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Original Article

Laparoscopic Living Donor Nephrectomy: 10-Year Experience

Nefrectomia Laparoscópica em Doador Vivo: 10 Anos de Experiência

FERNANDO MEYER[1]; LUIZ SÉRGIO SANTOS[2]; MARK FERNANDO NEUMAIER[3]; JOÃO CARLOS MICHELOTTO[3]; ANDRÉ EDUARDO VARASCHIN[3]; BRUNO DE FIGUEIREDO PIMPÃO[3]

Cajuru University Hospital, Catholic University, Paraná.

1. Chief of the Kidney Transplant Service, Cajuru University Hospital; Master's and Doctorate in Surgery from the Federal University, Paraná (UFPR); Chair and Professor of Urology, Catholic University, Paraná; 2. Master's and Doctorate in Surgery from the Federal University, Paraná (UFPR); Adjunct Professor of Urology, UFPR; [3] Staff Physician, Kidney Transplant Service, Cajuru University Hospital.

ABSTRACT

Objective: To review the results of the 10 years experience with laparoscopic live donor nephrectomies performed by an academic kidney transplant service in Paraná, Brazil. **Methods:** Between March 2003 and June 2013, 300 laparoscopic living donor nephrectomies were performed at the Kidney Transplant Service of the Cajuru University Hospital. Of the 300 procedures, 219 (73%) were left nephrectomies and 81 (27%) were right nephrectomies. The first 59 cases (19.6%) cases were performed using the manually-assisted laparoscopic technique. In the remaining 241 cases (80.4%) the pure laparoscopic technique was used. Hem-o-lok clips were used for hemostasis of the renal pedicle in all cases. We retrospectively reviewed operative time, warm ischemia time, estimated bleeding, and conversions to open surgery and their indications. **Results:** 204 (68%) donors were female; 96 (32%) were male. Mean age was 40.4 years. The mean operative time was 129.92 minutes, the mean warm ischemia time was 207.29 seconds, and mean estimated bleeding was 167.71 ml. 13 cases (4.3%) required conversion, 11 because of intraoperative vascular injuries. Two cases (0.66%) required re-operation, both for bleeding. **Conclusion:** Laparoscopic live donor nephrectomy is a safe technique with low morbidity; it which should be considered as an alternative to opening nephrectomy when choosing the surgical technique. Our results are consistent with the literature.

Key words: Laparoscopic. Living Donor. Nephrectomy. Outcomes. Single-Center.

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INTRODUCTION

In Brazil and around the world, queues for kidney transplantation grow steadily. Since it began, living donor renal transplantation has been shown to be superior to deceased donor kidney transplantation. In addition to presenting the best short and long term results, use of live donor kidneys tends to decrease the wait for an organ.[1]

In 1995 laparoscopic live donor nephrectomy was performed for the first time. Since then several centers around the world have adopted this technique as their standard procedure. As it offers significantly less morbidity, the laparoscopic approach has ended up encouraging more donors to donate their kidneys.[2,3]

We introduced laparoscopic live donor nephrectomy in 2003 and now, 10 years after its inception, we share our experience and analyze the results obtained over the past decade.

METHODS

Between March 2003 and June 2013, 300 laparoscopic nephrectomies were performed in living donors by the Kidney Transplant Service at the Cajuru University Hospital. The preoperative evaluation of donors consisted of routine laboratory tests, including creatinine clearance and proteinuria in a 24 hour collection; cardiac evaluation, consisting of stress testing and echocardiography; and CT angiography to determine renal vascular and excretory anatomy.

These studies also help in the detection and diagnosis of possible cases of kidney stones, cysts or scars, factors which may influence the choice of which kidney to transplant.

Although there is a general preference for transplanting the left kidney (because its renal vein is longer), for each donor the kidney to be transplanted was selected by a multidisciplinary team following established criteria – such as the kidney with less complex vascular anatomy. The principal aim is to ensure that the donor retains the "better" kidney. Using this approach, 219 donors (73%) underwent left laparoscopic nephrectomy and 81 donors (27%) underwent right laparoscopic nephrectomy.

The transperitoneal technique was used in all cases. With the first 59 cases (19.6%) we used a hand-assisted laparoscopy technique, and in the subsequent 241 cases (80.4%) we used a purely laparoscopic technique.

Under general anesthesia, patients were placed in partial lateral decubitus contralateral to the side to be operated. Pneumoperitoneum was established using the open technique, with an incision above the umbilicus, into which a 10mm trocar was positioned, through which an optic was then introduced. Another 10mm trocar, positioned at the height of the umbilicus at the edge of left rectus in cases of left nephrectomy, or in the midline, 5 cm below the xiphoid, in cases of right nephrectomy. A 5mm trocar was positioned in the midline, 5 cm below the xiphoid in case of a left nephrectomy, or at the edge of the right rectus in cases of right nephrectomy.

Occasionally a fourth 5mm puncture was positioned suprapubically on the left for left nephrectomies or sub-xiphoid in cases of right nephrectomy. Access to the retroperitoneum was through the parieto-colic gutter; dissection of the renal poles and renal pedicle was performed with a simple monopolar cautery. Hem-o-lok clips (Weck Closure Systems, Research Triangle Park, NC), were used for hemostasis of the renal pedicle. The kidney was extracted through an 8 cm Pfannestiel incision.

We retrospectively reviewed the operative time, warm ischemia time, estimated bleeding, conversions and their indications.

RESULTS

Of the 300 kidney donors, 204 (68%) were female and 96 (32%) were male. Donor age ranged between 21 and 65 years (mean 40.4 years). After a mean follow-up of 49 ± 37.2 months, all donors were alive with preserved renal function.

