Case Report

Single Port Laparoscopic Donor Nephrectomy: First Case Report in Ramathibodi Hospital

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The prevalence of patients with end stage renal disease (ESRD) is showing an increasing trend. At the same time, the waiting lists for cadaveric donor kidney transplantation continue to grow. Living donor kidneys may be an alternative for patients to receive kidneys for transplantation. However, a wide gap exists between the numbers of living kidney donors and the numbers of recipients on waiting lists. Many considerations are involved in living organ donation, including cosmetic reasons. Laparoscopic living donor nephrectomy has become the technique of choice for kidney transplantation in many centers. The benefits of a laparoscopic technique compared with open surgery include reduced blood loss, less analgesic requirement, a shorter hospital stay, faster return to work, and fewer cosmetic effects. The next step in minimal invasive surgery is laparoendoscopic single port donor nephrectomy. Early outcomes show this technique to be safe and cosmetically improved. This procedure may be the answer to reduce the gap between numbers of kidney donors and waiting recipients. We report our first experience of single port laparoendoscopic left donor nephrectomy. A 48-year-old healthy Thai man wished to donate his kidney to his 18-year-old son who suffered from IgA nephropathy and ended up with ESRD. The operation took three hours. The estimated blood loss was 50 ml and no blood transfusion was required. The donor was discharged home safely without any complications.

Keywords: *Single port, Donor nephrectomy*

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The first long-term successful kidney transplantation was reported in 1958[1]. Now, live donor kidney transplantation is one of the best treatments for patients with end-stage renal disease (ESRD)[2]. Living donor transplantation allows for better kidney graft function and a healthier organ donor before starting the operation. The first use of laparoscopy for living donor nephrectomy was described in 1995[3]. The graft outcomes and complication rates for laparoscopic surgery are now comparable to those of open donor nephrectomy[4,5], but the donor patients benefit from reduced operative blood loss, less analgesic requirement, a shorter hospital stay, and a faster return to work[2]. At Ramathibodi Hospital, we have performed laparoscopic donor nephrectomies since 2003. From our retrospective review, this is a safe procedure especially when conducted by experienced surgeons[6]. Laparoscopic living donor nephrectomy has now become the technique of choice in many academic centers, including Ramathibodi Hospital.

The number of kidney donors is disproportionately small compared to the number of waiting recipients. One benefit of laparoscopic donor nephrectomy is that it may have increased donor willingness[7] as the number of living kidney donations has increased since its inception[8]. Nevertheless, an imbalance still exists in Thailand between donations and the demand for kidney donors. Laparoendoscopic single site or single port donor nephrectomy is a safe procedure, with quicker convalescence and improved cosmetic consequences[9,10]. This procedure will probably decrease the gap between the numbers of recipients and organ donors. We report our first case of laparoendoscopic single port donor nephrectomy.

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Case Report

A 48-year-old healthy Thai man wished to donate his kidney. He had no underlying disease and

no abdominal scar or history of previous abdominal surgery. His body mass index was 20.20 kg/m^2. His baseline serum creatinine was 1.07 mg% (GFR = 65). He had a normal urinary analysis. A preoperative computer tomography angiogram showed normal size for both kidneys, and a single left renal artery and vein. However, he had double right renal arteries, so we choose the left kidney for organ transplantation.

The kidney was donated to his 18-year-old son, who had ESRD from IgA nephropathy and was now on regular continuous ambulatory peritoneal dialysis. After full donor and recipient evaluations for compatibility, single port laparoscopic left donor nephrectomy was performed.

Surgical technique

The patient was lying in the left flank position under general anesthesia. The incision was performed at the umbilical region along mid-midline, about seven centimeters in length. The GelPoint-Port (Fig. 1) was applied to this single umbilical incision, and then two ten-millimeters ports and one five-millimeter port were placed in a triangle pattern. A pneumoperitoneum was created by CO_2 with a limited pressure of 15 mmHg. The zero angle laparoscope was inserted via one ten-millimeter port. The grasper and scissors were inserted via the other two ports. The descending colon, spleen, and tail of the distal pancreas were mobilized downwards and medially to expose the left kidney. The ureter was dissected and freed down to the iliac level. After that, the gonadal vein was dissected up to the renal vein, to approach the renal hilar. The renal vein and its tributaries were dissected and identified (gonadal, lumbar, and adrenal veins), then clipped with medium sized Hem-o-lok clips. The renal vein was dissected and freed distal to the adrenal vein with sufficient length for anastomosis. The renal artery was dissected to its origin also. The kidney was then freed from the surrounding tissue. At the same time, the iliac vessels of the recipient were prepared for the new anastomosis by vascular surgeons. We then cut the renal artery after clipping with medium sized Hem-o-lok clips, and used the same technique with the renal vein, but we used the extra-large Hem-o-lok clips. The kidney was freed and carefully placed into the endobag. The endobag with the harvested kidney was removed gently from the abdominal cavity. Bleeding was checked and a tube drain was placed via the port incision. The length of the surgical wound was seven centimeters (Fig. 2) and abdominal wall was closed.

