the same analgesics as laparoscopic ureterolithotomy. However, laparoscopic ureterolithotomy had a longer operating time (mean 181.5 min vs 88, $p < 0.001$) and longer period of urine leak postoperatively (mean 6.6 days vs 2.4, $p < 0.003$) when compared with ureterolithotomy via lumbotomy.

Conclusions : Ureterolithotomy via lumbotomy offers similar low discomfort postoperatively compared with laparoscopic ureterolithotomy but had a shorter operating time and less complications.

เรื่องย่อ : เปรียบเทียบการผ่าตัด Open Ureterolithotomy ผ่านทาง Lumbotomy Incision และ Laparoscopic Ureterolithotomy สำหรับนิ่วท่อไตส่วนบน

ไชยยงค์ นวลยง พ.บ.*

*ภาควิชาศัลยศาสตร์, คณะแพทยศาสตร์ศิริราชพยาบาล, มหาวิทยาลัยมหิดล, กรุงเทพมหานคร 10700.

สารศิริราช 2542;51: 332-336.

วัตถุประสงค์ : เพื่อเปรียบเทียบประสิทธิภาพและผลแทรกซ้อนระหว่างการผ่าตัด laparoscopic ureterolithotomy และการผ่าตัด open ureterolithotomy โดยวิธี posterior lumbar approach

* Division of Urology, Department of Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

ผู้ป่วยและวิธีการ : เป็นการศึกษาย้อนหลังโดยการตรวจค้นจากเอกสารของผู้ป่วยกลุ่ม laparoscopic ureterolithotomy จำนวน 10 คน เปรียบเทียบกับผู้ป่วยกลุ่ม open ureterolithotomy ผ่านทาง lumbotomy incision จำนวน 15 คน โดยมีผู้ป่วยกลุ่ม flank ureterolithotomy จำนวน 12 คน เป็นกลุ่มเปรียบเทียบ ได้เปรียบเทียบในรายละเอียดต่างๆ ดังนี้ : อายุ, เพศ, ขนาดและตำแหน่งของนิ่ว, ฮีมาโตคริต, ยูเรียในโตรเจนในเลือด, ซีรัมครีอะตินิน, ความรุนแรงของการบวมนำของไตข้างที่มีนิ่ว, การทำงานของไตด้านตรงข้าม, ระยะเวลาการผ่าตัด, ข้อแทรกซ้อนของการผ่าตัด, จำนวนยาแก้ปวดที่ใช้หลังผ่าตัดและระยะเวลาในการอยู่โรงพยาบาลหลังผ่าตัด การคำนวณทางสถิติใช้ Chi-square test, Anova และ LSD multiple comparisons

ผลการศึกษา : รายละเอียดก่อนผ่าตัดของผู้ป่วยทั้ง 3 กลุ่มที่นำมาศึกษามีความเหมือนกันเมื่อเปรียบเทียบกลุ่ม ureterolithotomy โดยวิธี lumbotomy กับ flank ureterolithotomy จะพบว่าเหมือนกันทุกอย่าง ยกเว้นกลุ่ม ureterolithotomy โดยวิธี lumbotomy ใช้จำนวนยาแก้ปวดหลังผ่าตัดน้อยกว่า (ค่าเฉลี่ย 50 มก. และ 104, $p < 0.001$) เมื่อเปรียบเทียบกลุ่ม ureterolithotomy โดยวิธี lumbotomy กับกลุ่ม laparoscopic ureterolithotomy จะพบว่าเหมือนกันในจำนวนการใช้ยาแก้ปวดหลังผ่าตัด แต่กลุ่ม laparoscopic ureterolithotomy ใช้เวลาในการผ่าตัดนานกว่า (ค่าเฉลี่ย 181.5 นาที และ 88, $p < 0.001$) และมีระยะเวลาการรั่วของน้ำปัสสาวะหลังผ่าตัดนานกว่า (ค่าเฉลี่ย 6.6 วัน และ 2.4, $p < 0.003$)

สรุป : การผ่าตัด ureterolithotomy โดยวิธี lumbotomy มีความเจ็บปวดน้อยหลังผ่าตัดเหมือนกับการผ่าตัด laparoscopic ureterolithotomy แต่ใช้เวลาในการผ่าตัดเร็วกว่าและมีข้อแทรกซ้อนน้อยกว่า

