

LAPAROSCOPIC LIVE DONOR NEPHRECTOMY: COMPARISON OF LEFT SIDED AND RIGHT SIDED APPROACH

¹Marcelino, Albertus; ¹Mochtar, Chaidir Arif; ¹Wahyudi, Irfan; ¹Baskoro, Bagus; ¹Rodjani, Arry; ¹Rasyid, Nur.

¹Department of Urology, Faculty of Medicine/Indonesia University, Cipto Mangunkusumo General Hospital, Jakarta.

ABSTRACT

Objectives: To compare the operative results and outcomes between right and left laparoscopic live donor nephrectomy. **Material & methods:** We retrospectively analyzed the first 50 consecutive laparoscopic live donor nephrectomies (LLDN) in Indonesia performed between November 2011 and February 2013. Of these patients, 6 underwent right and 44 left LLDN. All patients underwent LLDN in Cipto Mangunkusumo General Hospital. All LLDN were done by the same surgical teams. Intraoperative, post-operative donor and recipient data results were compared. **Results:** There were no significant differences of intraoperative, post-operative and recipient data results in both groups. The first warm ischemic time (mean \pm SD, 6 min 55 sec \pm 145 sec vs 7 min 37 sec \pm 177 sec, $p > 0.05$), the second time (41 min 35 sec \pm 7 min 45 sec vs 48 min 36 sec \pm 8 min 41 sec, $p > 0.05$), and the operative time (4 hour 41 min \pm 31 min vs 4 hour 32 min \pm 49 min, $p > 0.05$) showed similar results in right and left LLDN, respectively. Active mobilization at 72-hour post-operation was found in 83.3% in the right LLDN group compared to 95.5% ($p > 0.05$). There were no delayed graft function and post-operative hemodialysis within one week in the recipients of right LLDN group. **Conclusion:** Right LLDN has similar operative results and outcomes compared to left LLDN. Right-sided LLDN may be a judicious approach for donors with unfavorable characteristics of the left kidney.

Keywords: Renal transplantation, laparoscopic live donor nephrectomy.

ABSTRAK

Tujuan: Membandingkan hasil operasi antara nefrektomi donor hidup laparoskopik (LLDN) kanan dan kiri. **Bahan & cara:** Kami menganalisa secara retrospektif 50 kasus pertama LLDN di Indonesia yang dilakukan pada November 2011 hingga Februari 2013. Enam pasien menjalani LLDN kanan dan 44 kiri. Seluruh pasien menjalani LLDN di RSUPN Cipto Mangunkusumo Jakarta. Seluruh LLDN dikerjakan oleh tim ahli bedah yang sama. Kami membandingkan data donor dan resipien intraoperatif dan pascaoperasi. **Hasil:** Tidak terdapat perbedaan bermakna data donor dan resipien intraoperatif dan pascaoperasi pada kedua grup. Waktu iskemia hangat pertama (rerata \pm simpang baku, 6 menit 55 detik \pm 145 detik vs 7 menit 37 detik \pm 177 detik, $p > 0.05$), waktu kedua (41 menit 35 detik \pm 7 menit 45 detik vs 48 menit 36 detik \pm 8 menit 41 detik, $p > 0.05$), dan lama operasi (4 jam 41 menit \pm 31 menit vs 4 jam 32 menit \pm 49 menit, $p > 0.05$) memberikan hasil yang serupa pada grup LLDN kanan dan kiri secara berurutan. Mobilisasi aktif dalam 72 jam pertama pascaoperasi sebesar 83.3% pada donor yang menjalani LLDN sisi kanan dibandingkan dengan 95.5% ($p > 0.05$). Tidak ditemukan fungsi graft yang terlambat dan hemodialisa dalam 1 minggu pascaoperasi pada resipien yang menjalani LLDN kanan. **Simpulan:** LLDN kanan menunjukkan hasil yang serupa dibandingkan LLDN kiri. LLDN kanan merupakan pilihan yang bijak pada donor dengan ginjal kiri yang kurang optimal.

