Inguinal Incision as a Successful Route To Extract the Kidney During Laparoscopic Retroperitoneal Live-Donor Nephrectomy

Ke Wang, Dong-fu Liu, Lin Wang, Chun-hua Lin, Chang-pin Men, Feng-chun Wan, Hui Wang, Zhen-li Gao

Abstract

Objectives: We sought to evaluate the advantages of an inguinal incision in extracting the kidney during retroperitoneal laparoscopic live-donor nephrectomy. Materials and Methods: From May 2008 to June 2011, fifty-eight cases of retroperitoneal live-donor nephrectomy were performed at our hospital; all data were analyzed retrospectively. All donors were grouped in a test group (n=32, inguinal incision) or a control group (n=26, lumbar incision) according to the selected graft retrieval incision. Donors were compared with regard to operative time and warm ischemia time, operative blood loss, hospital stay, cosmetic satisfaction, and incision complications. Results: All 58 cases of retroperitoneal live-donor nephrectomy were successfully accomplished, without donor death, serious complications, and conversion to open surgery. There were no differences in mean operative time, mean blood loss, mean warm ischemic time, graft function, and 1-year graft survival rate between the groups. However, in a test group, the mean hospital stay was shorter ($P < .01$), and the satisfaction with cosmesis was higher ($P < .01$). The incidence rates of abdomen asymmetry (9/28), incision hernia (4/28), wound infection (5/28), and wound faulty union (6/28) were higher in the control group than they were in the test group. Conclusions: Inguinal incision is a safe and practical graft retrieval incision in retroperitoneal laparoscopic donor nephrectomy and can be generally applied.

Key words: Retroperitoneal laparoscopic live-donor nephrectomy, Renal transplant, Inguinal incision

Introduction

Since the first laparoscopic donor nephrectomy (LDN) was performed by Ratner in 1995, LDN has been accepted as safe and has increased the potential number of living-kidney donors. Compared with open-donor nephrectomy (ODN), LDN results in fewer postoperative complications, less pain, shorter hospital stay, earlier recovery, and ideal cosmesis without differences in renal function or allograft survival. Laparoscopic donor nephrectomy can be performed transperitoneally or retroperitoneally on either side; the risk of bowel injury and intestinal obstruction is higher in transperitoneal LDN. Retroperitoneal LDN has the advantages of limiting the risk of damage to intra-abdominal organs and providing direct access to the renal artery and vein. It has been performed in many countries, especially China. Graft retrieval incision also plays an important role in encouraging kidney donation and ensuring better cosmesis, especially for young ladies who intend to donate a kidney.

From May 2008 to June 2011, we performed 32 cases of retroperitoneal LDNs with inguinal incision as graft retrieval incision. We retrospectively compared the differences in inguinal incision and lumbar incision for retroperitoneal LDN.

Materials and Methods

Donors and recipients

From May 2008 to June 2011, 58 cases of retroperitoneal LDNs were performed at our center. Obese donors and those with a history of a lumbar operation on the same side as the donor kidney were...
excluded. Before the study, the protocol was approved by our local institutional ethics committee, and conforms with the ethical guidelines of the 1975 Helsinki Declaration. Written, informed consent was obtained from all of the subjects. Among the donors, there were 17 men and 41 women (age range, 23 to 67 y; mean age, 38.6 y) and a kinship developed between the donor and the recipient.

Before the operation, all donors underwent a complete examination, including isotope nephrography and kidney arteriography with 3-dimensional reconstruction. All donors were grouped as a test group (n=32) and a control group (n=26). According to graft retrieval incision, an inguinal incision was used in the test group, and a lumbar incision was used in the control group. Among the 58 recipients, there were 37 men and 21 women (age range, 16 to 68 y; mean age, 37.5 y), and no renal transplant contradictions were found.

Live-donor nephrectomies procedure (left)
The patient was placed in a right lateral position. The port A (posterior axillary line maintained under the 12th rib) was created, and a 2-cm incision was made with a scalpel. Then, a long forceps was used to dissociate the subcutaneous tissue, muscle, and lumbar fascia. A finger could feel the inner face of the rib. A self-made gas bag was inserted, and 500 to 800 mL gas was insufflated and kept for 3 to 5 minutes (Figure 1). Port B (anterior axillary line maintained under the 12th rib) was created by finger guidance. Port C (middle axillary line maintained above the iliac crest) was created, and a 10-mm trocar was inserted (Figure 1). A 12-mm trocar was inserted into port A, the lumbar fascia was sutured first, and then the muscle and skin were sutured.

Entering the retroperitoneal cavity, extraperitoneal and perirenal fascia adipose tissue were separated superiorly to inferiorly with an ultrasonic knife, from anterior to posterior, then the peritoneal reflection and Gerota’s fascia were identified. Gerota’s fascia was dissected near the peritoneal reflection, exceeding the upper pole of the kidney, then 3 to 4 cm inferiorly to the lower pole of the kidney. The perirenal fat tissue was dissected from the lateral border near to renal hilum on the front of kidney first, then the real part. On the inferior pole of kidney, the dissection was performed carefully, because the ureter could be recognized and was mobilized. Renal vessel sheath was opened, and the renal artery and vein were mobilized. The adrenal gland was detached from the kidney. The ureter was sectioned close to the crossover with the iliac vessels.

