Laparoscopic Simple Nephrectomy: Perioperative Outcomes at Srinagarind Hospital

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Background: *Laparoscopic urology is a minimally invasive alternative to open surgery, especially laparoscopic simple nephrectomy for benign disease such as KUB stone.*
Objective: *To evaluate the efficacy and perioperative outcomes of laparoscopic simple nephrectomy at Srinagarind Hospital.*
Material and Method: *Analyzed the demographic and perioperative data of 78 consecutive patients who underwent laparoscopic simple nephrectomy.*
Results: *Mean age was 54.1. The indications included non-functioning kidney (64) and infection (14). Surgery averaged 118.37 minutes. In 38 and 40 respective cases, a transperitoneal and retroperitoneal approach was used. Intraoperative complications (13; 16.7%) included 10 bleeding, 2 diaphragmatic injuries and 1 pancreatic injury. Six cases (10.3%) were converted to open surgery: 5 for massive adhesion and 1 for uncontrolled bleeding. Mean estimated blood loss was 170.99 ml. Post-operative complications included: 8 cases of prolonged ileus and 5 wound infections. Mean post-operative analgesia was 14.0 mg morphine: mean pain score at post-operative day 1 6.20. Mean time to oral intake was 1.48 days, and post-operative period 4.63 days. Retroperitoneal access was associated with: shorter operative time (103.83 vs. 133.68 minutes, p = 0.008); a better result vis-a-vis post-operative ileus (1 vs. 7, p = 0.021); and shorter time to oral intake than transperitoneal route (1.20 vs. 1.79 days, p = 0.004).*
Conclusion: *Vis-a-vis reducing pain, faster recovery and improved cosmetics laparoscopic nephrectomy by a skilled surgeon via retroperitoneal approach is preferred for benign diseases.*

Keywords: *Laparoscopic simple nephrectomy, Perioperative outcomes, Transperitoneal and retroperitoneal approaches*

J Med Assoc Thai 2012; 95 (Suppl. 11): S18-S24
Full text. e-Journal: *http://jmat.mat.or.th*

KUB (Kidney, ureter, bladder) stone is a majority health problem in the northeastern region of Thailand, where the incident is ~8.4% and the mean age of affected persons is 40.3 years[1]. KUB stones can cause recurrent infection, chronic kidney disease and increase risk factor of renal and ureter tumors up to 2.5 folds for squamous cell carcinoma and transitional cell carcinoma[2, 3].

Multiple modalities have been developed to treat KUB stone including ESWL, URSL, PCNL and open nephrolithotomy. In Thailand 4.8-16% of patients with KUB stone need nephrectomy because of recurrent infection or non-functioning kidney disease[4,5]. Nephrectomy is a major procedure that can be done by traditional open surgery or minimally invasive surgery. The first reported laparoscopic nephrectomy was from Clayman et al in the 1990s[6,7]. Since then laparoscopic nephrectomy has become an accepted, advantageous, minimally invasive alternative to the open surgery. Laparoscopic nephrectomy can be performed transperitoneally or retroperitoneally. The former approach has the benefit of a wider working space and readily identifiable anatomical landmarks while the latter approach is associated faster recovery of bowel function, possibly leading to a shorter hospital stay[8,9].

Srinagarind Hospital began performing laparoscopic nephrectomies in 2006. Here, we present a retrospective report from single institution on the perioperative outcomes of laparoscopic nephrectomy, as performed on 78 consecutive eligible, consecutive patients with benign renal disease.

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Material and Method

Between June 2006 and April 2008, 78

consecutive patients with benign renal disease underwent transperitoneal or retroperitonal laparoscopic simple nephrectomy at Srinagarind hospital. The exclusion criteria for the present study were malignant renal tumors or lost of the medical records. Intraoperative data were completed by the operating surgeon in the operating room immediately validated on a data sheet. Post-operative data were collected by a ward nurse before patients were discharged from hospital.

