



# Result of Laparoscopic Living Donor Nephrectomy in Vajira Hospital

Thitawat Wongampornpat MD<sup>1\*</sup>

Bhapapak Na-songkla MD<sup>1</sup>

<sup>1</sup> Urologic unit, Department of surgery, Faculty of Medicine Vajira hospital, Navamindradhiraj University, Bangkok, Thailand

\* Corresponding author, e-mail address : thitawat.wong@gmail.com

Vajira Med J. 2021; 65(6) : 479-84

<http://dx.doi.org/10.14456/vmj.2021.xx>

## Abstract

**Background:** Laparoscopic living donor nephrectomy was performed in 2010 substituted open living donor nephrectomy in Vajira hospital. This study aims to present result of surgery.

**Method:** A retrospective descriptive study was conducted. Eighty eight donors were performed laparoscopic living donor nephrectomy and 88 kidneys were transplanted to recipients between 2010 to 2020. Donor demographic data, number of renal vessels, operative time, warm ischemic time, operative blood loss, length of hospital stay, complication, serum creatinine after nephrectomy, serum creatinine of recipients and delay graft function were retrospectively review from medical record.

**Result:** Mean operative time was 219±38 minutes, mean warm ischemic time was 192.2±39.8 seconds. Mean intraoperative blood loss was 66±56 milliliter, mean hospital stay length was 5.4±2.4 days. Complication rate of donor was 3.4%. There was no vascular or ureteral complication to recipients in this study.

**Conclusion:** Laparoscopic living donor nephrectomy in Vajira hospital is safe and feasibility. Result of kidney function of the recipients at one year of follow up stilled good.

**Keyword:** laparoscopic living donor nephrectomy



# การศึกษาผลการผ่าตัดตัดไตที่บริจาคในผู้บริจาคที่มีชีวิตด้วยวิธีการส่องกล้องผ่านทางหน้าท้องในโรงพยาบาลวชิรพยาบาล

ฐิตวัฒน์ วงศ์อัมพรพัฒน์ พ.บ.<sup>1\*</sup>

ปภาภัค ณ สงขลา พ.บ.<sup>1</sup>

<sup>1</sup> หน่วยศัลยกรรมทางเดินปัสสาวะ ภาควิชาศัลยศาสตร์ คณะแพทยศาสตร์ วชิรพยาบาล มหาวิทยาลัยนวมินทราธิราช กรุงเทพมหานคร ประเทศไทย

\* ผู้ติดต่อ, อีเมล: thitawat.wong@gmail.com

Vajira Med J. 2021; 65(6) : 479-84

<http://dx.doi.org/10.14456/vmj.2021.xx>

## บทคัดย่อ

**บทนำ:** การผ่าตัดตัดไตที่บริจาคในผู้บริจาคที่มีชีวิตด้วยการส่องกล้องผ่านทางหน้าท้องได้เริ่มต้นทำที่โรงพยาบาลวชิรพยาบาลตั้งแต่ปีพ.ศ. 2553 เพื่อทดแทนการผ่าตัดตัดไตแบบเปิด วัตถุประสงค์ของการศึกษานี้เพื่อแสดงผลลัพธ์ของการผ่าตัดด้วยวิธีนี้

**วิธีการ:** เป็นการศึกษาย้อนหลังเชิงพรรณนาโดยการเก็บข้อมูลของผู้บริจาคไตที่ได้รับการผ่าตัดตัดไตด้วยวิธีส่องกล้องผ่านทางหน้าท้องในโรงพยาบาลวชิรพยาบาลจำนวน 88 ราย ตั้งแต่ปี พ.ศ.2553 ถึงปี พ.ศ 2563

**ผลของการวิจัย:** จากการศึกษาพบว่าระยะเวลาในการผ่าตัดโดยเฉลี่ยมีค่า  $219 \pm 38$  นาที ค่าเฉลี่ยของ warm ischemic time มีค่า  $192.2 \pm 39.8$  วินาที ปริมาณเลือดที่เสียระหว่างผ่าตัดมีค่าเฉลี่ย  $66 \pm 56$  มิลลิลิตร ระยะเวลาในการนอนโรงพยาบาลเฉลี่ย  $5.4 \pm 2.4$  วัน อัตราการเกิดภาวะแทรกซ้อนจากการผ่าตัดมีค่า 2 เปอร์เซ็นต์ และไม่มีภาวะแทรกซ้อนในผู้ที่ได้รับบริจาคไตในแง่ของการเกิดเส้นเลือดอุดตันและปัญหาของท่อไต

