OUTCOME OF LAPAROSCOPIC DONOR NEPHRECTOMY: OUR INSTITUTIONAL EXPERIENCE

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ABSTRACT

Renal Transplantation has become established as the treatment of choice for patients with End Stage Renal Disease requiring renal replacement therapy. Laparoscopic Donor Nephrectomy is performed across a few centres across the country. Laparoscopic donor nephrectomy is advantageous in all aspect of donor surgery like lower operating time, less blood loss, lower post-operative pain, small surgical site scar and lesser requirement of analgesics. Though there is an increased warm ischaemia time, it has not impacted on the graft outcome. Our series also demonstrates the above benefit.

KEYWORDS

Laparoscopic Donor Nephrectomy, Post-Operative Pain, Lower Blood Loss.

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INTRODUCTION

Renal Transplantation has become established as the treatment of choice for patients with End Stage Renal Disease requiring renal replacement therapy.¹ It provides the patient with a good quality of life compared to other modalities of renal replacement therapy. Compared to Deceased Donor Renal Transplantation, Living Donor Renal Transplantation is associated with better graft and patient survival, economical and logistical benefits.² Despite this, live donor transplant has not gained wide spread acceptance among potential donors due to various factors like prolonged convalescence, post-operative pain and the resultant economic loss. Laparoscopic Donor Nephrectomy was developed in order to circumvent these shortcomings of open donor nephrectomy in the early 90s.³ Since then laparoscopic donor nephrectomy has become the standard of care in many well reputed centres across the world.⁴ Open Donor Nephrectomy, traditionally, has been associated with excellent results as far patient's morbidity and mortality are concerned.⁵ Hence, though Laparoscopic Donor Nephrectomy is an enticing procedure in terms of convalescence and shorter stay, to supplant Open Donor Nephrectomy as the procedure of choice it has to match or exceed open donor nephrectomy in terms of outcome of the donor and outcome of the recipient.⁶

As far as the Indian scenario is concerned, Laparoscopic Donor Nephrectomy is performed across a few centres across the country.¹ A long and steep learning curve and lack of logistical support have proven to be a major stumbling block for aspiring surgeons.

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In our institution, the Renal Transplantation Programme has been going on very successfully in terms of the volume and result for the past several years. Both Live and Deceased Donor Transplants have been taking place on a regular basis. Our first Laparoscopic Live Donor Transplant was done in 2013. Since then we have performed a sizeable number of laparoscopic donor transplants. In this study, we have strived to make a methodical study and comparison of the Live Open Donor Nephrectomy and Laparoscopic Donor Nephrectomy since its inception in our institution.

AIMS AND OBJECTIVES

1. To study Laparoscopic Donor Nephrectomy in our institution.
2. To compare Laparoscopic and Open Donor Nephrectomies in our institution in terms of graft and patient outcomes.

MATERIALS AND METHODS

In Government Stanley Medical College, Chennai, during the period - August 2013 – December 2015, 60 cases of donor nephrectomy were studied. The study design is prospective and observational.

Inclusion Criteria

- Donors 25 to 50 years.
- Left donor nephrectomy.
- Single vessel.
- ABO compatible donors.
- Donors with no associated cardiovascular and pulmonary disease.
- Absence of renal disease/infection/malignancy.

Exclusion Criteria

- Donors with hypertension and diabetics.
- Donors age <25 and >50 years.
- Donors with associated renal disease/infection/stones.
- Donors with mental dysfunction.
- Donors with transmissible malignancy.
- Anomalous kidney.

- Donors with transmissible disease.

INFERENCES

Age Distribution among Donors

Age Groups (In Years)	Laparoscopic LDN	%	Open LDN	%
≤ 30	1	6.25	3	6.67
31-40	5	31.25	6	13.33
41-50	7	43.75	17	37.78
51-60	3	18.75	19	42.22
Total	16	100	45	100

Table 1.1

Age Groups (In Years)	Laparoscopic LDN	Open LDN
N	16	45
Mean	43.50	47.62
SD	7.10	8.81
P value Unpaired t test		0.070957

Table 1.2

Sex Distribution among Donors

Sex Groups	Laparoscopic LDN	%	Open LDN	%
Male	6	37.5	12	26.67
Female	10	62.5	33	73.33
Total	16	100	45	100.00
Chi Square Statistic		0.666		
Degrees of Freedom		1		
P value Chi Square Test		0.414		

Table 2

Blood Group among Donors

Blood Groups	Laparoscopic LDN	%	Open LDN	%
O+ve	4	25	20	44.44
A+ve	1	6.25	8	17.78
B+ve	8	50	16	35.56
AB+ve	1	6.25	1	2.22
O-ve	1	6.25	0	0.00
A-ve	1	6.25	0	0.00
Total	16	100	45	100.00
Chi Square Statistic			9.03	
Degrees of Freedom			5	
P value Chi Square Test			0.108	

