

Surgical Complications and Long Term Follow Up of Live Related Kidney Donors, Encountered with Open Donor Nephrectomy: Single Center Study in Pakistan

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ABSTRACT

Background: For renal transplant, a living donor nephrectomy is not without its hazards with a reported mortality rate of 0.02%. The laparoscopic donor nephrectomy (LDN) approach is becoming the standard of care in most centers worldwide. But open donor nephrectomy (ODN) is a viable alternative to the laparoscopic approach. We aimed to establish the fact that reflects the safety of ODN as an alternative when the laparoscopic approach is not available without compromising the expanding demands of donor nephrectomies for renal transplantation.

Methods: From June 2017 through June 2019, we performed 56 open donor nephrectomies (ODN) at The Kidney Centre. Data collected on living donors included sex, body mass index (BMI), relationship to the recipient, pre-op and post-op creatinine level, pre-and post-op hemoglobin level, incision type, blood transfusion, any intraoperative complications according to the Clavien-Dindo classification (CDC) of Surgical Complications.

Results: Brother was found to be the most frequent relation in our study. Left side ODN was done in 41 cases with an advantage of a longer length of the left renal vein. We did not encounter any significant complications in our study.

Conclusion: Open donor nephrectomy is an important safe method to harvest kidneys for renal transplantation.

Keywords: ESRD, Open Donor Nephrectomy, LDKT

INTRODUCTION

The most cost-effective and definitive treatment for patients with end-stage renal disease (ESRD) is Kidney transplantation. Unquestionably, Kidney transplantation (KTx) bargains considerable improvement not only in the quality of life (QoL) but, more significantly, in life expectancy of the recipient paralleled to renal replacement therapies (RRT)¹

Given the critical demand-supply issues with the deceased donor program, increasing the live donor pool is highly desirable. To fulfill the ever-growing demand for kidney grafts, the transplant community all across the globe now has a strong emphasis on live donor kidney transplantation (LDKT), an option that is continuously evolving and expanding.²

Live kidney donors characterize a distinctive healthy population, posing an inordinate challenge to both transplant surgeons and nephrologists, as they are willingly going through an operative procedure of an organ removal with a purely humane drive, where the recipients benefit. All prerequisites of health-related outcomes of living donors are the safety of the surgical procedure and excellent short- and long-term results.³

A country like Pakistan, is a low-resource country, with a considerable population of ESRD patients who need dialysis services as well as supportive care and diagnostics.³With a national ESRD incidence of 100 per million, renal transplant programs in Pakistan, acquire an even greater level of significance.⁴

For the renal transplant, a living donor nephrectomy with a reported mortality rate of 0.02%.⁵ is not without its hazards like pleural injury (requiring insertion of a chest tube), wound infection, bleeding from the operative site, post-operative frank hematuria, abdominal aorta laceration, avulsion of renal vein, etc. With the bulk of organ donations coming from living donors, it becomes imperative to not only minimize the morbidity and mortality of all donors but also to harvest the kidneys with minimum warm ischemia time to maximize the potential of the donation to provide a cure to the ESRD patient.

While the laparoscopic approach is becoming the standard of care in most centers worldwide, it is a difficult procedure with a much steeper learning curve requiring vast experience in minimally invasive laparoscopy, higher cost, longer operative, and warm

ischemia time as compared to ODN.⁶ The precise effects, hazards, and restrictions of learning curves in LDN are tough to assess.

With an easier learning curve, less warm ischemia time, comparable graft survival and function rates, the open donor nephrectomy is still a viable alternative to the laparoscopic approach.⁷

In this study, we seek to review our experience of open donor nephrectomies over the past three years, with a focus on perioperative and post-operative complications, morbidity, and mortality. The study aims to establish the fact that reflects the safety of ODN as an alternative when the laparoscopic approach is not available without compromising the expanding demands of donor nephrectomies for renal transplantation as open surgery will remain a never-ending era.

MATERIALS AND METHODS

After taking approval from the ethical review board (107-URO-102020) study was started. From 2017 through June 2019, we performed 56 ODNs at The Kidney Centre, Karachi. This institute is one of the referral centers for kidney disease and renal transplantation where 800-900 endoscopic procedures were routinely done every month along with 1-2 live related renal transplants. Postoperatively, LDs and recipients were routinely followed up at 2 weeks, 6 months, 12 months, and yearly thereafter, and multidisciplinary clinical information was abstracted from the medical records retrospectively.

Data collected on living donors included sex, body mass index (BMI), relationship to the recipient, preoperative and postoperative creatinine level, preoperative and postoperative hemoglobin level, incision type, blood transfusion, any intraoperative complications according to the Clavien-Dindo classification (CDC) of Surgical Complications. Also recorded long term complication and comorbid developed by patient at last attended follow up in clinic. The data was entered and analysed on IBM SPSS version 21. Cleaning and coding of data was done prior to analysis. Mean \pm Standard deviation was computed for normally distributed continuous variables, while for skewed data, median with interquartile range were also observed along with mean \pm STD. Normality of data was checked by Shapiro Wilk's test ,

histogram and Q Q plot . On the other hand frequency with percentage was calculated for categorical variables..

