

# Comparison of three different techniques of extraction in laparoscopic donor nephrectomy

Kishore Thekke Adiyat, B. K. Tharun, Abijit Shetty, Srinivas Samavedi<sup>1</sup>

Department of Urology, Medical Trust Hospital, Cochin, Kerala, <sup>1</sup>KIMS Hospital, Hyderabad, India

## ABSTRACT

**Aim:** We compare the outcome of three different methods of graft extraction after a laparoscopic donor nephrectomy.

**Materials and Methods:** After a conventional five port laparoscopic donor nephrectomy, specimen was extracted through one of three approaches: 1. Iliac fossa (IF) incision and hand extraction, 2. Midline (MD) periumbilical with a lower polar fat stitch incorporating gonadal vein for traction while retrieval, and 3. Pfannensteil (PF) with Gel port extraction. Estimated blood loss, operating time, warm ischemia time, incision length, pain score, analgesic consumption, hospital stay, wound complications, graft complications and recipient creatinine at 6 weeks were analyzed.

**Results:** Warm ischemia time was significantly reduced in PF group when compared to other groups. Length of the incision was less in the MD group compared to other groups. Wound complications were significantly less in PF group when compared to other groups. Graft extraction complications were significantly high in MD group compared to other two groups.

**Conclusion:** Based on the results obtained, our current method of preference is by Pfannensteil incision. A controlled extraction with the use of a hand assist device would be best for donor safety and to avoid graft related complications.

**Key words:** Laparoscopy, nephrectomy, Pfannensteil, warm ischemia

## INTRODUCTION

Laparoscopic donor nephrectomies have gained immense popularity since the first laparoscopic live-donor nephrectomy performed by Ratner in 1995.<sup>[1]</sup> Currently, laparoscopic approach is considered a safe option for living donor nephrectomy.<sup>[2]</sup> Hand assisted and pure laparoscopic methods were the popular methods in the last decade and recently, few authors have also reported single-port techniques.<sup>[2-6]</sup> Graft extraction is the one of the most critical steps in living donor nephrectomy. It is a time sensitive procedure and has to be performed meticulously to avoid any graft damage. Various methods of extraction have been described

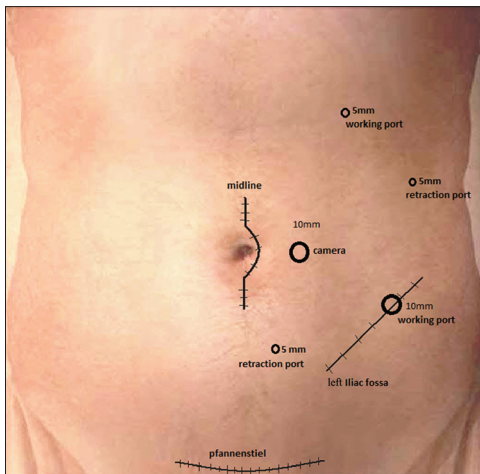
in the literature. Common techniques include extraction using a custom made Endobag, (EndoCatch bag II<sup>®</sup>, Ethicon Endosurgery, OH, USA), retrieval with the help of hand assist devices like Gelport (Applied Medical, Rancho Santa Margarita, CA, USA) and manual extraction without any hand assist device.<sup>[7-9]</sup> The common sites of extraction are Pfannensteil (PF) incision, vertical midline (MD) periumbilical and iliac fossa (IF) incision.<sup>[7-9]</sup> In this report, we prospectively compare the three techniques of extraction for outcomes.