**สรุป:** การผ่าตัดตัดไตในผู้บริจาคที่มีชีวิตด้วยการส่องกล้องผ่านทางหน้าท้องในโรงพยาบาลวชิรพยาบาลมีความปลอดภัย ผลของการทำงานของไตที่ได้รับการปลูกถ่ายที่ระยะเวลาหนึ่งปียังมีการทำงานที่ดี

**คำสำคัญ:** การผ่าตัดตัดไตด้วยการส่องกล้องผ่านทางหน้าท้อง

## Introduction

End stage renal disease (ESRD) is a serious problem affected public health system, economic system, and patients' quality of life. In Thailand, more than 100,000 patients required dialysis<sup>1</sup>. Kidney transplantation is the treatment of choice for suitable patients with ESRD that increased survival rate, reduced complications, improved quality of life and reduced cost of treatment compared with dialysis<sup>2,3</sup>. The problem of kidney transplantation is long waiting list due to low deceased donor. Living donor kidney transplantation is another option for increased rate of kidney transplantation with superior graft function and survival. In the past, open nephrectomy for living donor made the donor suffered from pain and slow recovery rate after surgery. After the first laparoscopic live donor nephrectomy was introduced in 1995 by Ratner et al, this operation has emerged as the preferred technique in many institutes due to less postoperative pain, short hospital admission period, returned to normal activity faster and improved cosmetic outcome without compromised graft function<sup>4,5,6</sup>. Eugene et al found that rate of kidney donor volunteer increased after the education program about laparoscopic live donor nephrectomy was given to them<sup>7</sup>. The objective of this study aims to report the result of laparoscopic living donor nephrectomy in Vajira hospital.

## Material and Methods

After approval was obtained from Vajira institutional broad review, the donors' data who underwent laparoscopic living donor nephrectomy were retrospectively reviewed from medical record from 2010 to 2020. The potential donors were evaluated in standard manner with medical history, physical examination, kidney function test and renal computerized tomography angiography to define renal vascular anatomy. The donors' data were collected included age, sex, weight, height, body mass index (BMI), comorbidity, estimated blood loss, warm ischemic time, number of renal vessels, incision for kidney extraction, length of hospital stay,

complication, serum creatinine after nephrectomy, serum creatinine of recipients and delay graft function.

## Definition of terms

Warm ischemic time was defined as the time from renal artery occlusion to the time of kidney perfusion<sup>8</sup>. Complications were defined as unexpected events within perioperative period that change patient recovery, prolong hospital stay, or represent of surgical technique change during operation. Delay graft function was defined as the need for dialysis at least one time due to poor allograft function in the postoperative<sup>9</sup>. Operative time was defined as time at first incision was done until the last incision was closed.

## Operative technique

The operation was done with the donor under general anesthesia. Orogastric tube was placed, Foley catheter was indwelled for bladder drainage, and preoperative antibiotic was used. The donor was placed in the modified right lateral decubitus position on the operative table for good exposure during explored extraction site. The table was flexed near the patient's iliac crest for good exposure during operation. The operation was performed by Dr. Bhapapak. The first horizontal incision was done near paraumbilical area length about 11-12 mm. Abdominal wall was opened layer by layer until access peritoneal cavity. Ten mm. port was placed into peritoneal cavity, then the camera was placed into this port. Pneumoperitoneum was made through this port. Intraabdominal CO<sub>2</sub> pressure was fixed at 12 mmHg. The second port was 5 mm. placed near subcostal area at level of anterior axillary line. The third 10 mm. port was placed near iliac fossa area as in figure 1. The second and third ports were placed under direct vision. Colon was mobilized medially along the Toldt's line from colonic angle to iliac vessels. Renal hilar fat was dissected for identification renal vessels. Renal vein and its tributaries were dissected from surrounding tissue. Renal veins tributaries were secured by Hem o loc clips or silk ligation or bipolar cauterization.

After complete dissection renal vein, renal artery was dissected from surrounding tissue. Adrenal gland was separated from kidney and perinephric fat was dissected from kidney but leaved some area with kidney for kidney suspension during renal vessels control. Ureter was identified and dissected from surrounding tissue inferiorly down to iliac vessels with preservation of periureteric tissue and lower pole renal fat for well-vascularized ureter. Gonadal vein was separated from ureter. After complete mobilization of kidney and ureter, the extraction site was done as low midline incision or Pfannenstiel incision. In the Pfannenstiel incision rectus sheath was divided sagittal, rectus abdominis muscle was separated and peritoneal cavity was opened. Assistant's right hand or extraction bag was introduced into peritoneal cavity. In case that used extraction bag (figure 2), ureter was clipped and divided at level of iliac vessels and pushed into extraction bag. The kidney was pushed into bag and lifted up during divided renal vessels. Renal artery was clipped by two Hem O loc clips size 10 mm. and divided, then renal vein was clipped by two Hem O loc clips size 15 mm. and divided, then bag was closed and kidney was removed. In case that used assistant's right hand, after divided ureter and renal vessels, kidney was pushed into assistant's

