



## Laparoscopic Donor Nephrectomy: Ramathibodi Hospital Experience.

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### Abstract

**Introduction:** Laparoscopic donor nephrectomy (LDN) is performed increasingly to improve donor outcomes, by reducing perioperative morbidity without compromising on allograft function in the recipient. We report our initial experience with standard and hand-assisted LDN.

**Materials and Methods:** From August 2007 to February 2009, 35 cases of standard and hand-assisted LDNs were performed in our institute. Potential donors were evaluated for suitability, which included a renal CT angiogram. During hand assisted surgery, dissection of the donor kidney was performed laparoscopically, aided by the surgeon's non-dominant hand inserted into the abdominal cavity through a hand-assist device via a 7.5 -cm abdominal incision. The renal allograft was subsequently delivered through the incision.

**Results:** The mean operating time was 140.0 +/- 30 minutes and the mean warm ischemic time was 2.00 +/- 0.5 minutes. There was one case of right side nephrectomy. There was one conversion to the open technique due to clip dislodgement. Postoperatively, patients returned to normal diet by 1.0 +/- 0.5 days. On average, the patients started ambulation at 2.0 +/- 0.9 days and were discharged 3 +/- 1.5 days after surgery. There were no significant major complications. All grafts had immediate graft function. Serum creatinine levels of all recipients fell down within 24 hours and reached baseline at a mean of one week.

**Conclusion:** Standard and hand-assisted LDN is safe, feasible and can be performed with minimal morbidity. It also allows for excellent allograft function.

## Introduction

Open donor nephrectomy has been reference as the standard treatment of kidney donation patient for several decades. However, it is associated with significant morbidity including post-operative pain and a long convalescence. By these outcomes, it had been considered a major obstacle for the volunteer to donate their kidney.[3,8,10,11,13-15] To overcome these limitations, laparoscopic donor nephrectomy (LDN) is performed increasingly to improve donor outcomes including decreasing post-operative pain, decreasing hospitalization and return to normal physical activity faster without compromising on allograft function in the recipient.

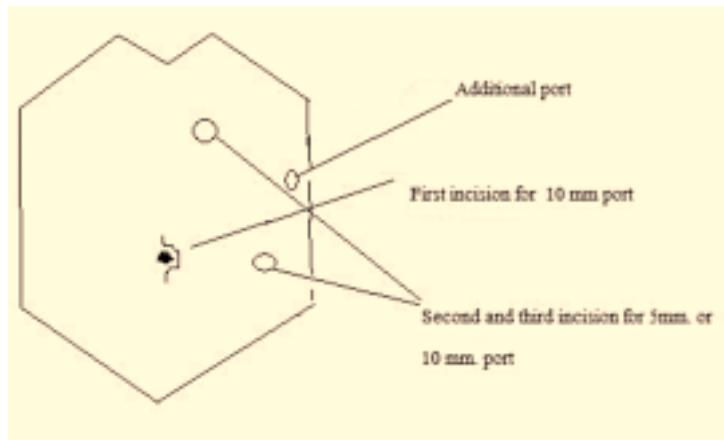
Herein, we report the initial experience of LDN in our institute.

## Materials and Methods

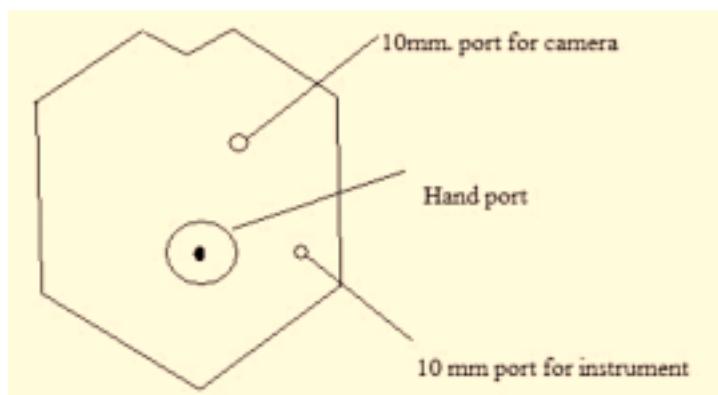
From August 2007 to February 2009, 35 cases of standard and hand-assisted LDNs were performed in our institute. Potential renal donors were evaluated with standard manner including medical history, physical examination and renal computerized tomography angiography or conventional renal angiography to evaluated renal arterial anatomy. If both kidneys were equal in structures, the left kidney was selected due to it has longer renal vein compared with right kidney. We had one case of right side laparoscopic donor nephrectomy due to the left kidney had double renal artery.