## MATERIALS AND METHODS

After approval from institutional ethical committee, patients undergoing laparoscopic live donor nephrectomy for renal transplantation were randomized to three groups. Patients with previous abdominal incisions were excluded from the study. All patients were admitted the day prior to surgery and an informed consent was obtained. Mechanical bowel preparation was performed using polyethylene glycol and Cefipime 1 g was given 1 h before procedure and another two doses given post-operatively at an 8 h interval. A Foley catheter is placed pre-operatively. The ports and incisions were placed as shown in Figure 1. In obese patients, all the ports were shifted laterally with camera port placed at the lateral border of the rectus muscle. Renal vessels were clamped using Hem-o-Lok clips (Teleflex Medical\*, NC, USA). The three methods of extractions are described below:

**For correspondence:** Dr. Kishore Thekke Adiyat, Medical Trust Hospital, MG Road, Cochin-682 016, Kerala, India.  
E-mail: kishoreta@yahoo.com

Access this article online	
Quick Response Code: 	Website: www.indianjurol.com
	DOI: 10.4103/0970-1591.117279



**Figure 1:** Port placement and various incisions used for kidney extraction

### *IF incision*

An incision of about 8 cm is made in the IF, adjacent to the right IF port up to the external aponeurosis. Once the renal vessels are divided, the incision is deepened, and the kidney extracted is by placing the hand through the incision. Muscles are closed in two layers with '0' Vicryl® (polyglycolic acid suture; Ethicon Inc., Somerville, New Jersey) and skin with subcuticular 4-0 Monocryl® (4-0 polyglecaprone suture; Ethicon Inc., Somerville, New Jersey).

### *MD incision*

Before hilar clamping, a 2-0 Vicryl® suture is placed over the lower polar fat, incorporating the gonadal vein. This is brought out through the umbilical port. Once the renal vessels are divided, traction is placed on the stitch and the kidney is pulled out through the umbilical incision. Rectus sheath is closed with '0' Vicryl® and skin closed with subcuticular 4-0 Monocryl® suture.

### *PF incision*

A Pfannenstiel incision is placed and a flap of rectus fascia is raised superiorly and inferiorly. The peritoneum is opened and an Alexis wound retractor is placed with a gel port placed over it. The kidney is retrieved through the gel port. The rectus sheath closed with '0' Vicryl® and skin closed with subcuticular 4-0 Monocryl®.

Intravenous paracetamol 750 mg to 1 g was given 8<sup>th</sup> hourly for first 2 days and then converted to 500-650 mg paracetamol orally 6<sup>th</sup> hourly for next 2 days. Intravenous morphine was added for the first and second post-operative day for breakthrough pain. The pain score was measured up to 4<sup>th</sup> post-operative day. The drain and Foley catheter were removed the day after surgery. Any wound complications were recorded. Estimated blood loss, operating time, warm ischemia time, incision length, pain score, analgesic consumption, hospital stay, wound complications, graft complications and recipient creatinine at 6 weeks were analyzed. The patients were followed up 1 month, 6 months, and 1 year after surgery.

Statistical analysis was done using SPSS version 13.0. Two factor ANOVA was performed on variables with parametric data. Kruskal Wallis test was used for those with non-parametric data. *Post hoc* analysis was performed using Bon Ferroni's test. In data sets with categorical outcome Chi square test and Fisher's exact test were used.

## RESULTS

76 patients were included in the study, 28 in IF, 23 in MD, and 25 in PF groups respectively. The results are summarized in Table 1. There was no significant difference in terms of age, sex, estimated blood loss, body mass index, vascular anatomy, operating time, post-operative pain score, analgesic consumption, delayed graft function, hospital stay and recipient creatinine after 6 weeks.

Warm ischemia time was significantly reduced in PF group compared to IF group ( $P < 0.001$ ). Length of the incision was less in the MD group compared to other groups ( $P < 0.001$ ). Wound complications were significantly less in PF group when compared to other two groups. Graft extraction complications were significantly high in MD group compared to other two groups.

