

Pretransplant Bilateral Hand-Assisted Laparoscopic Nephrectomy in Adult Patients With Polycystic Kidney Disease

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ABSTRACT

Laparoscopic procedures continue to gain popularity over traditional open procedures for a number of abdominal and pelvic surgeries. With increasing experience, the application of this technique is rising because it provides an alternative, less invasive, approach to various surgical procedures. Herein, we report our experience with adult patients with polycystic kidney disease, requiring bilateral laparoscopic nephrectomy before renal transplantation.

Key Words: Nephrectomy, Laparoscopic, Adult polycystic kidney disease.

INTRODUCTION

In 1901, a German surgeon, Kelling, reported his views of the abdominal viscera after filling a dog's abdomen with air and inserting a cystoscope.¹ Since then, several innovative advancements have been made in the field of laparoscopic surgery. This has resulted in a wider acceptance of laparoscopic surgery in the recent past. It has also accelerated the introduction of endoscopic and laparoscopic procedures in the field of urology, general surgery, and gynecology.² The advantages of laparoscopic donor nephrectomy have been well documented and include less patient discomfort, shortened hospital stay, quicker recovery and return to usual activities, and more pleasing cosmetic results.^{3,4} Increasing experience with the technique has prompted its use for more complicated procedures, such as bilateral laparoscopic nephrectomy in adult patients with polycystic kidney disease (ADPKD) before transplantation.⁵ We present our experience with the use of the laparoscopic technique for bilateral nephrectomy before transplantation in ADPKD patients. The indications for laparoscopic nephrectomy are outlined in **Table 1**.

METHODS

We retrospectively reviewed the charts of all the patients who underwent pretransplant bilateral hand-assisted laparoscopic nephrectomy for ADPKD between February 2000 to April 2002. We recorded patient demographics, such as age, race, sex, renal size, indication for bilateral laparoscopic nephrectomy, and perioperative complications (**Table 2**). All patients had end-stage renal disease (ESRD) and were on maintenance hemodialysis. The indications for the nephrectomy were massive kidney size, uncontrolled hypertension, recurrent cyst hemorrhages with macroscopic hematuria, and frequent urinary tract infections. All procedures were performed by a single surgeon at our institution along with surgical residents assisting under direct supervision.

Preoperative Evaluation

Patients were admitted the day before surgery for routine preoperative evaluation. Medications affecting coagulation were discontinued. Laboratory workup included a

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complete blood count (CBC), basal metabolic panel (BMP), prothrombin (PT), and partial thromboplastin time (PTT). Oral intake was stopped 12 hours before the procedure. A bowel preparation consisting of a gallon of polyethyleneglycol (GOLYTELY) was started the day before the procedure. An appropriate prophylactic antibiotic was administered preoperatively. Hemodialysis was performed the day before the laparoscopic nephrectomy.

Operative Technique

The procedure is performed with the patient under general anesthesia. Hemodynamics is monitored with a central venous catheter, Swan-Ganz catheter, and arterial-line as needed. A pneumoperitoneum is created with the patient in the supine position. Due to the lateral tilting of the

operating table, repositioning of the patient is not required (**Figure 1**). The handport incision was central at the level of the umbilicus, and then this was connected to the CO₂ insufflator. Three to 5 trocars are placed after transillumination of the inside abdominal wall (**Figure 2**). The umbilical trocar is generally used for the endoscopic camera (**Figure 3**). The line of Toldt is incised and the colon reflected medially. Gerota’s fascia is then incised to visualize the kidneys. In situ aspiration of the anterior nonhilar cysts is done to reduce the size of the kidney and thereby facilitate further mobilization of the kidney to access the renal vessels. Renal vessels are identified and transected by using an endovascular stapler. Dissection is continued along the lower and upper pole of the kidney, additionally draining large cysts, until complete mobilization of the kidneys. Hand-assisted laparoscopy (HAL) as used in these cases provides the surgeon with tactile sensation and spatial orientation not available with standard laparoscopy. An Endocatch device is placed in the abdomen and opened. The kidney is manipulated into the device and morcellated with either mechanical forceps or an electrical tissue morcellator (Cook Urological Inc, Spencer, IN). Reduction of renal size through aspiration of cyst fluid in situ precludes the need to make a sizable incision. Finally, the abdominal pressures are decreased and abdominal cavity checked for hemostasis. The fascia is closed with absorbable sutures, and the skin is closed with nonabsorbable ones.

Table 1.