INTRODUCTION

With the advent of extracorporeal shock wave lithotripsy (ESWL) and endourology, the need for open ureterolithotomy has markedly decreased. However, open ureterolithotomy is still necessary in cases where refractory ureteric stones fail to be removed by less invasive techniques. Furthermore, when open ureterolithotomy is needed for upper ureteric calculi, an approach through a posterior lumbotomy was reported to be superior to the standard flank incision in terms of less postoperative pain, less reflex ileus and shorter hospital stay.¹⁻⁴ Therefore, posterior lumbotomy ureterolithotomy was the operation of choice for upper ureteric stones for many urologists until laparoscopic surgery evolved and paved the way for new procedures in urology.

Until now, there have only been a few studies where laparoscopic ureterolithotomy has been considered as an alternative treatment to open ureterolithotomy.⁵⁻¹¹ All these reports confirmed the feasibility of the laparoscopic approach and also revealed advantages of minimal morbidity, especially decreased postoperative pain, short hospital stay, and a fast recovery period. However, laparoscopic

ureterolithotomy is a much more demanding procedure compared to open ureterolithotomy by the posterior lumbar approach. In addition, if the morbidity between laparoscopic ureterolithotomy and open ureterolithotomy via posterior lumbotomy is not much different, or not different at all, there is certainly a question whether it is reasonable to perform such a demanding procedure in the occasional cases which could be managed easier the other way with a comparable outcome. In addition, to date there has been no report directly comparing the efficacy and morbidity of laparoscopic ureterolithotomy and open ureterolithotomy via lumbotomy incision. In this paper the comparative study of laparoscopic ureterolithotomy and open ureterolithotomy via posterior lumbar approach has been made.

MATERIALS AND METHODS

Case records of 37 patients who had undergone three different types of ureterolithotomy for upper ureteric calculi between November 1994 and December 1998 were evaluated. Of these 37 patients, 10 had laparoscopic ureterolithotomy, 15

were open ureterolithotomy by lumbotomy incision, and 12 were open ureterolithotomy through a flank incision. All patients were evaluated according to age, sex, size and site of the calculus, haematocrit (Hct), blood urea nitrogen (BUN), serum creatinine (Cr), degree of hydronephrosis of the affected kidney, contralateral renal function, operative time, operative complications, amount of postoperative analgesics, and length of hospital stay.

The laparoscopic ureterolithotomy technique was carried out as follows. Under general anesthesia, the ureteral stent was placed and the patient was turned to full flank position. The first trochar was inserted by open technique lateral to the rectus muscle at the level of the umbilicus and a pneumoperitoneum was created. Afterwards the second and third trochar were inserted above and below the first port at the anterior axillary line level. Ten mm trochars were used in all ports. The colon was reflected medially and the ureter was then identified and traced to the stone which was identified by a bulge. The ureter was opened longitudinally over the stone which was removed from the abdomen with spoon forceps. The ureteral stent was then advanced across the ureterotomy up to the renal pelvis and the ureterotomy was either left open or closed with one or two interrupted 4-0 chromic catgut sutures. A rubber tube drain was placed through the lateral port and the port wounds were closed in layers.

The operative technique of the dorsal lumbotomy approach used herein was that described by Gil-Vernet¹² and the operative technique used for classical flank ureterolithotomy was the same as that described by Grayhack.¹³

Statistical analysis consisted of the Chi-square test, Anova and LSD multiple comparisons. Laparoscopic ureterolithotomy group, ureterolithotomy with lumbotomy incision and flank incision ureterolithotomy groups were compared with each other.

RESULTS

The demographic data of the patients in all three groups were similar with regard to age, sex, stone size and site, Hct, BUN and Cr, degree of hydronephrosis of the affected kidney, and contralateral kidney function (Table 1).

The operative results are shown in Table 2. Both open ureterolithotomy groups (ureterolithotomy via lumbotomy incision and flank ureterolithotomy) were similar in regard to operating time, complications and post operative stay but were different in the amount of pethidine required postoperatively. Patients in the flank ureterolithotomy group required more pethidine than patients in the lumbotomy group (mean 104 mg vs 50, $p < 0.001$). Patients in the laparoscopic ureterolithotomy group, like the ureterolithotomy via lumbotomy incision group, required less pethidine postoperatively when compared to the flank ureterolithotomy group (mean 35 mg vs 104, $p < 0.001$). However, patients in the laparoscopic group were different to patients in the open ureterolithotomy via lumbotomy groups regarding operating time and urine leak complications. The laparoscopic approach had a significantly longer operative time (mean 181.5 min vs 88, $p < 0.001$) and urine leak interval (mean 6.6 days vs 2.4, $p < 0.003$) than both open surgery groups. Postoperative stay of the three groups were all similar.