Open Donor Nephrectomy: All procedures were done in a flank position. After all aseptic measures, a flank incision was used either below the 12th rib or above the 12th rib or in some cases above the 11th rib incision was used depending upon the body habitus of the patient. After skin, fat, and incising muscle layer, retroperitoneal space is approached using a large-size self-retaining retractor. Pleura is carefully reflected superiorly in supracostal incisions. Gerota fascia was opened and psoas muscle was identified to sling the ureter. The kidney was mobilized along with perinephric fat. At renal hilum, renal vessels were mobilized. For right side kidneys, renal veins were mobilized along with inferior vena cava (IVC) so that a possible IVC cuff could be taken. On the left side, the gonadal vein and adrenal vein were divided. Renal arteries were mobilized to get an adequate length. Vessels were divided using vascular clamps and distal segments of vessels were repaired with prolene sutures. In few cases, an IVC patch was also taken, and IVC was repaired with prolene running sutures. The ureter was mobilized along with periureteral fat to avoid vascular insufficiency and divided. An active drain was placed in all cases. Pleura was repaired, in case of an iatrogenic breach, with vicryl running sutures. Only one case needed chest tube insertion after a few hours post-surgery for pneumothorax which was removed on 2nd post-operative day. The wound was closed in layers and the routine dressing was done.

RESULTS

We have recruited 56 donors in our study in which 24(42.9%) were male, while 32(57.1%) were female. Mean age was 33± 9.7 years with minimum of 18 and maximum of 58 years. All base line demographic and clinical characteristics are showed in table 1.

Our most of recipients, received kidney from their brothers 15 (26.8%), while sisters were second most common donors for the kidney transplantation 11 (19.6%). Figure 1.

In our hospital only 12 (21.4%) donors suffered with immediate surgical complications of grade 1 Clavien-Dindo classification and they all managed conservatively except 1 donor who needed chest tube insertion but he was also successfully treated and recovered. Table 2.

Table 1: Demographic, baseline and operative characteristics of donors

		n (%) / Mean ± STD & Median with IQR
Gender	Male	24(42.9)
	Female	32(57.1)
Age in years		33 ± 9.7 & 30.5 , 11.8
Body mass index		22.9 ± 3.9 & 22 , 5
Side of donor kidney	Left	41 (73.2)
	Right	15 (26.8)
Type of surgical incision	Supra 12	46 (82.1)
	Supra 11	5 (8.9)
	Infra 12	5 (8.9)
Pre-operative Hemoglobin in gm/dl		13.2 ± 0.5
Post-operative Hemoglobin in gm/dl		11.7 ± 1.6
Pre-operative Creatinine		0.7 ± 0.2
Post-operative Creatinine		1.1 ± 0.3
Last follow-up Creatinine		1 ± 0.3
Operative time in minutes		146.6 ± 30.7 & 150 , 60
Warm ischemia time in minutes		1.4 ± 0.6 & 1 , 1
Hospital stay in days		4.4 ± 0.8 & 4 , 1
Blood transfusion		4 (7.1)

Table 2: Surgical Complication according to Clavien-Dindo classification

Complication	Grade	N (%)	Treatment
Fever	I	06 (10.7)	Conservative Management
Wound infection	I	04 (7.1)	Dressing
Chest complication	I	01 (1.8)	Chest tube insertion
Other	I	01 (1.8)	Conservative

In long term follow up of 2-5 years, none of our donor developed hypertension, proteinuria or change in renal functions and neither died.

DISCUSSION

Kidney transplantation has become the most preferred treatment modality for ESRD, with an expected increase in patient survival as compared to patients on hemo- or peritoneal dialysis therapy.⁶ Organ availability is still the biggest hurdle to timely renal transplantation. Recently published data on the worldwide LDKT trends, in more than 70 nations, illustrated a greater than 50% rise in LDKT over the past ten years.⁹

In the western world, although living donors comprise the bulk of the kidney donor pool, deceased donors still manage to be the majority number of cases (67.6%) of actually transplanted kidneys.⁹⁻¹¹ On the contrary, in Asian and Middle Eastern countries, greater than 95% of kidney transplantation involve living donors, illustrating the motivation to continue perfecting LDKT to be as secure as possible.¹⁰

Demographically, Renoult et al. reported a donor population of older age as compared to our study (43.53±10.63 vs 33±9.7 years). They also reported a higher mean BMI as compared to our study (23.54±4.37 vs 20±2.1).¹²

In our study, there was no significant blood loss intra-operatively, as only 04 patients needed a blood transfusion after the procedure. George et al. reported similar Pre-operative Hb (13.93 vs 13.2 g/dl) and Post-operative Hb (11.87 vs 11.6 g/dl), as our study.¹³

Moreover, warm ischemia time and operative time are two variables that are directly related to the outcome of the procedure. These variables were remarkably lesser in our institute than in other centers, as according to Mansour et al. warm ischemia time for ON was 2.2 ± 0.6 minutes, as compared to our study i.e 1.3 ± 0.61 minutes, and operative time was 172.3 ± 45.5 minutes vs 146 ± 30 minutes in our study.¹⁴

Different studies reported shorter hospital stay for open nephrectomy than our study (3.76±1.16 days vs 4.3 ± 0.77 days) but more incidence of post-operative fever than our study (47% vs 10.7). One of these studies includes the study of Achit et al. that reported longer hospital stay as compared to our study (7.5 days vs 4.3 days).¹⁵

The safety of the donor remains the most important concern in donation surgeries. We had 06 patients who had a postoperative fever and 04 patients who had wound infection, but they all were managed conservatively with no long-term sequelae. In our study, there were no long-term complications reported except for a single case of incisional hernia, as we followed the patients up to five years.

To summarize, we had a good number of ODN with comparable pre-and post-operative outcomes with lesser morbidities and mortalities, as compared to other centers. This proves the notion that where expertise is available, ODN is still a good option for donor nephrectomy in this part of the world with limited resources, where Laparoscopic donor nephrectomy is in the phase of development.

In our study, the smaller sample size and retrospective nature of the study is the obvious limitations. A prospective randomized study with a larger sample size would give a better representation of the data.

CONCLUSION

In the light of the above discussion, we conclude our study with the words that open donor nephrectomy will remain an important safe method to harvest kidney for renal transplantation where laparoscopic practices are awaited to be organized.

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