Kata kunci: Transplantasi ginjal, nefrektomi donor hidup laparoskopik.

Correspondence: Marcelino, Albertus; c/o: Department of Urology, Faculty of Medicine/Indonesia University, Cipto Mangunkusumo General Hospital Jakarta. Jl. Diponegoro No. 71, Jakarta 10430. Office: (021) 3152892, 3923631. Mobile phone: 085242454891. Email: albertus.marcelino@gmail.com.

INTRODUCTION

Laparoscopic live donor nephrectomy (LLDN) was first introduced in 1995 by Ratner et al.¹

In Indonesia, Mochtar et al, reported the first LLDN.² Nowadays, LLDN is the standard procedure for kidney procurement.³ Compared with open live donor nephrectomy, LLDN showed superiority in

terms of less parenteral analgesics, lower estimated blood loss, shorter hospitalization, and faster returning to full activities.⁴⁻⁷ Longer warm ischemic time in LLDN has shown equivalent graft outcome in the recipients.^{5,8}

Right-sided approach of LLDN is less preferable due to shorter renal vein and its association with possibility of graft failure and renal vein thrombosis.^{9,10} The objective of this study was to compare the operative results and outcomes between right and left LLDN.

OBJECTIVE

To compare the operative results and outcomes between right and left laparoscopic live donor nephrectomy.

MATERIAL & METHOD

We retrospectively analyzed the first 50 consecutive LLDN in Indonesia performed between November 2011 and February 2013. Of these patients, 6 underwent right LLDNs and 44 left LLDNs. All patients underwent LLDN in Cipto

Mangunkusumo National Referral Center Hospital. All surgeries were done by the same team. Before surgery, all patients were assessed using computed tomography (CT)-angiography. Right LLDNs were chosen in patients with multiple left renal arteries. Patients' data were collected from medical records. Donor characteristics, intraoperative and post-operative data were compared. Statistical analyses were performed using SPSS version 20.0 (SPSS Inc) statistical software program. Differences among groups were evaluated by Independent t test or Mann-Whitney U-test for numerical variables or Fisher's exact test for categorical variables. A p value less than 0.05 was considered significant.

RESULTS

Baseline donor characteristics between right LLDN and left LLDN groups are shown in table 1. Both groups showed no significant differences in age ($p = 0.222$), gender ($p = 0.661$), body mass index ($p = 0.154$), and the relationship to recipients ($p = 0.37$).

The intraoperative data are shown in table 2. The first warm ischemic time ($p = 0.574$), cold ischemic time ($p = 0.297$), and second warm

Table 1. Donor characteristics.

	Right LLDN (n = 6)	Left LLDN (n = 44)	p-value
Age (year)	31.5 (30 - 53) [†]	30.5 (19 - 58) [†]	> 0.05
Gender (n)			> 0.05
Male	3	28	
Female	3	16	
Body Mass Index (kg/m ²)	26.62 ± 4.21 [‡]	24 ± 4.14 [‡]	> 0.05
Relationship to recipients (n)			> 0.05
Related	3	13	
Unrelated	3	31	

†: median (range), ‡: mean ± SD.

Table 2. Intraoperative data.

	Right LLDN (n = 6)	Left LLDN (n = 44)	p-value
First warm ischemic time	6 min 55 sec ± 145 sec [†]	7 min 37 sec ± 177 sec [†]	> 0.05*
Cold ischemic time (min)	19.93 (15.65-37.22) [‡]	23.93 (5.12-68.42) [‡]	> 0.05**
Second warm ischemic time	41 min 35 sec ± 7 min 45 sec [†]	48 min 36 sec ± 8 min 41 sec [†]	> 0.05*
Intraoperative time	4 hour 41 min ± 31 min [†]	4 hour 32 min ± 49 min [†]	> 0.05*
Estimated blood loss (ml)	225 (100 - 450) [‡]	200 (100-1300) [‡]	> 0.05**
Intra-operative complication (case)			> 0.05***
Bleeding >1000ml	0	1	
Bladder complication	0	2	
Vessel complication	0	1	
Conversion to open (case)	0	0	-

†: mean ± SD, ‡: median (range), *: Independent t test, **: Mann Whitney U-test, ***: Fisher's exact test.