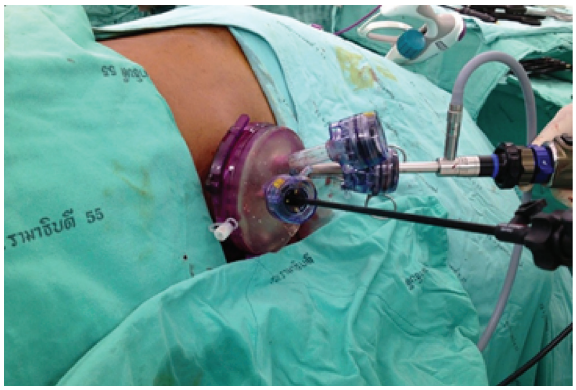

Fig. 1 The position of the lens and instrument were in the same direction to prevent fighting between instruments and camera.

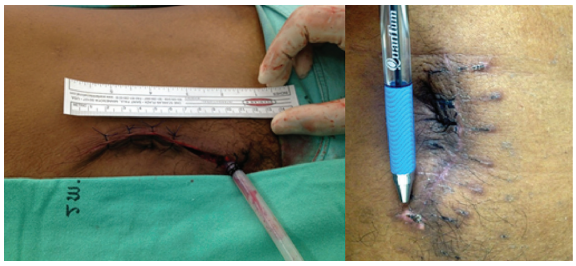

Fig. 2 The surgical incision and surgical wound after wound healing.

Results

The operation was successful, without any need for conversion to standard laparoscopic surgery or addition of a needleoscopic side port. The operation took three hours. The estimated blood loss was 50 ml and no blood transfusion was required. Warm ischemic time was three minutes. Cold ischemic time was 29 minutes. The renal vessels were adequate in length and a successful end to side anastomosis was made to the recipient vessels. The ureter could dissect freely until it reached the Iliac vessels. No intraoperative complications occurred. The allograft function was immediately restored after re-anastomosis of the renal graft vessels. The recipient's creatinine reached 1.19 mg% at post-operative day three. The donor was discharged home safely without any complications.

Discussion

The success of single port donor nephrectomy may increase the live kidney transplantation rate for ESRD patients and reduce the disproportionate gap between the number of kidney donors and the number of waiting recipients. In our institute, we have 918

ESRD patients on our waiting list (as of October 2012), but only 20 couples match for living donor kidney transplantation. Increasing the number of living kidney donations is critical for improving the kidney transplantation rate. In the United States, living kidney transplantations have increased from 3,668 cases in 1996 to 6,563 cases in 2005[11]. This trend occurred after introduction of laparoscopic living donor nephrectomy by Ratner in 1995[3]. The results from a meta-analysis comparing open and laparoscopic donor nephrectomy showed that laparoscopic donor nephrectomy has a longer operative and warm ischemic time, but the recipient complications and rates of graft dysfunction are similar between the two groups[2]. Other studies found that most kidney donors have a good attitude toward laparoscopic live donor nephrectomy[12,13]. Single port surgery is the next step in minimal invasive surgery and may influence or have a further positive impact on kidney transplantation rates in the future.

Laparoendoscopic single site surgery has a limitation in struggling with the instruments, needing greater surgical skill, and a steeper learning curve. For single port donor nephrectomy, the operative time was significantly longer in the first 25 cases[15]. In our early experience, laparoendoscopic donor nephrectomy is technique feasible. We hope that our technique can be reproducible to other center in Thailand. We recommended performing single port donor nephrectomy by experienced laparoscopic surgeon and in selected patients. A left side kidney donor, single renal artery and vein, and BMI less than 25 are appropriate criteria for single port live donor nephrectomy.

Donor nephrectomy is the highest expectant operation because the operation is performed in a healthy person. The best results come from harvesting a quality kidney, achieving excellent transplant allograft outcomes, maintaining donor safety, and minimizing complications[10]. Many series show results that can reach these objectives[9,10,15-17]. Single port donor nephrectomy has benefits in faster return to work, 100% recovery, and fewer cosmetic defects[10,17], so this procedure could increase the motivation of the living donor and the kidney transplantation rate in the future.