For the test group, the kidney was pulled out from the inguinal incision, a 5- to 7-cm skin incision was made 2 cm from the inguinal ligament (Figure 2). The skin, subcutaneous tissue and the oblique externus abdominis muscle membrane were cut open, and the endo-abdominal fascia and obliquus internus abdominis were left intact. For 12 cases, extract bags were placed into the retroperitoneal cavity using a 12-mm trocar that had been inserted through an inguinal incision. We then placed the kidney body in a bag. The renal artery and vein were ligated, the endo-abdominal fascia and obliquus internus abdominis were slit, and the extract bag with the kidney was pulled out from the inguinal incision. For 20 cases, the inguinal incision was about 6 to 7 cm long, and the kidney was pulled out by the operator’s hand.

Figure 1. Patient Position and Port and Graft Retrieval Incision for Live-Donor Nephrectomies

(A) A 12-mm trocar for a work port, (B) 5-mm trocar for a work port, (C) 10-mm trocar for the laparoscope. An inguinal incision for extracting the donor kidney.

Figure 2. Inguinal Oblique Incision Is Created Before Renal Artery Obstruction
For the contrast group, a lumbar incision was created from A to B, about 7 to 9 cm long; the external and internal oblique muscles were cut, and the transverse abdominal muscle fascia was left intact. After the renal artery and vein were ligated, the transverse abdominal muscle fascia was slit, and the kidney was pulled out by the operator’s hand from lumbar incision.

Clinical data
All live-donor nephrectomies were followed for at least 12 months with regard to operative time, operative blood loss, ischemia time, hospital stay, and incision complications were recorded and compared. Incision complications included abdomen asymmetry, incision hernia, wound infection, and wound faulty union for all donors. Donors were asked to complete a questionnaire about incision satisfaction at 1 month and 3 months after surgery. Incision satisfaction was rated as (1) not satisfied, (2) satisfied, and (3) highly satisfied.

Statistical analyses
Statistical analyses were performed with SPSS software (SPSS: An IBM Company, version 10.0, IBM Corporation, Armonk, NY, USA). Categorical variables were compared with the chi-square test; continuous variables were compared with the Mann-Whitney U test. A value for \( P < .05 \) was considered statistically significant.

Results
All 58 cases of retroperitoneal LDN were successfully accomplished, without donor death, serious complications, or conversion to open surgery. Demographics, operative time, blood loss, warm ischemia time, and 1-year graft survival rates and incision complications are reported in Table 1. There were no differences in mean operative time, mean blood loss, mean warm ischemic time, graft function, and 1-year graft survival rates between the groups. In the test group, however, mean hospital stay was shorter \( (P < .01) \), and satisfaction with cosmesis was greater \( (P < .01) \). The incidence rates of abdomen asymmetry \( (9/28) \), incision hernia \( (4/28) \), wound infection \( (5/28) \), and wound faulty union \( (6/28) \) were higher in the control group than they were in the test group.

Discussion
Since the first LDN was performed by Ratner in 1995, it has been gradually accepted as a safe procedure and has increased the potential number of living kidney donors.\(^1\,^5\) Since May 2004, all live-donor nephrectomies have been performed by laparoscopy at our hospital. Laparoscopic donor nephrectomy appears at least as safe and effective as open-donor nephrectomies.\(^6\,^9\) Compared with open-donor nephrectomy, LDN shows superior results in postoperative pain, fewer complications, satisfactory cosmesis, and fast recovery.\(^9\,^13\) There are no significant differences in cost effectiveness and graft function between LDN and open-donor nephrectomy.\(^14\,^16\) In addition, the longer warm ischemia time during LDNs shows no significant deleterious effect on graft survival.\(^17\,^20\)

Laparoscopic donor nephrectomy can be performed transperitoneally or retroperitoneally on either side. Owing to adequate working space and easy dissection, LDN is done transperitoneally at many centers. However, the risk of bowel injury and intestinal obstruction is higher in transperitoneal LDN. Retroperitoneal LDN was first performed by Yang and associates in 1995,\(^21\) because it has the advantages of limiting the risk of damage to intra-abdominal organs and providing direct access to the renal artery and vein, it has been performed in many countries, especially in China.\(^21\,^22\) Many studies have shown that retroperitoneal LDN is as safe and feasible as transperitoneal LDN, with less invasiveness than transperitoneal LDN.\(^25\,^27\)
The aim of LDN is to decrease operative trauma to the donor and guarantee as much as graft quality as possible. Incisional trauma to some degree is important for the donor deciding to donate, especially for young women. From a cosmetic standpoint, the midline or subcostal scar is often prominent, and cannot be concealed by lingerie or swimwear. Compared with the lumbar incision and upper abdominal incision, the inguinal incision has the advantages of thinner muscle, less trauma, less dehiscence, speedier recovery, better cosmesis, and fewer complications. Our study has shown that an inguinal incision does not increase operative time or blood loss, but decreases time spent in the hospital, the incision complication rate of abdomen asymmetry, incisional hernia, wound infection, and wound faulty union. In conclusion, the inguinal incision is a safe and practical graft retrieval incision in retroperitoneal LDN and can be generally applied.

References