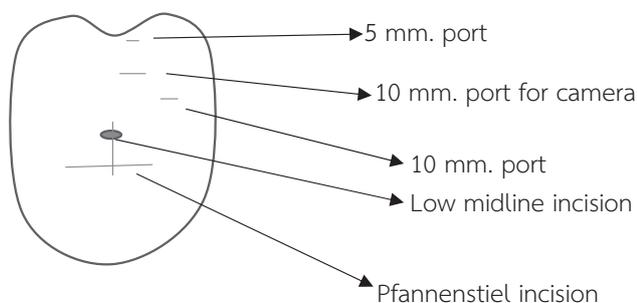
hand and removed. After kidney removal, extraction site was closed and pneumoperitoneum was made again and hemostasis was done. Tube drain was placed and all incisions were closed.

**Statistical analysis**

Demographic data were described as number and percentage and continuous data were described as mean and standard deviation.

**Result**

Total 88 laparoscopic living donor nephrectomies and 88 renal transplantations were performed. Thirty three were men and 55 were women. All of donors did not have underlying disease. Mean donor age was 38.9±9.6 years. Mean body mass index was 24.6±4.2. All of laparoscopic donor nephrectomy was performed on left side, 84 donors had single renal artery, 4 had double renal arteries. Mean operative time was 219±38 minutes, mean warm ischemic time was 192.2±39.2 seconds. Mean intraoperative blood loss was 66±56 milliliter, mean hospital stay length was 5.4±2.4 days. Mean serum creatinine before and after operation were 0.82±0.15 and 1.22±0.16 mg/dL. Low midline incision as extraction was performed in 20 donors (22%), then extraction site was changed to Pfannenstiel



**Figure 1:** diagram of ports and incision for kidney removal



**Figure 2:** Kidney extraction instrument in Vajira hospital

incision in 68 donors (88%). Kidney extraction instrument that was developed in our institute was used in 38 donors (43%). The overall complication rate was occurred in 2 donors (2%). In subgroup analysis mean warm ischemic time in group that extracted kidney via low midline incision was  $219\pm 38$  seconds and mean warm ischemic time in group that extracted kidney via Pfannenstiel incision was  $188\pm 36$  seconds. One had port site bleeding and needed reoperation to stop bleeding and had postoperative acute kidney injury and needed hemodialysis. One had reoperation due to omental evisceration at port site. On recipient outcomes, 2 had acute graft rejection (2%), 2 had delay graft function (2%), 84 had good graft function within one week after renal transplantation. After follow up to one year 86 recipients (97%) continued graft function with mean serum creatinine  $1.3\pm 0.45$  mg/dL. There was no ureteral complication at one year follow up.

**Table 1:**

Demographic data of donors

Male N (%)	33 (37.5%)
Female N (%)	55 (62.5%)
Age (years)	$38.9\pm 9.6$
BMI ( $\text{kg}/\text{m}^2$ )	$24.6\pm 4.2$
Creatinine pre operation (mg/dL)	$0.82\pm 0.15$
Single renal artery N (%)	84 (95%)
Double renal arteries N (%)	4 (5%)

**Table 2:**

intraoperative and postoperative data

Operative times (minutes)	$219\pm 38$
Warm ischemic time (seconds)	$192.2\pm 39.2$
Blood loss (milliliter)	$66\pm 56$
Hospital length stay(days)	$5.4\pm 2.4$
Creatinine post operation (mg/ dL)	$1.22\pm 0.16$