Table 3. Donor post-operative data.

	Right LLDN (n = 6)	Left LLDN (n = 44)	p-value
Hospital stay (H + day)	5.00 ± 2.00 [†] Median: 4 (3-8)	4.66 ± 1.46 [†] Median: 4 (3-9)	> 0.05**
Post-operative complications (case)			> 0.05***
Retention	0	5	
Transfusion	0	2	
Wound infection	0	2	
VAS = 7 on first 24 hour	0	1	
Visual Analogue Scale H + 48 hour	1.17 ± 0.98 [†] Median: 1 (0-3)	1.2 ± 0.91 [†] Median: 1 (0-3)	> 0.05**
Active Mobilization H + 72 hour (case)	5/6 (83.3%)	42/44 (95.5%)	> 0.05***
Epidural analgesia (day)	2.2 ± 1 [†] Median: 2 (1-4)	2.2 ± 1 [†] Median: 2 (1-7)	> 0.05**
Death (case)	0	0	-

†: mean ± SD, **: Mann Whitney U-test, ***: Fisher's exact test.

Table 4. Recipient post-operative data.

	Right LLDN (n = 6)	Left LLDN (n = 44)	p-value
Mean ± SD (median) creatinine decrease H + 48 (%)	51.2 ± 9.1 (52.9)	56.4 ± 26.5 (65.9)	> 0.05**
Delayed graft function (case)	0/6	10/44 (22.7%)	> 0.05***
Hemodialysis in 1 week (case)	0/6	4/44 (9.1%)	> 0.05***
Death (case)	0/6	5/44 (11.4%)	> 0.05***

ischemic time ($p = 0.064$) were not significantly different between the two groups. The mean operative time of the right LLDN group was 4 hour 41 min ± 31 min, which was similar to that in the left LLDN group (4 hour 32 min ± 49 min, $p = 0.637$). No intra-operative complication occurred in the right LLDN group. There was no conversion to open surgery in both groups.

Donor post-operative data are shown in table 3. More than 80 percent of patients in both groups had active mobilization in 72-hour post-operation. There was no deaths in both groups.

Recipient post-operative data are shown in table 4. There was no delayed graft function, hemodialysis in one-week, and death case in the right LLDN group.

DISCUSSION

Right kidney was chosen based on anatomical consideration, for instance, in case of multiple left renal arteries. The first warm ischemic time in right-sided group was 6 min 55 sec ± 145 sec (mean ± SD). This result was shorter for right-sided than left-sided LLDN. Nevertheless, the difference was not significant. Some studies also revealed no significant difference.^{11,12} We believed that learning curve was a reasonable cause of this difference. The

first 23 procedures were left-sided LLDNs.

Having shorter vein length, the right LLDN might increase the second warm ischemic time and the complexity of recipient anastomotic procedure. However, this logical consideration was not proven. The mean second warm ischemic time of the right-sided kidney group was shorter than that of the left-sided, although the difference was not statistically significant.

In our study, we found that the mean operative time of right LLDN was slightly longer than that of left LLDN. However, this result was not statistically significant. Kay et al¹³ reported that right LLDN was significantly faster than left LLDN. Dols et al¹¹ and Lind et al¹² reported the same. This difference was predicted due to easier technique of left LLDN.¹⁰ Another rationale explanation was the minimal experience of right LLDN compared with left LLDN in our hospital.

The result showed a comparable functional outcome in 48 hours of harvested kidneys between right-sided and left-sided LLDN. Hoda et al,¹⁴ reported no difference in mean creatinine difference in both groups. Husted et al,¹⁵ showed a similar renal allograft function in both right-sided and left-sided LLDN groups in post-operative day 7.

The limitation of our study was a small number of subjects underwent right-sided LLDN.