DISCUSSION

In this era of minimally invasive surgery, the surgeon has a variety of treatment options. Patient satisfaction also has to be considered. When minimally invasive treatments for upper ureteric stones fail and ureterolithotomy is needed, there are three choices of approach available. These are laparoscopic ureterolithotomy, ureterolithotomy via lumbotomy, and flank ureterolithotomy. Ureterolithotomy via lumbotomy incision has been reported to be superior to flank ureterolithotomy with a lower morbidity and discomfort.¹⁻³ However, to date there have been no reports which have compared laparoscopic ureterolithotomy with ureterolithotomy via lumbotomy in terms of efficacy and morbidity. It has also been noted that laparoscopic ureterolithotomy is much more technically demanding than ureterolithotomy via lumbotomy, and the number of cases that have indications for open ureterolithotomy are relatively few at the present time.

Although this comparative study was carried out retrospectively, the demographic data of all three groups were comparable. The flank ureterolithotomy group was included in the study as

เปรียบเทียบการผ่าตัด Open Ureterolithomy ผ่านทาง Lumbotomy Incision
และ Laparoscopic Ureterolithotomy สำหรับนิ่วท่อไตส่วนบน

สารศิริราช

ปีที่ 51, ฉบับที่ 5, พฤษภาคม 2542

335

ไชยวงศ์ นวลสง

Table 1. Demographic data for patients of the three different ureterolithotomy groups.

	Laparoscopic ureterolithotomy	Ureterolithotomy via lumbotomy	Ureterolithotomy via flank	P-value
Age (range)	41(24-56)	42(20-68)	45(33-62)	0.786
Sex (N)				
male	7/10	13/15	9/12	0.576
female	3/10	2/15	3/12	
Stone size (mm.)	9.2 ± 2.7	10.3 ± 6.9	10.8 ± 2	0.367
Stone site (N)				
right	4/10	13/15	5/12	1
left	6/10	2/15	7/12	
Hct (%)	41 ± 4.5	37 ± 6.9	39 ± 7.6	0.337
BUN (mg %)	13 ± 3.3	16.6 ± 13.9	16.7 ± 8.6	0.658
Serum creatinine (mg%)	1.1 ± 0.1	1.4 ± 1	1.5 ± 0.8	0.359
Degree of hydronephrosis (N)				
nil	0	0	1/12	0.827
mild	3/10	5/15	5/12	-
moderate	6/10	8/15	5/12	-
severe	1/10	2/15	1/12	
Contralateral renal function (N)				
normal	10	14/15	10/12	0.349
poor	0	1/15	2/12	

Table 2. Intraoperative and postoperative data of the three different ureterolithotomy groups.

	Laparoscopic ureterolithotomy	Ureterolithotomy via lumbotomy	Ureterolithotomy via flank
Operating time (min)	181.5 ± 46.6 † ‡	88 ± 29.3	115 ± 31.6
Complication			
urine leak interval (days)	6.6 ± 5.9 † ‡	2.4 ± 1.6	2
wound infection (N)	0	1/15	2/12
Postoperative pethidine required (mg.)	35 ± 24.2 ‡	50 ± 42.3 §	104 ± 39.7
Postoperative hospital stay (days)	9 ± 5.3	7 ± 2.2	8.3 ± 2.6

† p < 0.05 (Laparoscopic ureterolithotomy group compared with ureterolithotomy via lumbotomy group)

‡ p < 0.05 (Laparoscopic ureterolithotomy group compared with ureterolithotomy via flank group)