## Discussion

Laparoscopic living donor nephrectomy was introduced in 1995 and now is the standard operation due to less postoperative pain, faster recovery from operation, shorter hospital length of stay and improve cosmetic outcome without compromise kidney function to recipient<sup>10</sup>. In our institute this operation was started in 2010, during early period of operation, we extracted kidney via low midline abdominal incision. After several years of operation, we changed extraction site to Pfannenstiel incision due to less postoperative pain and better cosmesis<sup>11,12</sup>. After we developed instrument for extraction kidney in our institute, we used it for extraction kidney and it could reduce operative cost compared with commercial instrument without compromised operative outcomes. Major complications rate of this operation in our institute was about 2%. Rate of major complication in our study was comparable with other studies<sup>13,14</sup>. One had postoperative bleeding from port site needed reoperation laparoscopically to stopped bleeding and had acute kidney injury that needed hemodialysis and the patient had fully recovery after 2 weeks of operation. One had omental evisceration at port site due to inadequate closure abdominal sheath technique. Two cases of complication occurred due to closure abdominal wall technique, not from laparoscopic technique. In our institute did not have renovascular and bowel injury complications. Result to recipients in our study did not have ureteral complication and renovascular thrombosis. Rate of acute graft rejection, delay graft function and kidney function at one year is comparable with other studies<sup>13,14</sup>. Operative times, intraoperative bleeding, warm ischemic times did not decline over our experience those may be from the operation needed meticulous technique surgery, low intraoperative bleeding and carefully controlling vessels technique from the first case to the last case of our study. Limitation of this study is retrospective study and performed in single center.

## Conclusion

The study showed the feasibility and safety to perform Laparoscopic living donor nephrectomy in Vajira hospital. Result of kidney function of the recipients at one year of follow up stilled good and long term result of kidney function should be follow up.

## Conflict of interest

None

## Fund

None

## References

- Krittayaphong R, Rangsin R, Thinkhamrop B, Hurst C, Rattanamongkolgul S, Sripaiboonkij N, et al . Prevalence of chronic kidney disease associated with cardiac and vascular complications in hypertensive patients: a multicenter, nation-wide study in Thailand. *BMC Nephrol* 2017;18:115. doi: 10.1186/s12882-017-0528-3.
- Laupacis A, Keown P, Pus N, Krueger H, Ferguson B, Wong C, et al. A study of the quality of life and cost-utility of renal transplantation. *Kidney Int* 1996;50:235-42.
- Wolfe RA, Ashby VB, Milford EL, Ojo AO, Ettenger RE, Agodoa LY, et al. Comparison of mortality in all patients on dialysis, patients on dialysis awaiting transplantation, and recipients of a first cadaveric transplant. *N Engl J Med* 1999;341(23):1725-30.
- Ratner LE, Ciseck LJ, Moore RG, Cigarroa FG, Kaufman HS, Kavoussi LR. Laparoscopic live donor nephrectomy. *Transplantation* 1995; 60:1047-9.
- Flowers JL, Jacobs S, Cho E, Morton A, Rosenberger WF, Evans D, et al. Comparison of open and laparoscopic live donor nephrectomy. *Ann Surg* 1997;226(4):483-9.
- Ratner LE, Kavoussi LR, Sroka M, Hiller J, Weber R, Schulam PG, et al. Laparoscopic assisted live donor nephrectomy--a comparison with the open approach. *Transplantation* 1997;63(2):229-33.
- Schweitzer EJ, Wilson J, Jacobs S, Machan CH, Philosophe B, Farney A, et al. Increased rates of donation with laparoscopic donor nephrectomy. *Ann Surg* 2000;232(3):392-400.
- Halazun KJ, Al-Mukhtar A, Aldouri A, Willis S, Ahmad N. Warm ischemia in transplantation: search for a consensus definition. *Transplant Proc* 2007;39(5):1329-31.
- Siedlecki A, Irish W, Brennan DC. Delayed graft function in the kidney transplant. *Am J Transplant* 2011;11(11):2279-96.
- Yuan H, Liu L, Zheng S, Yang L, Pu C, Wei Q, Han P. The safety and efficacy of laparoscopic donor nephrectomy for renal transplantation: an updated meta-analysis. *Transplant Proc* 2013; 45:65-76.
- Tisdale BE, Kapoor A, Hussain A, Piercey K, Whelan JP. Intact specimen extraction in laparoscopic nephrectomy procedures: Pfannenstiel versus expanded port site incisions. *Urology* 2007;69(2):241-4.
- Adiyat KT, Tharun BK, Shetty A, Samavedi S. Comparison of three different techniques of extraction in laparoscopic donor nephrectomy. *Indian J Urol* 2013;29(3):184-7.
- Kortram K, Ijzermans JN, Dor FJ. Perioperative Events and Complications in Minimally Invasive Live Donor Nephrectomy: A Systematic Review and Meta-Analysis. *Transplantation* 2016;100(11): 2264-75.
- Tooher RL, Rao MM, Scott DF, Wall DR, Francis DM, Bridgewater FH, et al. A systematic review of laparoscopic live-donor nephrectomy. *Transplantation* 2004;78(3):404-14.