

Laparoscopic Live Donor Nephrectomy : Initial Experience

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Key words. Living donor ; nephrectomy ; kidney transplantation ; morbidity ; laparoscopy ; case report.

Abstract. Transplanting a kidney graft harvested from a live donor has been proposed and used to shorten the waiting time of kidney transplant candidates and to increase the graft pool. Live donor renal transplants have demonstrated better results in term of graft survival rates, compared to renal transplants harvested from brain dead donor. Recently, laparoscopic live donor nephrectomy has been introduced to reduce the live procurement morbidity. This lower morbidity may result in increased acceptance of the donor operation. We initiated a program of laparoscopic live donor nephrectomy in January 1997 and up until June 1998, three cases were successfully performed in our department. The purpose of this paper was to report the first case of this program and its first year of follow-up.

Introduction

Renal transplantation has been recognized as the optimal treatment modality for end stage renal disease. In the Eurotransplant area, most renal recipients receive a kidney transplant harvested from a brain dead donor. However, the organ donor shortage has lead to long waiting time for kidney transplant candidates. One way to shorten this waiting time is to harvest the graft from a live donor. In the United States, live donors accounted for 29% of the kidney transplants in 1995 (1). Moreover, live donor renal transplants have demonstrated better results in term of graft survival rates, compared to renal transplants harvested from brain dead donor (2). Disincentives to live donation are mainly the perioperative mortality, which has proven to be low (< 0.1%), and the risk for the future of the donor renal function, which has also proven to be not significant (3). However, the perioperative morbidity, including duration of hospitalization, postoperative pain, cosmetic results, and prolonged convalescence may also be considered as major concerns by potential donors. This morbidity has been significantly reduced in many abdominal procedures by the use of laparoscopic techniques. Thus, laparoscopic live donor nephrectomy (LLDN) has recently been proposed to reduce the perioperative morbidity of live donor kidney harvesting (4, 5). The main potential advantage of LLDN may be that the sum of the improvements in patient recovery may result in increased acceptance of the donor operation and may expand the pool of potential kidney donors.

In our institution, we initiated a LLDN program in January 1997. As a rule, we do not raise the possibility

of living donation to the transplant candidates or their family, and we accept to consider living donation only if proposed by the patient and his (her) relatives themselves after one whole year of wait on the Eurotransplant list. Donors undergo the classical pre-living kidney donation evaluation (6), and since January 1997, LLDN has been proposed to the donor if the living donation is a valuable option and if there is no contraindication to pneumoperitoneum, as history of major abdominal surgery or severe obesity. Up until June 1998, three cases were successfully performed in our department. The purpose of this paper was to report our initial experience in LLDN and to describe the first case of this program and its first year of follow-up.

Case report

The patient was an 18 year-old female suffering from end stage renal disease secondary to cystinosis. Hemodialysis was first started in 1988 when she was 10. She received her first kidney harvested from a brain dead donor in 1990. Unfortunately, she presented early chronic rejection unsuccessfully treated with corticosteroid pulses and monoclonal antibodies. The function of her graft deteriorated quickly and she was placed back on hemodialysis 13 months after transplant. She was registered on the Eurotransplant waiting list for a second transplantation in September 1992.

After 4 years on the waiting list, her 56 year-old mother proposed one of her kidney for living donation. She underwent classical preoperative assessment that confirmed her suitability as a live kidney donor for her daughter. Particularly, anatomy and function of both

kidneys were normal. Moreover, there was no abdominal surgery history. The possibility of LLDN was discussed with both donor and recipient. The theoretical advantages and risks of the laparoscopic approach were explained and understood by both. Informed consent for LLDN was obtained.

The left kidney was chosen because of the longer length of the left renal vein. The surgery was performed on March 13, 1997 under general anesthesia with the patient in modified left lateral decubitus position. The patient was draped to allow access to the left abdomen and to the left flank, allowing kidney extraction through an abdominal incision in the left lower quadrant and conversion to urgent laparotomy if necessary. Fifteen mmHg carbon dioxide pneumoperitoneum was established via a Veress needle; four 12-mm operating ports were used in a modified transabdominal approach that we previously described as our standard technique for adrenal resection (7). Splenic flexure of the left colon was first mobilized; descending colon and sigmoid were also retracted medially allowing the left ureter dissection until iliac bifurcation level. The Gerota's fascia was then opened, and the left kidney was exposed. Left renal vein was identified and dissected medially. Gonadal and adrenal veins were located, clipped and divided. The renal artery was then dissected free to its origin at the aorta. While entering the Gerotas fascia and freeing the kidney from all surrounding tissues except the vessels, care was taken to avoid kidney rotation around its vascular pedicle. In preparation of kidney removal, a 8 cm incision was created in the left lower abdominal quadrant down to, but not through, the peritoneum. After clipping, the ureter was divided. The renal artery was then occluded with two clips, and divided, starting the warm ischemia. The renal vein was transected using an endovascular GIA-stapler. The peritoneum was then incised and the kidney was removed manually from the peritoneal cavity. The kidney was immediately flushed with cold (4°C) University of Wisconsin solution and classically transplanted to the recipient who was prepared in an adjacent operative room. Warm ischemic time was less than five minutes, and kidney function was immediate. Procurement operative time was 130 minutes.