The data were reported as a mean ± standard deviation (range). Continuous variables were compare

Table 1. Demographic data

	No. (%)
Age (Mean ± SD)	0.5-85 (54.1 ± 19.1)
Sex	
Male	51 (65.4%)
Female	27 (34.6%)
Underlying disease	
Diabetic mellitus	8 (10.3%)
Hypertension	16 (20.5%)
Dyslipidemia	8 (10.3%)
Chronic renal failure	11 (14.1%)
Tumor and Cancer	4 (5.2%)
Heart disease	4 (5.2%)
Mean ASA score ± SD (range)	1.9 ± 0.7 (1-3)
Mean mg/dL serum creatinine ± SD (range)	
Pre-operative	1.80 ± 2.73 (0.6-20.9)
Post-operative	1.77 ± 2.49 (0.6-20.9)

Table 2. Intra-operative data

	No. (%)
Indication for surgery	
Non-functioning kidney	64 (82.1%)
Recurrent infection	14 (17.9%)
Approach	
Transperitoneal	38 (48.7%)
Retroperitoneal	40 (51.3%)
Side of procedure	
Right	42 (53.8%)
Left	35 (44.9%)
Both sides	1 (1.3%)
Conversion to open	6 (7.7%)
Cause of open	
Bleeding	1 (1.3%)
Marked adhesion	5 (6.4%)
Stone	
Renal	57 (73.1%)
Ureteric	14 (17.9%)
Mean minute operative time ± SD (range)	118.37 ± 50.50 (45-330)
Mean ml blood loss ± SD (range)	170.99 ± 216.60 (2-1,100)
Intraoperative complication	13 (16.7%)
Intraoperative bleeding > 500 ml	10 (12.8%)
Pancreatic injury	1 (1.3%)
Diaphragm injury	2 (2.6%)

using the student t-test or Mann-Withney U test while categorical variables were compare using the Chi-square test or Fisher exact test, with $p < 0.05$ considered statistically significant. This study was approved by the Khon Kaen University Ethic Committee (number HE521100).

Results

The mean age of the 78 patients underwent laparoscopic simple nephrectomy was 54.1 years, (51 males; 27 females). Some patients had co-morbidities such as diabetes, hypertension, chronic renal disease or cardiac diseases. The mean ASA score at surgery was 1.9. The respective pre and post-operative serum creatinine were 1.80 and 1.77 mg/dL.

The indication for nephrectomy included non-functioning kidney in 64 cases and recurrent infection in 14. A transperitoneal approach was used in 38 cases while a retroperitonal approach was used in 40. Six cases were converted to open surgery; five due to massive adhesion (2 cases had had a previous kidney surgery) and 1 had uncontrolled bleeding. The mean operative time was 118.37 minutes and the mean blood loss was 170.99 ml.

Thirteen incidents of intra-operative complications were recorded, including: 10 cases of bleeding of > 500 ml, 2 for diaphragmatic injury and 1 for pancreatic injury. All 3 incidents of diaphragmatic and pancreatic injury were possible to control using laparoscopically. Post-operative complications were recorded in 13 cases, including prolonged ileus in eight, wound infection in 5. The mean pain score on post-operative day1 was 6.20 and the mean post-operative morphine requirement for post operative day 1 was

Table 3. Post-operative data

	No. (%)
Post-operative complication	13 (16.7%)
Prolonged ileus	8 (10.3%)
Wound infection	5 (6.4%)
Atelectasis	1 (1.3%)
Pain score at post operative Day 1 ± SD (range)	6.20 ± 2.30 (0-10)
Mean mg morphine equivalent at post operative Day 1 ± SD (range)	14.0 ± 10.7 (0-60)
Blood transfusion	8 (10.3%)
Mean day for removed Foley catheter ± SD (range)	1.42 ± 1.10 (0-8)
Mean day for removed drain ± SD (range)	2.38 ± 1.38 (1-7)
Mean day for oral intake ± SD (range)	1.48 ± 0.90 (1-7)
Mean day post-operative period ± SD (range)	4.63 ± 2.83 (2-16)