## DISCUSSION

Various techniques of graft retrieval have been described in literature, all of which have their own merits and demerits. A recent study published by Saito *et al.* found the subcostal flank incision to be most popular, followed by PF incision among health care providers.<sup>[10]</sup> Another study demonstrated reduced morbidity with intact specimen extraction through a PF incision compared with an extended port site incision during laparoscopic nephrectomy procedures.<sup>[11]</sup> Gupta *et al.*, on retrospective review, found that IF incision had less morbidity whereas the Pfannenstiel incision had better cosmesis.<sup>[8]</sup> A popular technique of extraction is using a specimen retrieval bag (EndoCatch bag II®, Ethicon Endosurgery, OH).<sup>[7]</sup> This technique allows the retrieval in a controlled manner in the long axis of the kidney. The drawback of this technique is that the retrieval bags are expensive. With this technique, pneumoperitoneum is not maintained after extraction and any emergent situation cannot be tackled until the abdomen is closed. Shalhav *et al.* has performed specimen retrieval without a pneumoperitoneum preserving device for laparoscopic live donor nephrectomy.<sup>[9]</sup> Recently, techniques of extraction of specimen through vagina have also been successfully reported.<sup>[12]</sup>

In our first method, the incision was placed around the port at IF, thus reducing a port site scar. The kidney can be easily extracted through the incision as there are no intervening structures like colon. This method is not a controlled extraction; the muscle cutting incision is expected to be

**Table 1: Comparative analysis of variables and their statistical significance**

Variable	IF	MD	PF	Total	P value
Mean age	42.6±10	43.2±7	37.4±9	41.1±9	0.13
Male	13	9	15	37	0.33
Female	15	14	10	39	
BMI	22.7±5	23.7±2	24.1±3	23±4.2	0.46
Warm ischemia time	241±62	206±49	175±59	208±63	<0.001
Operating time	164±31	165±27	180±34	170±31	0.125
Single vessel	21	21	17	59	0.317
Multiple vessel	7	2	8	17	
Blood loss	180±66	145±74	145±53	159±66	0.08
Incision length	8.3±0.68	6.7±1.3	8.0±0.9	7.7±1.1	<0.001
Wound complication	7	3	0	10	0.02
Morphine consumption in mg	7.13±1.3	6.8±1.1	7.1±1.0	7.01±1.1	0.55
Pain score					
Day 1	6.2±1.3	6.1±1.8	5.7±1.6	6.0±1.5	0.48
Day 2	4.1±1	4.6±1.6	4.3±1.3	4.3±1.3	0.39
Day 3	3.2±1.3	3±1.7	3.2±1.3	3.1±1.4	0.75
Day 4	2.1±0.9	1.7±1.1	1.8±1.3	1.9±1.1	0.40
Graft extraction complications	0	5	0	5	0.002
Delayed graft function	4	0	5	9	0.11
Hospital stay	6.6±1.7	5.6±1.1	6.1±0.9	6.1±1.42	0.06
Mean recipient creatinine	1.3	1.1	1.21	1.3	0.48

IF=Iliac fossa, MD=Midline, PF=Pfannensteil, BMI=Body mass index

more painful and prone to wound complications as shown in our study.

The MD peri-umbilical incision is cosmetic, as most of the incision is concealed under umbilicus. Incidence of wound infection and wound breakdown is more common than PF incision, but was not statistically significant. The placement of a stitch in the lower pole fat allows the kidney to be delivered through a smaller incision. This method was initially described by Dubey *et al.* in their experience with single incision laparoscopic donor nephrectomy.<sup>[13]</sup> With this technique, we encountered difficulties during extraction in obese patients. Excessive traction can forcefully detach the fat and the gonadal vein from the lower pole. The suture placed in the lower polar fat interfered while applying the clips on renal vessels. We also had two cases where a perinephric hematoma occurred due to excessive traction applied on the kidney during extraction.

In our experience with PF incision, wound complications were found to be minimal. It may not be safe to extract kidney through this incision without a hand assist device, as there is a possibility of misplacing the kidney inside the abdomen. The placement of a gel port requires a larger incision. The warm ischemia time is decreased by 60-90 s in this method because the incision is preplaced before hilar clamping. With a hand assist device, any bleeding can be controlled immediately as pneumoperitoneum is

maintained. This exposure and placement of Gelport is time consuming especially in obese patients and up to 10 min of extra operating time compared to other techniques.