Donor and recipient postoperative courses were uneventful, and donor required postoperative analgesia was minimal. The donor wished to stay in the hospital with her daughter and was discharged home on postoperative day 8. Recipient received quadruple immunosuppressive therapy based on induction therapy with antithymocyte globulins (ATG), Cyclosporin A, prednisone and azathioprine. She was discharged home on postoperative day 14 with normal renal tests. At one month follow-up, both donor and recipient were very happy with their experience of LLDN. Particularly, donor morbidity was not existent. The first year of

follow-up was uneventful, and both donor and recipient enjoyed normal renal function.

Up until June 1998, two other successful cases were performed in our department (unpublished data). These three kidneys harvested laparoscopically had immediate function with intraoperative urine production. Postoperative courses were uneventful and the recipients were discharged from hospital in the 2 weeks following the transplantation, with a normal creatinin blood level.

Discussion

Live donor renal transplantation has been first proposed as a way to reduce the waiting time for kidney transplantation by increasing the pool of available grafts. Moreover, studies proved that live donor renal transplantation has better results in term of graft survival rates, compared to renal transplants harvested from brain dead donors. However, live donor renal transplantation has not reached wide acceptance, at least in the Eurotransplant countries. Live donor nephrectomy exposes healthy donor to the risks of a major surgical procedure, and to the potential risk of future renal function impairment. Mortality is estimated at 0.03% (3) but morbidity may be substantial ranging from 15 to 20% or higher (8). This morbidity may include wound infection, pneumothorax, wound diastasis, incisional pain, prolonged hospitalization and convalescence. Potential donors also express concerns about the cosmetic results of a large flank incision.

In live donor nephrectomy, the procurement has to be safe and efficacious, ideally with minimal morbidity, no mortality and the best possible kidney graft. To date, nephrectomy via an open extraperitoneal flank approach has been the standard method of live donor renal allograft harvesting, in terms of low mortality and excellent graft function. LLDN was recently introduced and justified by a morbidity reduction. The feasibility of live donor nephrectomy was first presented in a porcine model (9) and the first LLDN was reported in 1995 (10). To date, two uncontrolled studies comparing the laparoscopic and standard approaches of live renal donation have been published (4, 5), presenting 10 and 70 cases of LLDN, respectively. LLDN seemed to compare favorably to matched historical controls, with no differences in donor mortality or graft function, and significant improvement in donor recovery and morbidity. Importantly, laparoscopic procurement seemed to provide significant reduction in postoperative pain, analgesic requirement, hospital stay, and convalescence (4). In the case we reported herein, the donor wished to stay in the hospital with her daughter and was discharged on postoperative day 8. In the two other cases of our experience, the donors were discharged home at postoperative day 2 without any complication (unpublished data). Because of this low morbidity,

LLDN may result in an increased acceptance of the donor operation and may expand the pool of potential live kidney donors. However, randomized studies are still missing and longer follow-up is needed to assess the long term function of the kidney grafts. Especially, the consequences of the pneumoperitoneal positive abdominal pressure and the longer initial warm ischemia on the long term graft function have to be assessed (4, 5).

In this paper, we presented our initial experience of LLDN. These cases and the other clinical cases published in the literature (4, 5, 10) have proved that LLDN is feasible with presumed benefits for the donor, and no deleterious effect on the graft function. However, priority has to be given to the donor safety and to the graft function, and to date the retroperitoneal open approach is still the "gold standard" of live donor nephrectomies. LLDN results need to be assessed by prospective, randomized, multicenter, controlled studies. Before the availability of results of such studies, LLDN should be performed in selected cases by highly skilled surgeons trained in complex laparoscopic procedures. In our institution, our experience with laparoscopic adrenal resections allowed us to initiate our LLDN program.

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Received : 22 July 1998.

Accepted : 16 October 1998.

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