Table 4. Demographic data

	Transperitoneal Approach No. (%)	Retroperitoneal Approach No. (%)	p-value
Patients	38	40	Not assess
Mean age ± SD	59.26 ± 14.41	49.26 ± 21.82	0.019*
Male	25 (65.8%)	26 (65.0%)	0.942
Mean ASA score ± SD	2.03 ± 0.59	1.73 ± 0.68	0.040*
Mean mg/dL serum creatinine ± SD (range)			
Pre-operative	2.00 ± 3.29	1.61 ± 2.10	0.529
Post-operative	2.02 ± 3.28	1.54 ± 1.41	0.399
Underlying disease			
Diabetic mellitus	2 (5.3%)	6 (15.0%)	0.159
Hypertension	7 (18.4%)	9 (22.5%)	0.658
Dyslipidemia	3 (7.9%)	5 (12.5%)	0.506
Chronic renal failure	5 (13.2%)	6 (15.0%)	0.816
Tumor and Cancer	2 (5.2%)	2 (5.0%)	0.917
Heart disease	2 (5.2%)	2 (5.0%)	0.948

14.0 mg. The mean time to taking food and drink was 1.48 days after the operation. The patients were able to do without the Foley catheter and drain at 1.42 and 2.38 days after the surgery, respectively. The mean post-operative hospital stay was 4.63 days.

The patients in the retroperitoneal groups were younger (49.26 vs. 59.26 years, p = 0.019) and had a better ASA classification (1.73 vs. 2.03, p = 0.040) than the transperitoneal groups. There was no significant or apparent difference in serum creatinine, co-morbid diseases, indications for surgery or side-effects of the surgery.

Use of a retroperitoneal approach had a shorter operative time (103.83 vs. 133.68 minutes, p = 0.008) but no difference in: blood loss (181.05 vs. 161.43 ml, p = 0.692), number of conversions (4 vs. 2 cases, p = 0.363) or intra-operative complications (8 vs. 5 cases, p = 0.314). Post-operative bowel ileus (7 versus 1 cases p = 0.021)

Table 5. Intra-operative data

	Transperitoneal Approach No. (%)	Retroperitoneal Approach No. (%)	p-value
Indication for surgery			
Non function kidney	32 (84.2%)	32 (80%)	0.630
Recurrent infection	6 (15.8%)	8 (20%)	0.630
Side of procedure			
Right	19 (50.0%)	23 (57.5%)	0.509
Left	19 (50.0%)	16 (40.0%)	0.378
Both sides	0	1 (2.5%)	0.330
Conversion to open	4 (10.5%)	2 (5.0%)	0.363
Cause of open			
Bleeding	1 (2.6%)	0	0.305
Marked adhesion	3 (7.9%)	2 (5.0%)	0.604
Stone			
Renal	29 (76.3%)	28 (70.0%)	0.532
Ureteric	8 (21.1%)	6 (15.0%)	0.489
Mean minute operative time ± SD	133.68 ± 53.96	103.83 ± 42.76	0.008*
Mean ml blood loss ± SD	181.05 ± 211.15	161.43 ± 223.90	0.692
Intraoperative complication	8 (21.0%)	5 (12.5%)	0.314
Intraoperative bleeding > 500 ml	6 (15.8%)	4 (10.0%)	0.448
Pancreatic injury	1 (2.6%)	0	0.971
Diaphragm injury	1 (2.6%)	1 (2.5%)	0.305

Table 6. Post-operative data

	Transperitoneal Approach No. (%)	Retroperitoneal Approach No. (%)	p-value
Post-operative complication	9 (23.6%)	5 (12.5%)	0.314
Prolonged ileus	7 (18.4%)	1 (2.5%)	0.021*
Wound infection	2 (5.2%)	3 (7.5%)	0.689
Atelectasis	0	1 (2.5%)	0.330
Pain score at post operative Day1 ± SD	6.68 ± 2.01	5.75 ± 2.50	0.074
Mean mg morphine equivalent at post operative Day 1 ± SD	14.32 ± 10.19	13.79 ± 11.29	0.832
Blood transfusion	5 (13.2%)	3 (7.5%)	0.193
Mean day for removed Foley catheter ± SD	1.34 ± 0.81	1.50 ± 1.32	0.530
Mean day for removed drain ± SD	2.66 ± 1.51	2.13 ± 1.20	0.088
Mean day for oral intake ± SD	1.79 ± 1.14	1.20 ± 0.46	0.004*
Mean day post-operative period ± SD	4.74 ± 2.66	4.53 ± 3.05	0.745
Mean day hospital stay ± SD	7.84 ± 4.49	8.90 ± 4.90	0.325