Table 3

Weight Distribution among Donors

Weight Groups (In Kgs)	Laparoscopic LDN	%	Open LDN	%
≤ 60	2	12.5	8	17.78
61-70	7	43.75	25	55.56
71-80	7	43.75	9	20.00
81-90	0	0	3	6.67
Total	16	100	45	100

Table 4.1

Weight Groups (In Kgs)	Laparoscopic LDN	Open LDN
N	16	45
Mean	69.125	67.28889
SD	7.283543	7.593724
P value Unpaired t test		0.399214

Table 4.2

Height Distribution among Donors

Height Groups (In cms)	Laparoscopic LDN	%	Open LDN	%
≤ 160	2	12.5	16	35.56
161-170	9	56.25	22	48.89
171-180	5	31.25	7	15.56
Total	16	100	45	100

Table 5.1

Height Groups (In cms)	Laparoscopic LDN	Open LDN
N	16	45
Mean	167.4375	163.9778
SD	6.397591	6.264942
P value Unpaired t test	0.073097	

Blood Urea Levels among Donors

Blood Urea (In mg/dL)	Laparoscopic LDN	%	Open LDN	%
≤ 20	2	12.5	15	33.33
21-30	12	75	28	62.22
31-40	2	12.5	2	4.44
Total	16	100	45	100

Table 6.1

Blood Urea (In mg/dL)	Laparoscopic LDN	Open LDN
N	16	45
Mean	26.125	23.02222
SD	4.031129	4.540169
P value Unpaired t test	0.015987 *	

Table 6.2

Serum Creatinine Levels among Donors

Serum Creatinine (In U/L)	Laparoscopic LDN	%	Open LDN	%
≤ 0.8	7	43.75	26	57.78
0.9 - 1.0	7	43.75	18	40.00
1.1 - 1.2	2	12.5	1	2.22
Total	16	100	45	100

Table 7.1

Serum Creatinine (In U/L)	Laparoscopic LDN	Open LDN
N	16	45
Mean	0.89375	0.837778
SD	0.118145	0.113396
P value Unpaired t test	0.1123	

Table 7.2

Haemoglobin Levels among Donors

Haemoglobin in (In mg/dL)	Laparoscopic LDN	%	Open LDN	%
≤ 11	6	37.5	2	4.44
11.1-13	9	56.25	28	62.22
13.1-15	1	6.25	15	33.33
Total	16	100	45	100

Table 8.1

Haemoglobin (In mg/dL)	Laparoscopic LDN	Open LDN
N	16	45
Mean	11.7	12.68444
SD	1.258571	0.889319
P value Unpaired t test	0.009016*	

Table 8.2

DTPA-[R] Levels

DTPA-R (In mg/dL)	Laparoscopic LDN	%	Open LDN	%
< 50	1	6.25	13	28.89
≥ 50	15	93.75	32	71.11
Total	16	100	45	100

Table 9.1

DTPA-R (In mg/dL)	Laparoscopic LDN	Open LDN
N	16	45
Mean	52.5625	51.37778
SD	2.25	3.712931
P value Unpaired t test	0.140425	

Table 9.2

DTPA-L

DTPA-L (In mg/dL)	Laparoscopic LDN	%	Open LDN	%
< 50	13	81.25	30	66.67
≥ 50	3	18.75	15	33.33
Total	16	100	45	100

Table 10.1

DTPA-L (In mg/dL)	Laparoscopic LDN	Open LDN
N	16	45
Mean	47.4375	48.62222
SD	2.25	3.712931
P value Unpaired t test	0.140425	

Table 10.2

Comparison of Warm Ischaemia Time between Open LDN and Laparoscopic LDN

Warm Ischaemia Time (In Mins)	Laparoscopic LDN	%	Open LDN	%
≤ 5	10	62.5	45	100.00
> 5	6	37.5	0	0.00
Total	16	100	45	100

Table 11.1

Warm Ischaemia Time (In Mins)	Laparoscopic LDN	Open LDN
N	16	45
Mean	5.375	3.288889
SD	1.927866	0.944415
P value Unpaired t test	0.000619*	

Table 11.2

Graft Side

Graft Side	Laparoscopic LDN	%	Open LDN	%
Left	16	100	31	68.89
Right	0	0	14	31.11
Total	16	100	45	100
Chi Square Statistic			6.46	
Degrees of Freedom			1	
P value Chi Square Test			0.011*	

Table 12

CT Angiography (Artery)

CT Angiography (Artery)	Laparoscopic LDN	%	Open LDN	%
Single	16	100	43	95.56
Double	0	0	2	4.44
Total	16	100	45	100
Chi Square Statistic			0.735	
Degrees of Freedom			1	
P value Chi Square Test			0.391	

