Laparoscopic Nephrectomy in Children: Experience at Srinagarind Hospital, Khon Kaen University

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Background: *Laproscopic nephrectomy has become a popular procedure since first being introduced in 1990.*
Objective: *Evaluate the feasibility and efficacy of laparoscopic pediatric nephrectomy.*
Material and Method: *The authors reviewed the in-patient medical records at Srinagarind Hospital, Khon Kean University between 2007 and 2011. Laparoscopic nephrectomy was performed on 9 pediatric patients. The demographic data, indications for surgery, route of approach and peri-operative outcomes were analyzed.*
Results: *Ten nephrectomies (6 L; 4 R) were performed on the nine patients (mean age 8.8 years: 7 males; 2 females). One patient underwent a bilateral nephrectomy at a different time. A trans-and retro-peritoneal approach was used on 1 and 9 cases, respectively. The respective mean operative time and hospital stay was 108.8 minutes and 5.8 days. The mean estimated blood loss was 31.8 ml (minimal-100 ml): no blood transfusion was required. Post-operatively, there were no major complications and the mean pain score was 2.3 (0-5). Only one patient was converted to an open nephrectomy and that due to massive adhesion.*
Conclusion: *Laparoscopic pediatric nephrectomy has been a feasible and safe procedure at our institution.*

Keywords: *Laproscopic nephrectomy, Operative time, Pain score*

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In 1993, Kavoussi and Koyle[1] reported the first pediatric laparoscopic nephrectomy; this approach became the predominant procedure worldwide after its introduction in 1990. The advantages include less post-operative pain and a shorter operative time; notwithstanding, this procedure is not done routinely. The authors aim was to evaluate the feasibility and efficacy of laparoscopic pediatric nephrectomy on the authors first nine cases.

Material and Method

From the searchable medical records of in-patients seen at Srinagarind Hospital, Khon Kean University, between 2007 and 2011, the authors found that laparoscopic nephrectomies had been performed by one surgeon on nine pediatric patients (age range, 6 months to 15 years). The authors analyzed the demographic data, indications for surgery, route of approach and perioperative outcomes. The present study was reviewed and approved by the Khon Kean University Ethics Committee for Human Research as per the Helsinki Declaration and ICH Good Clinical Practice Guidelines.

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Procedure

The patient was placed in a lateral (kidney) position. Laparoscopic nephrectomy was performed using three ports for the instrument: one for a 12 mm camera at the tip of the 12th rib and two others (5 mm each) for the trocar. Retro-peritoneal access was used for the balloon dilator to develop the retro-peritoneal space. The stump of the renal artery, vein and ureter were secured with Hemolok® clips (size ML). After finishing the procedure, the kidney was extracted through an extended incision from 12 mm to 2-5 cm at the camera port site.

Results

Patient characteristics are presented in Table 1. There were 7 males and 2 females with a mean age of 8.8 years (range, 6 months to 15 years). Six left and four right nephrectomies were performed. Only one trans-peritoneal approach was performed (the first case) while the remainder were performed using the retroperitoneal

route.

Among the nine patients, ten nephrectomies were performed for various diseases (Table 2). One was converted to an open nephrectomy because of massive adhesion and failure to progress. One patient underwent bilateral nephrectomy at different times due to poor renal function and recurrent infection of both kidneys before the kidney transplantation took place. The mean operative time was 108.8 minutes (range, 50-180). The mean estimated blood loss was 31.8 ml (range, nominal to 100 ml) and no blood transfusion was required. During the post-operative period, there were no major complications. The mean post operative pain score was 2.3 (range, 0-5). All of the patients received

Table 1. Patients characteristics and access

Patient number	Age (years)	Sex	Side	Laparoscopic approach
1	13	Female	Left	Trans-peritoneal
2	11	Male	Both sides	Retro-peritoneal
3	2	Male	Right	Retro-peritoneal
4	15	Male	Left	Retro-peritoneal
5	10	Male	Right	Retro-peritoneal
6	8	Male	Left	Retro-peritoneal
7	7	Female	Right	Retro-peritoneal
8	1/2	Male	Left	Retro-peritoneal
9	13	Male	Left	Retro-peritoneal

Table 2. Clinical diagnosis, indication(s) for surgery and pathological diagnosis

Patient number	Diagnosis	Indication for surgery	Pathological diagnosis
1.	Myelomeningocele, neuropathic bladder, VUR[a]	Non-functioning kidney with recurrent infection	Pyonephrosis and Chronic pyelonephritis
2. (Lside)	HUS[b]	Non-functioning kidney with recurrent infection	Chronic glomerulonephritis
2. (Rside)	HUS	Non-functioning kidney with recurrent infection	Chronic glomerulonephritis
3.	PUV[c] and VUR	Non-functioning kidney with recurrent infection	Chronic pyelonephritis
4.	UPJO[d]	Non-functioning kidney with recurrent infection	Pyonephrosis, Chronic pyelone phritis and Chronic ureteritis
5.	VUR	Non-functioning kidney with recurrent infection	Chronic pyelonephritis
6.	UPJO	Non-functioning kidney with recurrent infection	Chronic pyelonephritis
7.	Renal hypoplasia	Non-functioning kidney with recurrent infection	Renal hypoplasia
8.	ARM[e] high type, VUR	Non-functioning kidney with recurrent infection	Chronic pyelonephritis
9.	VUR	Non-functioning kidney with recurrent infection	Chronic pyelonephritis

[a]VUR = Vesicoureteric reflux
[b]HUS = Hemolytic Uremic Syndrome
[c]PUV = Posterior urethral valve
[d]UPJO = Ureteropelvic junction obstruction
[e]ARM = Anorectal malformation

adequate analgesic medication (*i.e.*, fentanyl or morphine). The mean hospital stay was 5.8 days (2-13 days).