For standard laparoscopic donor nephrectomy (SLDN), the patient was placed in full flank position and for hand assisted laparoscopic donor nephrectomy (HLDN) the patient was placed in modified 45 degrees flank position. For SLDN the first incision was done at paraumbilical area and abdominal wall was opened layer by layer into peritoneal cavity and Hudson trocar was placed into peritoneal cavity for

placement of camera. The second and the third ports were placed into peritoneal cavity under direction vision of camera as showed in the figure. For HLDN the first incision was done at paraumbilical area for the length about 7.5 centimeters. Abdominal wall was opened layer by layer into peritoneal cavity and the hand port was placed into peritoneal cavity. The ten millimeters camera was applied into peritoneal cavity via hand port and the second and the third ports were placed into peritoneal cavity under direct vision of the camera as same as SLDN as showed in the figure. The size of the ports were selected by surgeons' preference. For SLDN colon was mobilized medially at white line of Toldt. Gerota fascia was opened to identified gonadal vein and ureter. Renal vein was identified by dissection gonadal vein up to its tributary. Renal vein and its branches were dissected and renal vein branches were sacrificed. Renal artery was identified and dissected. After dissection of renal vessels, ureter was dissected down to level of pelvic brim without preservation of gonadal vein. Kidney was dissected freely from surrounding tissue by blunt and sharp technique. Before control renal vessels, paraumbilical wound was extended for the placement of surgeon's non-dominant hand. Ureter was controlled by one of Hem O loc clip and cut it proximal to the clip. Renal artery was controlled first by two of ten millimeters Hem O loc clips and cut it. Renal vein was controlled by two of fifteen millimeters Hem-o-loc clips and cut it and the kidney was placed into the surgeon's hand and removed from peritoneal cavity via the extended wound. For HLDN, the surgeon's non dominant hand was placed into peritoneal cavity via hand port for the assistant in dissection kidney. Technique for extraction the kidney is as same as SLDN and the kidney was moved via hand port wound.



**Fig 1** Ports position for SLDN



**Fig 2** Ports position for HLDN

**Table 1** Demographic data

Data	Standard	Hand assisted
Age (years)	38.5(23-53)	37.5(28-48)
Operative times (min)	158(100-240)	178(90-245)
Warm ischemic times (min)	3(2-5)	2.5(1-5)
Blood loss (ml)	277(50-2,000)	139(50-200)
Intravenous analgesics (mg of morphine)	14(4-24)	11(3-25)
Postoperative stay (days)	5.9(3-12)	4.2(2-8)

## Results

21 cases were performed SLDN and 14 cases were performed HLDN. One of the HLDN was performed right nephrectomy. The mean operating time was 140.0 +/- 30 minutes and the mean warm ischemic time was 2.00 +/- 0.5 minutes. The length of renal artery and vein were adequate but in the case of right nephrectomy the transplant surgeon used vein graft for extension the length of renal vein. Postoperatively, patients returned to normal diet by 1.0 +/- 0.5 days. On average, the patients started ambulation at 2.0 +/- 0.9 days and were discharged 3 +/- 1.5 days after surgery. The demographic and perioperative data are showed in the table 1. All grafts had immediate graft function. Serum creatinine levels of all recipients fell down within 24 hours and reached baseline at a mean of one week. One case of SLDN group was converted to open surgery due to dislodgement of the clip from renal vein and one case of HLDN group that had stricture ureter due to stretching of ureter during specimen removal.