The main limitation of our study is that the hand assist device was placed in only in one arm; this has created a disparity in the warm ischemia time. However, this also confirms the safety and superiority of extraction with a hand assist device. Another drawback is that long term consequences including neuralgic pain and other complications like hernia have not been addressed.

## CONCLUSION

Based on the results obtained, our current method of preference for kidney extraction is by a Pfannensteil incision as the wound complications are lower with this technique. Controlled extraction with the use of a hand assist device reduces warm ischemia time.

## REFERENCES

1. Ratner LE, Ciseck LJ, Moore RG, Cigarroa FG, Kaufman HS, Kavoussi LR. Laparoscopic live donor nephrectomy. *Transplantation* 1995;60:1047-9.
2. Kieran K, Roberts WW. Laparoscopic donor nephrectomy: An update. *Curr Opin Nephrol Hypertens* 2005;14:599-603.
3. Romanelli JR, Kelly JJ, Litwin DE. Hand-assisted laparoscopic surgery in the United States: An overview. *Semin Laparosc Surg* 2001;8:96-103.

4. Kocak B, Baker TB, Koffron AJ, Leventhal JR. Laparoscopic living donor nephrectomy: A single-center sequential experience comparing hand-assisted versus standard technique. *Urology* 2007;70:1060-3.
5. Wang GJ, Afaneh C, Aull M, Charlton M, Ramasamy R, Leeser DB, *et al.* Laparoendoscopic single site live donor nephrectomy: Single institution report of initial 100 cases. *J Urol* 2011;186:2333-7.
6. Siqueira TM Jr, Mitre AI, Simoes FA, Maciel AF, Ferraz AM, Arap S. A cost-effective technique for pure laparoscopic live donor nephrectomy. *Int Braz J Urol* 2006;32:23-8.
7. Su LM, Ratner LE, Montgomery RA, Jarrett TW, Trock BJ, Sinkov V, *et al.* Laparoscopic live donor nephrectomy: Trends in donor and recipient morbidity following 381 consecutive cases. *Ann Surg* 2004;240:358-63.
8. Gupta M, Singh P, Dubey D, Srivastava A, Kapoor R, Kumar A. A comparison of kidney retrieval incisions in laparoscopic transperitoneal donor nephrectomy. *Urol Int* 2008;81:296-300.
9. Shalhav AL, Siqueira TM Jr, Gardner TA, Paterson RF, Stevens LH. Manual specimen retrieval without a pneumoperitoneum preserving device for laparoscopic live donor nephrectomy. *J Urol* 2002;168:941-4.
10. Saito M, Tsuchiya N, Maita S, Numakura K, Obara T, Tsuruta H, *et al.* What is the most preferred wound site for laparoscopic donor nephrectomy?: A questionnaire assessment. *J Laparoendosc Adv Surg Tech A* 2011;21:511-5.
11. Tisdale BE, Kapoor A, Hussain A, Piercey K, Whelan JP. Intact specimen extraction in laparoscopic nephrectomy procedures: Pfannenstiel versus expanded port site incisions. *Urology* 2007;69:241-4.
12. Allaf ME, Singer A, Shen W, Green I, Womer K, Segev DL, *et al.* Laparoscopic live donor nephrectomy with vaginal extraction: Initial report. *Am J Transplant* 2010;10:1473-7.
13. Dubey D, Shrinivas RP, Srikanth G. Transumbilical laparoendoscopic single-site donor nephrectomy: Without the use of a single port access device. *Indian J Urol* 2011;27:180-4.

**How to cite this article:** Adiyat KT, Tharun BK, Shetty A, Samavedi S. Comparison of three different techniques of extraction in laparoscopic donor nephrectomy. *Indian J Urol* 2013;29:184-7.

**Source of Support:** Nil, **Conflict of Interest:** None declared.