Robotic laparoscopic single site surgery has been successfully done in many urologic procedures, such as radical prostatectomy, radical nephrectomy, partial nephrectomy etc.[18]. Robotic-assisted laparoscopic donor nephrectomy was first reported in 2002 by Horgan[19]. Since then, single-incision robotic-assisted living donor nephrectomy was successfully performed[20]. The robotic approach improves ergonomics and the surgeon's comfort while still having the benefit of a single site laparoendoscopic surgery. This procedure will need more long-term prospective trials in the future.

What is already known on this topic?

Due to the large gap between kidney donor and recipients, the wide variety of minimal invasive surgery will increase willingness of healthy people to become the kidney donors. Laparoendoscopic single site live donor nephrectomy was first reported by Gill et al[14]. The data from international series comparing laparoscopic and laparoendoscopic single site donor nephrectomy showed comparable outcomes in operative time, estimate blood loss, length of stay and overall complication rates[9,10,15]. Regarding on warm ischemic time and allograft outcomes, laparoendoscopic single site donor nephrectomy slightly have longer warm ischemic time. However, early allograft outcome were comparable in both groups[10]. Laparoendoscopic single site donor nephrectomy has the benefits of faster return to work and 100% recovery[10,17]. The cosmetic outcome was better than laparoscopic or open donor nephrectomy[9,10].

What this study adds?

Laparoendoscopic donor nephrectomy is technical feasible. Single port donor nephrectomy has benefits of less pain, minimal blood loss, faster return to work, 100% recovery, and fewer cosmetic effects, so this procedure could increase the motivation of the living donor and the kidney transplantation rate in the future.

The authors hope that the present technique can be reproducible to other transplantation center in Thailand.

Potential conflicts of interest

None.

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การผ่าตัดปลูกถ่ายไตโดยวิธีการผ่านส่องกล้องเทคนิครูเดียว: รายงานการผ่าตัดรายแรกในโรงพยาบาลรามาธิบดี

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ในปัจจุบันมีผู้ป่วยโรคไตวายเรื้อรังเพิ่มมากขึ้น ทำให้อัตราการรอรับบริจาคไตเพิ่มขึ้น ดังนั้นการบริจาคไตที่มีชีวิต (living donor nephrectomy) จึงมีแนวโน้มเพิ่มมากขึ้น อย่างไรก็ตามยังมีความไม่สมดุลระหว่างผู้บริจาคและผู้รอรับบริจาคไต ทั้งนี้มีหลายปัจจัยที่เป็นตัวกำหนดการตัดสินใจบริจาคไตซึ่งสาเหตุหนึ่งในนั้นคือปัญหาเรื่องแผลผ่าตัด

ในปัจจุบัน การผ่าตัดแบบผ่านกล้อง (laparoendoscopic surgery) มีแนวโน้มที่จะเป็นการผ่าตัดที่เป็นมาตรฐานในหลายหัตถการ เนื่องจากผู้ป่วยสามารถกลับบ้านได้เร็วขึ้น แผลผ่าตัดมีขนาดเล็กลง การผ่าตัดผ่านกล้องเทคนิครูเดียว (laparo-endoscopic single site surgery, LESS) เป็นอีกทางเลือกของผู้ที่จะมาบริจาคไต ซึ่งสามารถทำได้อย่างปลอดภัยและแผลผ่าตัดน้อยกว่าการผ่าตัดส่องกล้องแบบมาตรฐาน ซึ่งการผ่าตัดแบบ LESS อาจจะเป็นคำตอบในการลดช่องว่างของจำนวนผู้บริจาคและผู้รอรับบริจาคไต ผู้นิพนธ์มีความประสงค์ที่จะรายงานการผ่าตัดผ่านกล้องเทคนิครูเดียว (laparoendoscopic single port donor nephrectomy) รายแรกที่ได้รับการผ่าตัดที่โรงพยาบาลรามาธิบดี

ชายไทยอายุ 48 ปี ต้องการมาบริจาคไตให้บุตรชายอายุ 18 ปี ที่ป่วยเป็นโรคไตวายระยะสุดท้าย การผ่าตัดใช้เวลา 3 ชั่วโมง เสียเลือดระหว่างผ่าตัด 50 มิลลิลิตร ผู้ป่วยมีแผลผ่าตัดขนาด 10 เซนติเมตร บริเวณข้างสะดือ หลังจากผ่าตัดสามารถกลับบ้านได้โดยไม่มีภาวะแทรกซ้อน