## Discussion

The first open donor nephrectomy had been performed in 1986 by Professor Phaitun Gojaseni and until now we have an experience for more than 1,200 cases of kidney transplantation in our institute. Although we have an extensive experience of transplantation, we are quite cautious in changing our successful open surgical practice to perform laparoscopic treatment for the donor case. This is because we believe that we put the risk of major surgery to a healthy person without their direct medical benefit. If we have to change the routine practice to the new modality we also have to perform the new kind of surgery without any morbidity or mortality to our patient. Therefore, we performed the first LDN in August 2007 after we have gained extensive

experience and performed more than 250 cases of laparoscopic renal surgery for both benign and malignant renal conditions.

The LDN can be performed by pure laparoscopic or hand assisted approaches. The major benefits of hand-assisted approach are better tactile sensation for the dissection, less bleeding and shorter operative time. The surgeon can also use the hand port incision to be an extraction site for the kidney allograft. In addition, the warm ischemic time is usually shorter comparing to the pure laparoscopic approaches.[14] However, we had several patients who have a small body habitus and we faced the unique trouble of limited working space during the hand-assisted procedure. This problem may not occur in the western people who have a big body habitus. Therefore, we modified our techniques by performing the whole procedure with pure laparoscopic approach and using the hand just only for organ retrieval. We have no longer performed hand assistance at the beginning of the procedure. By this technique, we still have a short warm ischemic time and we could save the cost of organ retrieval bag. The down site of this technique is less cosmetic result because the extraction site is usually on the peri-umbilical area. However, until now we do not have any consensus regarding which extraction sites provide the best results to the patients.

Regarding the technique of renal vessel control, there was a report concerning[4] the problem of using Hem-o-lok to control the renal artery. It is considered to be the contraindication of using this clip for donor case. However, we still use Hem-o-lok routinely to control both renal artery and renal vein. We believe the problem of dislodgement of the clip was due to inappropriate use of the clip. It was not because of malfunction of the clip. We routinely use 2 clips for the proximal part of renal artery with leaving some

vessel tissue beyond the clip and we believe this is safe. We feel it is easier to use this clip and the clip is not cumbersome like endovascular stapler. We can get some more length of the vessels by using this clip compared to using the endovascular stapler. Several authors advised using the stapler for the renal vein because the size of Hem-o-lok may not be wide enough. However, we did not face any problem of this issue with the use of XL size of this clip for the renal vein control.

Our results including operative time, blood loss, and morbidity are comparable with earlier larger series reported in the literature.[3,8,10,11,13-15] These outcomes were better compare to the open series. We had one case of significant renal vein bleeding because of inappropriate using clip, fortunately, we could perform the conversion and we could save the patient without compromising the renal allograft. We also had a case of ureteral necrosis this was due to surgeon error. By our technique, we usually leave the ureter including package of gonadal vein intact until when we are ready to control the pedicle. In this case, the operation went well, however, we had a miscommunication with the vascular team. Our team had to wait for 30 min before the vascular team was ready. We decided to stop the operation temporary. Once we came back we did clip the package of gonadal vein which we thought it was a ureter. When we pulled out the kidney through the incision, the ureter still was intact without recognition. Therefore, the ureter was stretching before we cut and this caused the ureteral necrosis in 1 week after the

operation. The recipient of this case underwent re-operation; ureteropyelostomy to the native ureter.

We had a case of right side LDN and we used successfully one Hem-o-lok clip in combination of one tie-knot of non-absorbable suture for the renal vein control. We might have a shorter 0.5 cm of the renal vein graft compared to the open Carrel patch of the inferior vena cava (IVC). We believe we can be able to use a laparoscopic Satinsky's clamp to control the renal vein as we perform in the open technique. However, it is quite risky and very difficult to deal in case of clamp dislodgement during the laparoscopic operation. We do not want to add too much risk to the donor site. In addition, the vascular surgeon can use saphenous vein graft easily to add some more length of the vessel allograft. Therefore, the using of clip and suture tie are reasonable adjustment.

The drawback of this paper is small number of the patients. We could not draw any statistic conclusion compared between two techniques. We also need to adjust some of our techniques to improve the outcomes.

## Conclusions

From our early experience, LDN is a safe and efficacious approach for kidney donation. It provides the benefits of less morbidity and early convalescence compared to the traditional open operation. However, we still need some adjustments of our operative techniques to improve the operative outcomes. We encourage LDN to be a standard treatment of kidney donation in our urology community.

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