Discussion

The advantages of laparoscopic surgery are recognized. The benefits include: good visualization because of magnification provided by the scope, a short recovery period and good cosmetics.

Several reports have compared open vs. laparoscopic nephrectomy in children. Hamilton et al[2] compared ten open and ten laparoscopic nephrectomies in children. The parameters of their study included: period of recovery, hospital stay and cosmetics. They study reported favorable outcomes of laparoscopic nephrectomy over open surgery[2].

The laparoscopic procedure can be done safely through either a trans- or retro-perinoneal approach. Trans-peritoneal access offers a large working space; while retro-peritoneal access allows quicker access to the renal hilum. Both approaches are suitable for either younger or older patients[3]. For children < 1 year of age and infants < 10 kg in weight, the laparoscopic approach has proven safe and effective[4,5].

The indications for laparoscopy in our study included: non-functioning kidney and recurrent infection. According to surgeon preference-in terms of shorter time to access the renal hilum-almost all of the cases were performed through the retro-peritoneal access. There was no limitation, even on a small infant of 6 months. One nephrectomy in present study needed to be converted to open surgery due to massive adhesion.

The objective of the current study was to assess the perioperative outcomes and the feasibility of laparoscopic pediatric nephrectomy. Based on the authors' data, there were good outcomes without major complications. Operative time depended on the severity of disease in each patient. Since are tro-peritoneal approach requires adequate space to complete the procedure, the surgery can be safely done in only selected pediatric patients.

Conclusion

Laparoscopic pediatric nephrectomy is a challenging procedure for urologists; however, the current review confirms that it has been a safe and feasible procedure. Surgical skill and laparoscopic experience are important factors for consistently good outcomes.

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Potential conflicts of interest

None.

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การศึกษาการผ่าตัดนำไตออกผ่านกล้องในเด็ก: ประสบการณ์ ณ โรงพยาบาลศรีนครินทร์ มหาวิทยาลัยขอนแก่น

วรวรรธน์ แก้ววิเชียร, ขจิตร์ พาชีรัตน์, เอกรินทร์ โชติกวาณิชย์

***ภูมิหลัง**: การผ่าตัดนำไตออกผ่านกล้องได้ใช้เป็นที่แพร่หลายตั้งแต่การรายงานครั้งแรกเมื่อปี พ.ศ. 2533*
***วัตถุประสงค์**: ศึกษาความเหมาะสมและประสิทธิผลของการผ่าตัดนำไตออก โดยวิธีส่องกล้องในเด็ก*
***วัสดุและวิธีการ**: ผู้นิพนธ์ทบทวนเวชระเบียนผู้ป่วยที่เข้ารับการรักษาด้วยการผ่าตัดนำไตออกโดยวิธีส่องกล้องในเด็กตั้งแต่ปี พ.ศ. 2550-2554 พบผู้ป่วยทั้งหมด 9 ราย โดยทำการศึกษาข้อมูลทั่วไปของผู้ป่วย ข้อบ่งชี้ในการผ่าตัด ช่องทางในการทำผ่าตัดและผลการรักษา*
***ผลการศึกษา**: จากการทบทวนเวชระเบียนพบว่ามีผู้ป่วย 9 ราย ได้รับการทำผ่าตัดนำไตออกโดยวิธีส่องกล้อง 10 ครั้ง (ข้างซ้าย 6 ครั้งและข้างขวา 4 ครั้ง) อายุเฉลี่ย 8.8 ปี เป็นเพศชาย 7 ราย เพศหญิง 2 ราย มีผู้ป่วย 1 ราย ทำการผ่าตัดนำไตออกทั้งสองข้างในเวลาที่ต่างกัน สำหรับช่องทางการผ่าตัด พบว่ามีการผ่าตัดผ่านทางช่องท้อง 1 รายและทางบริเวณหลังช่องท้อง 9 ราย ระยะเวลาการผ่าตัดเฉลี่ย 108.8 นาที ระยะเวลานอนโรงพยาบาล 5.8 วัน ปริมาณการเสียเลือดระหว่างผ่าตัดเท่ากับ 31.8 มิลลิลิตร (ระหว่างปริมาณน้อยมาก-100 มิลลิลิตร) โดยพบว่าไม่มีการให้เลือดระหว่างหรือหลังผ่าตัด และสภาวะหลังผ่าตัด พบว่าไม่มีภาวะแทรกซ้อนที่รุนแรง คะแนนความปวดหลังผ่าตัดเฉลี่ย 2.3 คะแนน (ระหว่าง 0-5 คะแนน) จากผู้ป่วยทั้งหมดมี 1 ราย ที่เปลี่ยนมาทำการผ่าตัดแบบเปิดเนื่องจากมีพังผืดในช่องท้องมาก*
***สรุป**: การผ่าตัดนำไตออกในเด็กโดยวิธีส่องกล้องมีผลการรักษาที่ดีและเป็นหัตถการที่ปลอดภัย*