International Surgery Journal
Kanesh SSK et al. Int Surg J. 2017 Aug;4(8):2811-2815
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20173424

Original Research Article

Study on outcome of laparoscopic donor nephrectomy

Subha Kanesh S. K.[1]*, Govindarajan P.[2]

[1]Department of Urology, Tirunelveli Medical college, Tirunelveli, Tamil Nadu, India
[2]Department of Urology, Madras Medical College, Chennai, India

Received: 15 June 2017
Accepted: 08 July 2017

***Correspondence:**
Dr. Subha Kanesh S. K.,
E-mail: 19ganesh75@gmail.com

ABSTRACT

Background: Laparoscopic donor nephrectomy is being performed in increasing numbers since 1995. Now laparoscopic donor nephrectomy has been accepted as good alternate to open procedure as seen in various other abdominal surgeries. This was the basis of the present study. So, the present study was designed to analyse and compare the outcome of Laparoscopic donor nephrectomy and Open donor nephrectomies.
Methods: The prospective and observational study was conducted at Stanley Medical College in Department of Urology in 61 Patients aged between 25-50 years who underwent left donor nephrectomy The Mean operating time, warm ischemic time, blood loss, analgesic requirement and duration of hospital stay were recorded and analysed statistically.
Results: Out of 61 donor nephrectomies, 16 kidneys harvested by laparoscopic method with only 2 (12%) conversion to open due bleeding. Mean operating time was 179.9±47.6 minutes. Present study showed mean blood loss of (163±93 ml). Analgesic requirement of the LDN (mean 1.25 days) was significantly lower when compared to open group (mean 3.75 days). The present study shows duration of hospital stay was lower in LDN (mean 5.1days).
Conclusions: Laparoscopic donor nephrectomy is an effective, safe and rewarding though it is time consuming and technically challenging. The analgesic requirement, duration of hospital stay and the blood loss were less with the laparoscopic surgery. Results of graft functioning of kidneys in both procedures were equivalent. So laparoscopic donor nephrectomy can be made as the procedure of choice in future.

Keywords: LDN, Warm ischemic time

INTRODUCTION

Renal transplantation has been established as the treatment of choice for patients with end stage renal disease requiring renal replacement therapy. It provides the patient with a good quality of life compared to other modalities of renal replacement therapy.

Organ transplantation took off hand in hand with the development of skills in vascular surgical techniques. Ulmann performed the first successful auto-transplant in a dog in 1902 in Vienna.[1] But the real impetus came when Carrell devised new methods and techniques in vascular suturing ushering in the era of organ transplantation.[2] First human kidney transplants were reportedly performed by Jaboulay in 1906.[4] He performed kidney transplants using pig and goat as donors for two of his patients with chronic kidney disease. Both the kidneys worked for only a hour.[3] Voronoy, a surgeon from the erstwhile Soviet Union, performed a human transplant in 1949.[5] The donor was a brain dead patient. Though the blood groups of the donor and the recipient were mismatched the patient survived for two days.[4] Gill et al, in showed that laparoscopic live-

donor nephrectomy can be performed safely and reproducibly in the porcine model.[5]

Compared to deceased donor renal transplantation, living donor renal transplantation is associated with better graft and patient survival, economical and logistical benefits. 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. Since then laparoscopic donor nephrectomy has become the standard of care in many well reputed centres across the world.

Open donor Nephrectomy, traditionally, has been associated with excellent results as far patient morbidity and mortality are concerned. Laparoscopic donor Nephrectomy offers the advantage of decreased morbidity for the donor, with short hospital stay, earlier return to normal activity and work.[6] As far as the Indian scenario is concerned, Laparoscopic donor Nephrectomy is performed across a few centres across the country.[7] A long and steep learning curve and lack of logistical support have proven to be a major stumbling block for aspiring surgeons. In 1998 Wolf et al, and Slakey et al, described the hand assisted approach to make it more appealing and easier to master.[8,9] At present Laproendoscopic single site surgery (LESS) has been proposed to include all these procedures and has more prospects of coming into increased clinical use.[10] Using smaller and fewer trochars will reduce the post-operative morbidity.[11,12,13]

In Stanley Medical College, 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. The first laparoscopic live donor transplant was done in 2013. Since then a sizeable number of laparoscopic donor transplants have been performed. The present study is a methodical study and comparison of the live open donor nephrectomy and laparoscopic donor nephrectomy since its inception in the institution.