Mean operative time was 129.92 minutes and ranging from 50 to 270 minutes. Mean warm ischemia time was 207.29 seconds ranging from 60 to 660 seconds. The mean estimated bleeding was 167.71 ml and ranged from 10 to 3000 ml. Thirteen cases (4.3%) required conversion to open surgery, eleven because of an intraoperative vascular injury, one because of technical problems related to the gas insufflator, and one because we were unable to clip the three renal veins, which were of large caliber and very close to each other.

Re-operation was required in two cases (0.66%), both for postoperative bleeding. One of these re-operations was performed laparoscopically on the first postoperative day. The source of bleeding was not identified and the patient improved after the second laparoscopic approach.

In the other case, the patient developed hypovolemic shock after the dressings were in place. We opted for emergency laparotomy and encountered severe bleeding coming from the renal artery due to displacement of the Hem-o-loks. (Two closed Hem-o-loks were found loose beside the aorta). The patient's recovery was uneventful.

DISCUSSION

Kidney transplantation not only improves the quality of life of the recipient, but also prolongs their survival. With an increasing number of patients with chronic renal insufficiency, living donor kidney transplantation has an essential role to play in greatly expanding the availability of organs for patients with End Stage Renal Disease (ESRD).[4]

The issue at hand is how to ask a healthy person to undergo a major surgical procedure. The ability to minimize the morbidity of the procedure and spare the donor the major setbacks associated with the open nephrectomy, should encourage kidney donation. The laparoscopic nephrectomy in living donors is an alternative to the open procedure that is gaining favor because of its ability to minimize the surgical morbidity.

In a recently published meta-analysis,[5] laparoscopic nephrectomy was found to offer considerable benefits by reducing intraoperative bleeding, shortening the duration of hospitalization,

reducing pain, enabling donors to return earlier to work activities, and improving post-operative quality of life.[6-8]

Other studies have shown that warm ischemia time and operative time were significantly longer when compared to the open technique.[9-11] However, this did not impact on the medical course of the donors, nor on the function of grafted kidney.[12-14]

Another point to consider is that the experience of the surgeon can strongly impact in shortening operative time. In studies with larger numbers of donors undergoing laparoscopic live donor nephrectomy, we note a decrease in surgical time, often comparable to the operative time of open surgery.[15-18]

Hand-assisted laparoscopy nephrectomy can be an alternative to the pure laparoscopic technique and may assist those accumulating experience on the "learning curve". With regard to the warm ischemia time and operative time indicators, it has been demonstrated in several studies, that there is no benefit over pure laparoscopy.[1, 19-22]

Recently, the use of Hem-o-lok polymer clips was discouraged for use in laparoscopic live donor nephrectomy. However, due to the high cost of endovascular staplers and their high degree of compression along a length of the vessels, the use of Hem-o-lok, in our view, still stands as a good alternative. In Europe, 30% of services still use these clips to control the renal pedicle.[23-25]

Thirteen of the 300 laparoscopic nephrectomies (4.3%) required conversion to open surgery. In four studies such conversions occurred in 0.4% to 5% of laparoscopic live donor nephrectomies: Harper et al reported conversions in three cases, Jacobs et al had 12, Leventhal et al had eight, and Nikeghbalian et al reported five.[15,16,26,27]

CONCLUSION

Live donor laparoscopic nephrectomy is a safe procedure with less bleeding, shorter hospital stays, less pain, and an earlier return to work activities when compared to open surgery.[5] Given the fact that the procedure is being performed in a healthy patient, the relative morbidity should be the leading basis in the choice of which technique to use.

This case series report, together with other similar series, attest that laparoscopic live donor nephrectomy is a safe procedure with short operative times and warm ischemia times that do not compromise the function of the grafted kidney.

RESUMO

Objetivo: Revisar os resultados obtidos em 10 anos de experiência de nefrectomia laparoscópica em doador vivo realizados no serviço de transplante renal do Hospital Universitário Cajuru. **Métodos:** Entre março de 2003 e junho 2013, 300 nefrectomias laparoscópicas em doador vivo foram realizadas no Serviço de Transplante Renal do Hospital Universitário Cajuru. Dos 300 casos operados, 219 (73%) foram à esquerda e 81 (27%) à direita. Nos 59 casos (19,6%) iniciais foi adotada a técnica laparoscópica assistida pela mão. Nos 241 casos (80,4%) subseqüentes foi utilizada a técnica laparoscópica pura. Hem-o-lok foi o dispositivo utilizado para controle do pedículo renal em todos os casos. Revisamos retrospectivamente dados como tempo cirúrgico, tempo de isquemia quente, sangramento estimado, conversões a cirurgias abertas e seus motivos. **Resultados:** 204 (68%) pacientes eram do sexo feminino, 96 (32%) do sexo masculino. A média de idade dos doadores foi 40,4 anos. O tempo cirúrgico médio foi de 129,92 minutos, o tempo de isquemia quente médio foi de 207,29 segundos e o sangramento estimado médio foi de 167,71 ml. 13 casos (4,3%) necessitaram conversão, sendo que 11 por lesões vasculares intra-operatórias. Dois casos (0,66%) necessitaram re-operação, ambos por sangramento. **Conclusão:** Nefrectomia laparoscópica em doador vivo é uma técnica segura e com baixa morbidade, fato que deve ser considerado na escolha da técnica a ser empregada. Nossos resultados são compatíveis com a literatura mundial.

Key words: Laparoscopic. Living Donor. Nephrectomy. Outcomes. Single-Center.

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Corresponding Author:
FERNANDO MEYER
Rua Portugal 307, Curitiba, Paraná, Brazil
E-mail: fmeyer@urocentro.com