and delayed oral intake (1.20 versus 1.79 days, p = 0.004) were found more commonly when a transperitoneal approach was used than a retroperitoneal route. There was however, no difference between the two approaches vis-a-vis: post-operative hospital stay (7.84 vs. 8.90 days, p = 0.325), pain score at day 1 (6.68 vs. 5.75, p = 0.074), analgesic requirement (14.32 vs. 13.79 mg, p = 0.832), number of blood transfusion (5 vs. 3 cases, p = 0.193), time to withdrawal of the Foley catheter (1.34 vs. 1.50 days, p = 0.530), and time to withdrawal of the drain (2.66 vs. 2.13, p = 0.088).

Discussion

The reported laparoscopic nephrectomy was performed by Clayman et al using a transperitoneal approach[6,7]. Reports from multiple institutions world-wide have since confirmed the technical feasibility, safety, decreased morbidity, speedier recovery and superior cosmetics of performing laparoscopic nephrectomy over against traditional open surgery.

The current study confirm that KUB stone is a major cause of benign renal disease in the northeastern region of Thailand. It causes chronic kidney disease, non-functioning kidney, recurrent infection and increase the risk of malignant renal tumors[2,3]. At Srinagarind Hospital, laparoscopic nephrectomy was first performed in 2006. Here we report our early experience in terms of perioperative outcomes.

In the early period, the procedures were performed through a transperitoneal approach, which allowed more space (greater maneuverability) and better visualization of the anatomic organs. Subsequently, a retroperitoneal approach was used as an alternative.

In current study, the operative time was 118 minutes and estimated blood loss 170 ml. By comparison, in other studies, the mean operative time was 90 minutes and the estimated blood loss 97 ml[7,10,11].

The authors found 6 cases (7.7%) that had been converted to open surgery while previous studies had a conversion rate of ~6.1%[7,10,11]. The reasons for converting in our study included (a) uncontrolled bleeding (2 cases) and massive adhesion (4 cases)-2 had massive adhesion due to a previous kidney surgery, one had malignant adhesion from a preoperatively un-diagnosed renal tumor, and one from severe infection. The complication rate of laparoscopic nephrectomy in other studies were 20.6%[7,10-12] but in the current study, it was 16.7% and there were no cases of mortality found. The authors found three cases of major complications 2 cases of diaphragmatic injury and one of pancreatic injury. All of these cases were treated under laparoscopy without any further post-operative morbidity.

By way of comparison in our series, the retroperitoneal approach had a shorter operating time (p = 0.008), a speedier resumption of oral intake, a lower rate of post-operative ileus (p = 0.004) and less post-operative pain at post-operative day1 (p = 0.0074).

Conclusion

Laparoscopic urology is currently considered a routine, safe and effective procedure associated with minimal morbidity. The inherent include reduced pain level, faster recovery and improved cosmetic results; notwhithstranding the choice of approach depends on the training and preference of the attending laparoscopic surgeon. For benign diseases, when feasible, the authors prefer to perform laparoscopic nephrectomy using a retroperitoneal approach.

Acknowledgement

The authors wish to thank the Faculty of Medicine Cleft Lip-Cleft Palate and Craniofacial Center in Association with Tawanchai Project for support and Mr. Bryan Roderick Hamman and Mrs. Janice Loewen-Hamman for assistance with the English-language presentation.

Potential conflicts of interest

None.