Indications for Nephrectomy in Adult Polycystic Kidney Disease (ADPKD)

Recurrent pyelonephritis
Symptomatic multi-cystic dysplastic kidney
Complex renal cysts
Renal cell carcinoma
Pretransplant nephrectomy in ADPKD patients (bilateral)
Pretransplant nephrectomy in severe refractory hypertension in ADPKD

Table 2.

Patient Demographics

Age (yrs)	Sex	Race	BMI	Renal Size (cm)	Estimated Blood Loss (mL)/ Surgical Time (min)
39	M	W	23	L 19 × 15 × 8; W 1.5 Kg R 18 × 14 × 9; W 1.4 Kg	150/150
65	F	W	30	L 17 × 10 × 7; W 0.9 Kg R 18 × 9 × 7; W 1.0 Kg	375/210
48	F	B	33	L 20 × 16 × 13; W 1.4 Kg R 19 × 16 × 13; W 1.1 Kg	500/210
54	F	H	28	L 22 × 15 × 8; W 1.6 Kg R 19 × 14 × 8; W 1.7 Kg	600/180
64	M	W	28	L 12 × 10 × 7; W 1.0 Kg R 14 × 10 × 5; W 1.2 Kg	100/180
55	M	W	23	L 15 × 12 × 9; W 1.1 Kg R 15 × 12 × 8; W 1.2 Kg	350/180

BMI = body mass index; W = Weight.

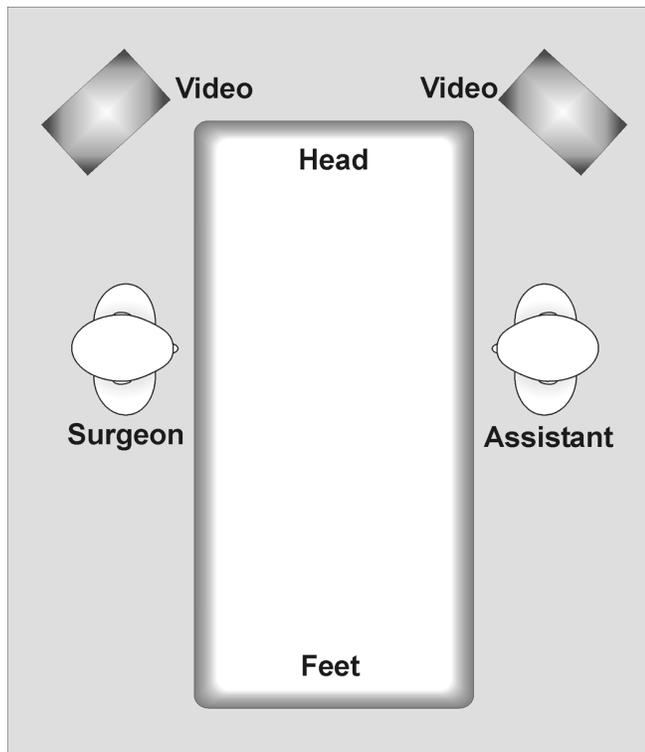


Figure 1. Operative setup for laparoscopic nephrectomy.

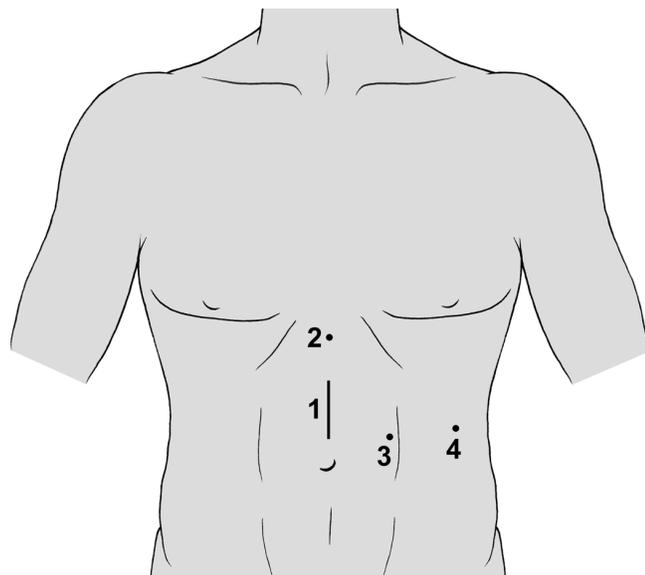


Figure 2. Port placement for left nephrectomy: 1 is the hand port. 2 and 4 are 10-mm ports. 3 is a 12-mm port that is used for the laparoscopic vascular stapler. Port-site needle closure system is used for closure