Table 13

Duration of Hospital Stay

Duration of Hospital Stay (In Days 0)	Laparoscopic LDN	%	Open LDN	%
1 to 5	14	87.5	0	0.00
6 to 10	0	0	22	48.89
11 to 15	2	12.5	22	48.89
16 to 20	0	0	1	2.22
Total	16	100	45	100

Table 14.1

Duration of Hospital Stay	Laparoscopic LDN	Open LDN
N	16	45
Mean	5.1875	10.84444
SD	2.53558	1.609002
P value Unpaired t test		0.00001*

Table 14.2

Analgesic Requirement

Analgesic Requirement	Laparoscopic LDN	%	Open LDN	%
1	14	87.5	0	0.00
3	2	12.5	28	62.22
5	0	0	17	37.78
Total	16	100	45	100

Table 15.1

Analgesic Requirement	Laparoscopic LDN	Open LDN
N	16	45
Mean	1.25	3.755556
SD	0.68313	0.98062
P value Unpaired t test		0.00001*

Table 15.2

Operative Time

Operative Time (In Mins)	Laparoscopic LDN	%	Open LDN	%
≤120	2	12.5	17	37.78
121-180	6	37.5	28	62.22
181-240	6	37.5	0	0.00
241-300	2	12.5	0	0.00
Total	16	100	45	100

Table 16.1

Operative Time (In Mins)	Laparoscopic LDN	Open LDN
N	16	45
Mean	179.9375	129.8889
SD	47.61578	24.06168
P value Unpaired t test		0.00081*

Table 16.2

Blood Loss

Blood Loss (In ml)	Laparoscopic LDN	%	Open LDN	%
≤100	5	31.25	9	20.00
101-300	9	56.25	31	68.89
301-500	2	12.5	5	11.11
Total	16	100	45	100

Table 17.1

Blood Loss (In mL)	Laparoscopic LDN	Open LDN
N	16	45
Mean	163.4375	215.5556
SD	93.37592	119.5742
P value Unpaired t test		0.08503

Table 17.2

DISCUSSION

Our study is a prospective study and we have evaluated 16 laparoscopic donor nephrectomy and 45 open donor nephrectomy. We have compared our study with similar studies, where multiple factors were analysed for outcome of donors following laparoscopy and the graft function in recipients.^{1,6,7,8,9} In our series, we have selected only a left side kidney for laparoscopic procedure which is easier technically because of long renal vein on left side. This has been already reported in many studies including hands.^{9,10}

All the 16 kidneys harvested by laparoscopic method were transplanted successfully in the recipients with only 2 (12%) conversion to open due to bleeding from posterior lumbar vein where bleeding was controlled, but we found difficulty in repairing it laparoscopically. Conversion rate in SGPGI is 10.1%.¹ Mean operating time was 179.9±47.6 minutes, which were comparable with other studies of about 225 minutes on an average.^{1,10,11,12} Our operative time has been lesser in duration with all the above mentioned studies.

Blood loss in our study was 169±93 mL, which is comparable with other studies.^{1,10,11} Most series have shown decreased blood loss in LDN on comparing with open surgery. The analgesic requirement of LDN in our series was 1.25 days, which was significantly lower when compared to open group (mean 3.75 days) P value 0.00001. Similar studies also shown decreased analgesic requirement in LDN.^{1,10,11,13}

Our study shows duration of hospital study was lower in LDN (Mean 5.1 days) as compared to open group (Mean 10.8 days), statistically significant p-value 0.00001, as it was seen in other series.^{1,6,10,11} We monitored serial values of serum creatinine and urine output of the recipients postoperatively, which are good indicators of renal graft function. Many studies showed that though there was prolonged warm ischaemia, there was no significant difference seen in initial graft function and more so the final outcome.^{1,6,9,10,11} This has been seconded by our study, which showed prolonged warm ischaemia time seen in laparoscopic donor nephrectomy (5.3 minutes) with initial graft function similar to that of open surgery. Limitations of our study is small number of cases. Only left-sided laparoscopic donor nephrectomy has been done. We have not done donor nephrectomy with any added risk factors. A larger randomized controlled study is required to confirm the finding of our study and to establish the merits of laparoscopic donor nephrectomy.

CONCLUSION

Laparoscopic donor nephrectomy is an effective, safe and rewarding procedure. Although, it is time consuming and technically demanding with steep learning curve, once acquired has produced results as comparable and also better in some aspects than open surgeries. The analgesic requirement, duration of hospital stay and the blood loss were less with the laparoscopic surgery than open surgery. Results of graft functioning of laparoscopically harvested kidneys were equivalent to those kidneys harvested from open surgery. All these show that laparoscopic donor nephrectomy can be made as the procedure of choice in future.

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