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การศึกษาผลการรักษาผู้ป่วยโดยวิธีการผ่าตัดไตโดยการส่องกล้องในโรงพยาบาลศรีนครินทร์

เก่งกาจ วินัยโกศล, ขจิตร์ พาชีรัตน์, เอกรินทร์ โชติกวณิชย์

ภูมิหลัง: *การผ่าตัดรักษาผู้ป่วยศัลกรรมทางเดินปัสสาวะในปัจจุบันได้มีแนวโน้มเปลี่ยนแปลงไปเป็นการผ่าตัดแบบส่องกล้อง ซึ่งเริ่มเข้ามาทดแทนการผ่าตัดแบบเปิด โดยเฉพาะผู้ป่วยที่ไตวายที่ต้องเข้ารับการผ่าตัดไตอันเนื่องมาจากนิ่วในทางเดินปัสสาวะ*

วัตถุประสงค์: *เพื่อศึกษาผลของการรักษาผู้ป่วยที่เข้ารับการผ่าตัดไตโดยวิธีการส่องกล้องใน โรงพยาบาลศรีนครินทร์*

วัสดุและวิธีการ: *เป็นการศึกษาข้อมูลผู้ป่วยย้อนหลังทั้งในด้านลักษณะผู้ป่วย และผลการรักษาผู้ป่วยโดยวิธีการผ่าตัดไตโดยการส่องกล้องทั้งหมด 78 ราย ที่เข้ารับการผ่าตัดระหว่างปี พ.ศ. 2549-2551*

ผลการศึกษา: *ผู้ป่วย 78 ราย อายุเฉลี่ยขณะผ่าตัด 54.1 ปี ข้อบ่งชี้ในการผ่าตัดคือ ไตไม่ทำงาน 64 ราย และภาวะติดเชื้อเรื้อรัง 14 ราย ระยะเวลาทำการผ่าตัดเฉลี่ย 118.37 นาที ผู้ป่วยเข้ารับการผ่าตัดวิธีผ่านทางช่องท้อง 38 ราย และผ่านทางด้านหลังผนังช่องท้อง 40 ราย มีภาวะแทรกซ้อนจากการผ่าตัด 13 ราย (16.7%) กล่าวคือ 10 ราย เสียเลือดมากกว่า 500 มิลลิลิตร 2 ราย บาดเจ็บต่อกะบังลม และ 1 ราย บาดเจ็บต่อตับอ่อน มีผู้ป่วย 6 ราย (10.3%) ต้องเปลี่ยนมาทำการผ่าตัดแบบเปิด เนื่องจากมีพังผืดจำนวนมาก 5 ราย และเสียเลือดโดยไม่สามารถห้ามเลือดโดยการส่องกล้องได้ 1 ราย การผ่าตัดเสียเลือดเฉลี่ย 170.99 มิลลิลิตร ภาวะแทรกซ้อนภายหลังผ่าตัดพบ 8 ราย มีภาวะท้องอืด รับประทานอาหารได้ล่าช้า และ 5 ราย มีภาวะแผลติดเชื้อ ยาแก้ปวดต้องใช้มอร์ฟีนเฉลี่ย 14 มิลลิกรัม ค่าความเจ็บปวด ณ หลังผ่าตัดวันแรกเฉลี่ย 6.20 ผู้ป่วยสามารถรับประทานอาหารได้เป็นปกติเฉลี่ย 1.48 วัน และต้องอยู่โรงพยาบาล หลังผ่าตัดเฉลี่ย 4.63 วัน การผ่าตัดผ่านทางด้านหลังผนังช่องท้องพบว่าใช้เวลาผ่าตัดน้อยกว่า (103.83: 133.68 นาที, p = 0.008) ภาวะท้องอืดภายหลังผ่าตัดน้อยกว่า (1: 7 วัน, p = 0.021) และสามารถรับประทานอาหารได้เป็นปกติเร็วกว่า (1.20: 1.79 วัน, p = 0.004) เมื่อเทียบกับการผ่าตัดผ่านทางช่องท้อง*

สรุป: *การผ่าตัดไตโดยการส่องกล้องสามารถลดความเจ็บปวดหลังผ่าตัด สามารถฟื้นตัวได้เร็วและให้ผลการรักษาด้านความงามเป็นที่น่าพึงพอใจโดยสามารถทำได้ทั้งการผ่าตัดผ่านทางช่องท้องและผ่านทางด้านหลังผนังช่องท้องขึ้นอยู่กับความถนัดของศัลยแพทย์แต่ละคน*