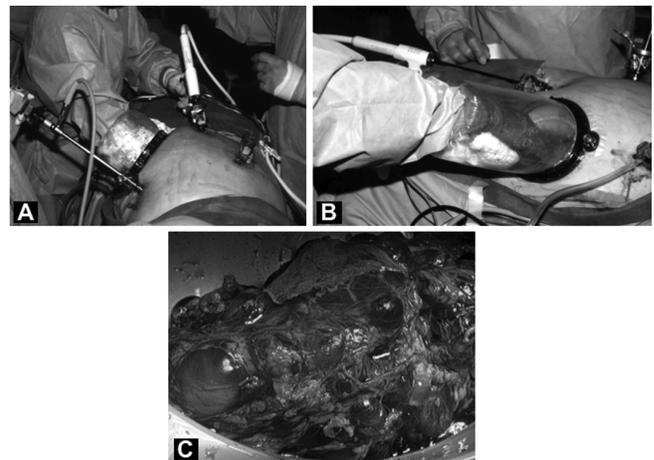


Figure 3. (A) Operative setup during laparoscopic nephrectomy. (B) Use of hand-port during laparoscopic nephrectomy. (C) Adult polycystic kidney removed via hand-port assisted laparoscopy.

DISCUSSION

Laparoscopic nephrectomy in patients with ADPKD was first reported in 1993 with intact removal of a 2200-g specimen from a 15-cm incision.⁶ Laparoscopic procedures may require more operative time to complete in patients with ADPKD because of the massive renal size, surrounding fibrosis, and proximity to several vital structures.⁷⁻¹¹ With the advent of hand-assisted techniques, bilateral laparoscopic nephrectomy is technically less demanding with shortened operative times. Hand-assisted laparoscopic surgery is associated with rapid dissection and a significantly shorter learning curve when compared with that of traditional laparoscopy.⁷⁻¹¹ Also, HAL shortens the laparoscopic learning curve of the technique. Longer operative times have been reported for standard laparoscopy and HAL in the literature as compared with operative times with the open procedures. It is an additional option in more complex cases, allowing the surgeon to convert to hand assistance.¹² Because laparoscopic surgery is minimally invasive, it confers upon the patient superior cosmetic results, shorter hospitalization, lower morbidity, and shorter convalescence.³⁻⁸ In addition, a decrease in analgesic use, hospital stay, and convalescence will make this technique more accepted and practiced. Recent literature has documented the problems experienced by ADPKD patients after transplantation (pain, recurrent infection, hemorrhage). Nephrectomy before transplantation improved the 5-year graft survival and patient survival by 19% and 18%, respectively, among those ADPKD patients undergoing pretransplantation ne-

phrectomy.¹³ Bilateral laparoscopic nephrectomy may be undertaken before transplantation in those patients with cyst-related signs and symptoms. We feel that in-situ cyst drainage, entrapment, and morcellation eliminate the need for a large incision and wound hernia formation. This also reduces blood loss, operative time, and postoperative use of parenteral analgesics. Given the effectiveness and excellent convalescence associated with the laparoscopic approach, we believe more patients with ADPKD may become candidates for pretransplantation bilateral laparoscopic nephrectomy.

RESULTS

Six patients underwent successful bilateral laparoscopic nephrectomy. They included 3 females and 3 males. The ages ranged from 39 years to 65 years with a mean of 49.4 ± 4.7 years. The mean BMI (body mass index) was 27.6 ± 1.78 (range, 23 to 33). The technique used was HAL in all cases. No significant complications were noted in these cases. The average estimated blood loss was 345mL (range, 100mL to 600mL) per case. No patient required intra- or postoperative blood transfusion. The operative time ranged from 150 minutes to 210 minutes, with an average of 185 minutes per case.

CONCLUSION

The use of laparoscopy in general and transplantation surgical procedures has increased in recent years as more studies show the safety and efficacy of this approach. Bilateral laparoscopic nephrectomy in ADPKD patients appears to be safe in experienced hands. In this article, we have illustrated the use of the laparoscopic technique for bilateral nephrectomy in ADPKD patients with good results. We feel that these data support the efforts to incorporate laparoscopic procedures as an alternative to open nephrectomy in pretransplant ADPKD patients for bilateral laparoscopic nephrectomy. However, randomized, controlled trials will be necessary to validate these findings.

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