Nevertheless, subjects underwent LLDN will increase exponentially with time in our center and subsequent studies involving more subjects can be performed.

CONCLUSION

Right-sided LLDN has equal operative results and outcomes compared to left LLDN. Right-sided LLDN may be a judicious approach for patients with unfavorable characteristics of left kidney.

REFERENCES

1. Ratner LE, Ciseck LJ, Moore RG, Cigarroa FG, Kaufman HS, Kavoussi LR. Laparoscopic live donor nephrectomy. *Transplantation*. 1995; 60(9): 1047-9.
2. Mochtar CA, Wahyudi I, Rasyid N, Rodjani A, Birowo P, Atmoko W, et al. Laparoscopic living donor nephrectomy: feasibility and first experience in Indonesia. *Indonesian Journal of Urology*. 2012; 19(2): 49-55.
3. Hawasli A, Berri R, Meguid A, Le K, Oh H. Total laparoscopic live donor nephrectomy: a 6-year experience. *Am J Surg*. 2006; 191: 325-9.
4. Ratner LE, Kavoussi LR, Schulam PG, Bender JS, Magnuson TH, Montgomery R. Comparison of laparoscopic live donor nephrectomy versus the standard open approach. *Transplant Proc*. 1997; 29: 138-9.
5. Altinel M, Akinci S, Gunes ZE, Olcucuoglu E, Gonenc F, Yazicioglu AH. Open versus laparoscopic donor nephrectomy: perioperative parameters and graft functions. *Transplant Proc*. 2011; 43(3): 781-6.
6. Waller JR, Hiley AL, Mullin EJ, Veitch PS, Nicholson ML. Living kidney donation: a comparison of laparoscopic and conventional open operations. *Postgrad Med J*. 2002; 78: 153-7.
7. Dolce CJ, Keller JE, Walters KC, Griffin D, Norton HJ, Heniford BT, et al. Laparoscopic versus open live donor nephrectomy: outcomes analysis of 266 consecutive patients. *Surg Endosc*. 2009; 23: 1564-8.
8. Simforoosh N, Basiri A, Tabibi A, Shakhssalim N, MM S, Moghddam H. Comparison of laparoscopic and open donor nephrectomy: a randomized controlled trial. *BJU Int*. 2005; 95(6): 851-5.
9. Hsu JW, Reese PP, Naji A, Levine MH, Abt PL. Increased early graft failure in right-sided living donor nephrectomy. *Transplantation*. 2011; 91: 108-14.
10. Mandal AK, Cohen C, Montgomery RA, Kavoussi LR, Ratner LE. Should the indications for laparoscopic live donor nephrectomy of the right kidney be the same as for the open procedure? Anomalous left renal vasculature is not a contraindication to laparoscopic left donor nephrectomy. *Transplantation*. 2001; 71.
11. Dols LFC, Kok NFM, Alwayn IPJ, Tran TCK, Weimar W, Ijzermans JNM. Laparoscopic donor nephrectomy: a Plea for the right-sided approach. *Transplantation*. 2009; 87: 745-50.
12. Lind MY, Hazebroek EJ, Hop WCJ, Weimar W, Bonjer HJ, Ijzermans JNM. Right-sided laparoscopic live-donor nephrectomy: is reluctance still justified? *Transplantation*. 2002; 74: 1045-61.
13. Kay MD, Brook N, Kaushik M, Harper SJF, Bagul A, Nicholson ML. Comparison of right and left laparoscopic live donor nephrectomy. *BJU Int*. 2006; 98: 843-4.
14. Hoda MR, Greco F, Wagner S, Heynemann H, Fomara P. Prospective, nonrandomized comparison between right- and left-sided hand-assisted laparoscopic donor nephrectomy. *Transplant Proc*. 2011; 43: 353-6.
15. Husted TL, Hanaway MJ, Thomas MJ, Woodle ES, Buell JF. Laparoscopic right living donor nephrectomy. *Transplant Proc*. 2005; 37: 631-2.