§ p < 0.05 (Ureterolithotomy via lumbotomy group compared with ureterolithotomy via flank group)

a control group and in fact revealed that patients who had either laparoscopic ureterolithotomy or ureterolithotomy via lumbotomy required less pethidine postoperatively than did patients who had flank ureterolithotomy. This finding not only confirmed the low discomfort of the lumbotomy approach as reported by many authors but also supported the findings of minimal postoperative pain in laparoscopic ureterolithotomy. Furthermore, there was no difference when laparoscopic ureterolithotomy was compared directly with ureterolithotomy via lumbotomy incision regarding the amounts of postoperative pethidine required. Hence, both laparoscopic ureterolithotomy and ureterolithotomy with lumbotomy approach result in the same levels of minimal postoperative pain. However, laparoscopic ureterolithotomy had a significant longer operative time and urine leak interval postoperatively compared to both open ureterolithotomy groups. Harewood et al reported laparoscopic ureterolithotomy in 9 patients where the operating time ranged from 80 to 260 min (mean 158).¹⁰ In addition, Micali et al also reported their laparoscopic ureterolithotomy experience in 6 patients where the operating time was considerably longer, ranging from 200 to 348 min (mean 245).¹¹ A long operative procedure is a disadvantage as patients are at more anesthetic risk.

The long urine leak interval observed postoperatively in laparoscopic ureterolithotomy is of great concern. Getting access to the ureter by the

transperitoneal route in laparoscopic ureterolithotomy makes urine leakage a likely complication. However, it should be noted that this complication has not been encountered in many reports. Harewood et al reported a short urine leak interval which was no longer than two days.¹⁰ Micali et al reported urinoma in only one patient in their series.¹¹ With proper stenting and closure of the ureterotomy, the urine leak problem would probably be less. However, even if laparoscopic ureterolithotomy can be performed without urine leakage complications, it is certainly not an easy task to lessen the operative time because laparoscopic ureterolithotomy is an elaborate procedure and demanding for surgeons to practice. In contrast, open ureterolithotomy by either lumbotomy or flank incision is a simple and straightforward operation which can be done by all urologists and which has a short operative time and low urine leak complication. From the findings in this study it can be extrapolated that most busy urologists in this country would not readily accept laparoscopic ureterolithotomy as a procedure to treat upper ureteric calculus where open ureterolithotomy is indicated.

In conclusion, ureterolithotomy via lumbotomy incision offers similar low discomfort postoperatively as does laparoscopic ureterolithotomy but has fewer complications and a shorter operating time.

REFERENCES:

1. Gardiner RA, Naunton-Morgan TC, Whitfield HN, Hendry WF. The modified lumbotomy versus the oblique loin incision for renal surgery. *Br J Urol* 1979; **51**: 256-9.
2. Das S, Harris CJ, Amar AD, Egan RM. Dor-sovertical lumbotomy approach for surgery of upper urinary tract calculi. *J Urol* 1983; **129**: 266-70.
3. Freiha F, Zeineh S. Dorsal approach to upper urinary tract. *Urol* 1983; **21**: 15-6.
4. Surabote A. Renal and ureteral operations via a posterior approach. *J Med Assoc Thai* 1983; **66**: 364-5.
5. Hudnall CH, Kirk JF, Radwin HM. The role of posterior lumbotomy in the management of surgical stone disease. *J Urol* 1988; **139**: 704-5.
6. Raboy A, Ferzli GS, Ioffreda R, Albert PS. Laparoscopic ureterolithotomy. *Urol* 1992; **39**: 223-5.
7. Wuernschimmel E, Lipsky H. Laparoscopic treatment of an upper ureteral stone. *J Lap Surg* 1993; **3**: 301-7.
8. Gaur DD. Retroperitoneal laparoscopic ureterolithotomy. *World J Urol* 1993; **11**: 175-7.
9. Bellman GC, Smith AD. Special considerations in the technique of laparoscopic ureterolithotomy. *J Urol* 1994; **151**: 146-9.
10. Harewood LM, Webb DR, Pope AJ. Laparoscopic ureterolithotomy: the results of an initial series, and an evaluation of its role in the management of ureteric calculi. *Br J Urol* 1994; **74**: 170-6.
11. Micali S, Moore RG, Averch TD, et al. The role of laparoscopy in the treatment of renal and ureteral calculi. *J Urol* 1997; **157**: 463-6.
12. Gil-Vernet J. New Surgical concepts in removing renal calculi. In: Douglas Whitehead C, ed. *Current Operative Urology*. Harper & Row, 1975: 71-90.
13. Grayhack JT. Nephrectomy. In: Glenn JF, ed. *Urologic Surgery*, 3rd ed. Philadelphia, Toronto: J.B. Lippincott Company, 1983: 63-85.