METHODS

The objectives of the present study were to study Laparoscopic donor nephrectomy and to compare Laparoscopic and Open Donor Nephrectomies in terms of graft and patient outcomes.

Inclusion criteria

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

Exclusion criteria

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

It is a prospective study conducted in Stanley Medical College from August 2012 to March 2015. Outcome of the 61 donor Nephrectomies done in the institution was studied after institutional ethical committee approval. The Mean operating time, warm ischemic time, blood loss, analgesic requirement and duration of hospital stay were recorded and analysed statistically.

Statistical analysis

Descriptive statistics was done for all data and suitable statistical tests of comparison were done. Continuous variables were analysed with the unpaired t-test and categorical variables were analysed with the Chi-Square test with Yates correction. Statistical significance was taken as P <0.05. The data was analysed using EpiInfo software (7.1.0.6 version; Center for disease control, USA) and Microsoft Excel 2010.

RESULTS

61 patients had undergone live related renal transplant surgeries in the centre from June 2013 to March 2015. Among them 16 (23%) underwent Laparoscopic donor nephrectomy and 45 (67%) underwent open donor nephrectomy. In the present study majority of donors were in the age group 41-50 and 51-60 years.

Table 1: Renal transplant surgeries.

Type of surgery	Percentage
Laparoscopic donor nephrectomy	16 (23%)
Open donor nephrectomy	45 (67%)

In both groups majority of the donors were females. Majority of the kidney donors were parents 9 (56.25%) and 33 (73.33%) of them 5 (31.25%) and 24 (53.33%) of kidney donors were mothers. Out of 61 donor nephrectomies, 16 kidneys harvested by Laparoscopic method. The total conversion was 2 (12.5%) and the reason was due to bleeding from the posterior lumbar artery. Mean operating time for laparoscopic donor nephrectomy was 179.9±47.6 minutes whereas for open donor nephrectomy it was 129.8± 24 minutes (Table2).

Table 2: Operating time.

Operative time (In Minutes)	Laparoscopic LDN	Open LDN
N	16	45
Mean	179.9375	129.8889
SD	47.61578	24.06168
P value unpaired t test		0.00081*

In the present study LDN has warm ischemic time of 5.3 minutes and with ODN are 3.2 minutes which was statistically significant (p-value 0.000619) (Table 3).

Table 3: Warm ischemic time.

Warm ischaemia time (In Minutes)	Laparoscopic LDN	Open LDN
N	16	45
Mean	5.375	3.28889
SD	1.927866	0.94445
P value unpaired t test		0.0006*

The present study showed mean blood loss of (163±93 ml). Most series have shown decreased blood loss in LDN on comparing with ODN (Table 4). As seen in other studies the analgesic requirement of the LDN (mean 1.25 days) was significantly lower when compared to open group (mean 3.75days) P value 0.00001 (Table 5).

Table 4: Blood loss.

Blood Loss (In M	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 5: Analgesic requirement.

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*

The present study shows duration of hospital stay was lower in LDN (mean 5.1days) as compared to open group (mean 10.8 days) statistically significant p-value 0.00001 (Table 6).

Drop in serum creatinine in LDN was equal to that in ODN with no significant difference Urine output following transplant seems to be almost equal in both groups.

The overall outcome when monitored by comparing the serial creatinine values and the urine output of the recipients showed no statistically significant difference between the two groups (Table 8).

Table 6: Duration of hospital stay.

Duration of hospital stay (in days)	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 7: Significance in duration of hospital stay.

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 8: Post-transplant outcome.

Post-transplant outcome	Laparoscopic LDN	%	Open LDN	%
Normal	14	87.5	41	91.11
Graft Nephrectomy	2	12.5	3	6.67
Dialysis	0	0	1	2.22
Total	16	100	45	100
Chi square statistic			0.863	
Degrees of freedom			2	
P value chi square test			0.650	

DISCUSSION

Laparoscopic donor nephrectomy is being performed in increasing numbers since 1995, when first Laparoscopic donor nephrectomy was done by Ratner et al.[14,15] Although earlier complications like early graft loss and complications in ureters were seen now Laparoscopic donor nephrectomy has been accepted as good alternate to open procedure as seen in various other abdominal surgeries, due to advances in technique and instrumentation thereby decreasing both mortality and morbidity on both the donor and the recipient's aspect. Laparoscopic donor nephrectomy has so far shown very good results with excellent benefits to the donor. Various parameters such as blood loss, operative time, analgesic usage, duration of hospitalization, commencement of oral intake have been compared between ODN and LDN.[16]

This was the basis of the present study. Stanley Medical College is the first to perform Laparoscopic donor nephrectomy in the government hospitals in the state of Tamil Nadu.

In the present study only left side kidney was selected for Laparoscopic procedure as the right-side nephrectomy is more technically challenging than the left sided donor nephrectomy and the renal vein length will be short than the left.

Most of the donors were the parents of the recipients, and mothers being the majority of donor. There was significant number of donors from spouse also. 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 the posterior lumbar vein which we found difficult to arrest by Laparoscopic technique. Conversion rate in armed hospital was 22.7 %.[4]

Mean operating time was 179.9±47.6 minutes which were comparable with the studies from flowers et al, (226 minutes), Ratner et al, (224 minutes), kumar et al, (180.7 minutes), armed hospital (230 minutes), Jacobs et al, (202 minutes) operative time of the present study has been lesser in duration with all above mentioned studies.[14-19]

Table 9: Comparison of results of our study with other studies.

	Flowers et al		Ratner et al		Kumar et al		Armed hospital		Present study	
	LDN	ODN	LDN	ODN	LDN	ODN	LDN	ODN	LDN	ODN
Number	70	65	19	20	42	50	22	50	16	45
Operative time	226	213	224	183	180.7	101.5	230	170	179.9	129.8
EBL (ml)	122	408	222	393	87.5	220	130	300	163	215
Conversion	1 (1.4%)	NA	NA	NA	NA	NA	21%	NA	2 (12%)	NA
Hospital stay	2.2	4.5	3.1	5.7	3.5	1.5	5	9	5.1	10.8
Analgesic use	4.2	11.8	1.2	2.5	-	-	-	-	1.2	3.7

On comparing the studies for estimated blood loss from various studies Flowers et al, (122 ml), Ratner et al, (222 ml), Kumar et al (87.5 ml), Armed hospital (130 ml), Jacobs et al, (128 ml) present study showed mean blood loss of (163±93 ml). Most series have shown decreased blood loss in LDN on comparing with ODN.[14-19]

As seen in other studies the analgesic requirement of the LDN (mean 1.25 days) was significantly lower when compared to open group (mean 3.75 days). P value 0.00001. Similar studies have also shown decreased analgesic requirement in LDN Flowers et al, (4.2 days), Ratner et al, (1.2days).[14,15,17]

Present study shows duration of hospital stay 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 Flowers et al, (2.2days), Ratner et al, (3.1days), Kumar et al, (3.5 days), Armed hospital (5 days).[14-17]

On comparing the recipient outcome by monitoring the postoperative creatinine value and the urine output following transplant as it is a most important concern as the warm ischemic time was always slightly increased in LDN comparing with the ODN as this may affect the graft function when it is prolonged but this has been disproved many previous series of studies.

In the present study LDN has warm ischemic time of 5.3 minutes and with ODN is 3.2 minutes which was statistically significant (p-value 0.000619) as it was seen in other series.

But the overall outcome when monitored by comparing the serial creatinine values and the urine output of the recipients showed no statistically significant difference between the two groups. The availability of LDN has doubled the availability of live donor transplantation rate as the outcomes are excellent with better patient compliance.[20]

CONCLUSION

Laparoscopic donor nephrectomy is an effective, safe and rewarding procedure. Although it is time consuming and technically challenging 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 the 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.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. DeVita, Lawrence VT, Preface TS, Ratner LE, Montgomery RA, Kavoussi LR. Laparoscopic live donor nephrectomy: the four-year John Hopkins University experience. Nephrol Dialysis Transplant. 1999;14(9):2090-3.
2. Carrel A. The Operative technique of vascular anastomoses and visceral transplantation. Lyon Med. 1902;98:859.
3. Jaboulay M. Kidney graft at elbow crease by welding arte. Bull Lyon Med. 1906;107:575.
4. Voronoy Yu Yu. On the blockage of the reticuloendothelial apparatus. Siglo Med. 1936;97:296.
5. Gill IS, Carbone JM, Clayman RV. Laparoscopic live donor nephrectomy. J Endourol. 1994;8:143-6.
6. Rao MM, Russell CH. Laparoscopic live donor nephrectomy. Aust N ZJ Surg. 2005;75:6-9.
7. Arvind NK, Kumar A. Laparoscopic live donor nephrectomy: An indian perspective. Indian J Urol. 2002;19:29-37.
8. Wolf Js, Jr. Tchetgen MB, Merion RM. Hand assisted Laparoscopic live donor nephrectomy. Urol. 1998;52:885-7
9. Slakey DP, Wood JC, Hender D, Thomas R, Cheng S. Laparoscopic living donor nephrectomy, advantages of the hand assisted method. Transplant. 68:581-3.
10. Gill Is. Consortium establishes criteria for single port surgery. Renal and Urology. 2008. Available at: news.com/article/119754htm.
11. Soble JJ, Gill Is. Needlescopic urology: incorporating 2 mm instruments in laproscopic surgery. Urol. 1998;52:187-94.
12. Mostafa G, Matthews BD, Sing Rf, Kercher KW, Heniford BT. Mini-laproscopic versus laproscopic approach to appendicectomy. BMC Surg. 2001;1:4.
13. Bisgaard T, Klarskov B, Trap R, Kehlet H, Rosenberg J. Microlaprascopic versus conventional laprascopic cholecystectomy: a prospective randomized double-blind trial. Surg Endosc. 2002;16:458-64.
14. Ratner LE, Kavoussi LR, Schulam PG. Comparison of laparoscopic live donor nephrectomy versus the standard open approach. Transplant Proc. 1997;29(1-2):138-9.
15. Sinha T, Varma PP, Srivastava A, Karan SC, Sandhu AS, Sethi GS, et al. A comparative study of laparoscopic with conventional open donor nephrectomy in renal transplantation. Med J Armed Forces India. 2006;62(3):236-8.
16. Nogueira JM, Cangro CB, Fink JC. A comparison of recipient renal outcomes with laparoscopic versus open. Transplantation. 1999:67(5):722-8.
17. Flowers JL, Jacobs S, Ho E, Cho E, Morton A, Rosenberger WF, Evans D et al. Comparison of open and laparoscopic live donor nephrectomy. Ann Surg. 1997;226:483-90.
18. Kumar A, Mandhani A, Verma BS. Expanding the livingrelated donor pool in renal transplantation: use of marginal donors. J Urol. 2000;163:33-8.
19. Jacobs SC, Cho E, Foster C. Laparoscopic live donor nephrectomy: the university of Maryland 6-year experience. J Urol. 2004;171:47-54.
20. Eugene J, Schweitzer MD, Wilson J, Jacobs S, Carol H. Machan increased rates of donation with laproscopic donor nephrectomy. Ann Surg. 2000;232(3):392-400.

Cite this article as: Kanesh SSK, Govindarajan P. Study on outcome of laparoscopic donor nephrectomy. Int Surg J 2017;4:2811-5.