Case Study of the Month

Laparoscopic Kidney Transplantation

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1. Case report

The donor, with body mass index (BMI) of 25 kg/m², was emotionally related to the recipient. Hand-assisted laparoscopic nephrectomy was performed without complications, removing a kidney with normal vascular anatomy.

The recipient was a 69-yr-old woman with BMI of 22 kg/m² who had no surgical history and was suffering from end-stage renal disease (ESRD) without dialysis (creatinine: 422 mmol/l; glomerular filtration rate: 9 ml/min per 1.73 m²), due to nephroangiosclerosis.

1.1. Surgical procedure

The kidney graft was perfused with University of Wisconsin (UW) solution (ViaSpan; Bristol-Myers Squibb, Madrid, Spain), and backbench standard preparation was performed with posterior perirenal fat-tissue conservation.

With the recipient in the left lateral decubitus position, a 7-cm Pfannenstiel incision was made. A hand-access device (Dextrus® Ethicon Endo-Surgery, Cincinnati, OH, USA) was placed with closure of the diaphragm to surround an 11-mm trocar. Three trocars were placed in the right hemiabdomen, as shown in Fig. 1.

A retroperitoneal window was created, followed by dissection of the right external iliac vessels, separating the artery and vein. Immediately, the kidney graft was introduced and oriented above the psoas muscle (Fig. 2).

After heparinization, two endoscopic curved bulldog clamps were placed on the external iliac vein through the hand-access device. A venous terminolateral anastomosis was performed with 5-0 uncoated, monofilament polypropylene (Surgipro; Covidien, Mansfield, MA, USA).
continuous suture (Fig. 3A). The external iliac artery was clamped, and arterial anastomosis performed using a discontinuous suture (Fig. 3B).

Renal hypothermia was maintained by means of ice and transcutaneous continuous irrigation with cold saline solution.

Clamps were released, and it was verified that the suture was watertight and that there was appropriate kidney reperfusion with a satisfactory arterial thrill (intra-abdominal carbon dioxide insufflation was decreased to 10 mm Hg to favor intrarenal perfusion). Finally, the graft was fixed to the abdominal wall via its posterior fat.

Ureterovesical reimplantation was done using a modified Taguchi technique (Fig. 4). Kidney graft extraperitonealization was performed with continuous suture of the peritoneal window.

1.2. Results

Surgical time was 240 min (53 min and 25 min for vascular suture and ureterovesical reimplantation, respectively) with 300 cm³ of blood loss. Cold ischemia time was 182 min. The urethral catheter was removed on the seventh postoperative day. Serum creatinine improved progressively (to 95 mmol/l and 73 mmol/l on the seventh postoperative day and the day of discharge, respectively). No surgical complications were recorded.

2. Discussion

Since the first laparoscopic nephrectomy was reported by Clayman et al in 1991 [1], this technique has evolved rapidly, gradually replacing the open approach. Over the same period, laparoscopic procedures have increased in complexity, and nowadays, techniques are performed that would previously have seemed unfeasible [2,3]. Laparoscopic kidney transplantation (LKT) would enable recipients to benefit from a less invasive technique, as is already offered to renal donors.

Presently, the number of available cadaver kidneys is tending to decrease and fewer are in optimal condition. Because of this, incentives for live donation and crossover transplantation have been proposed. The main beneficiaries of LKT and the minimally invasive approach that it offers could well be recipients with ESRD without dialysis, who tend to have minor comorbidities and more normal arterial segmentation. Although this is the first instance of LKT in humans, previously reported, outstanding surgical procedures have already suggested the procedure’s feasibility.

Laparoscopic vascular surgery has evolved significantly since 1995, when Ahn et al. [4] reported their initial experience in an animal model of laparoscopic aortofemoral bypass. In recent years, Castillo et al. [5] reported a laparoscopic approach to repair a renal artery aneurysm, and Chung and Gill [6] have used a laparoscopic splenorenal bypass to relieve outflow obstruction in a patient with nutcracker syndrome, with satisfactory results. When Meraney et al. [7] performed laparoscopic renal autotransplantation in animal models, they obtained good results and considered vascular anastomosis to be feasible in laparoscopic and vascular surgery when performed by expert hands. It is also noted that laparoscopic ureterovesical reimplantation is already considered a valid alternative in the context of reconstructive urologic surgery.

The principal reason for use of a laparoscopic approach is the expected reduction in morbidity owing to the small surgical incision (Fig. 5). The incidence of incisional hernia when employing the classic open surgical approach for kidney transplantation is 3–4% [8]. Furthermore, 16–21% of
immunodeficient patients present wound infection and 14% of the transplanted patients will suffer wound complications, with the incidence rising to 53% among those treated with mammalian target of rapamycin (mTOR) inhibitors [9].

Pfannenstiel incision is recommended for kidney extraction in nephrectomy and nephroureterectomy because it has a lower incidence of incisional hernia, with minimal morbidity [10].

LKT is a complex technique that requires previous experience in vascular and laparoscopic surgery. Initial cases have to be selected based on BMI and the vascular anatomy of the donor and the recipient. As with all novel procedures, technical modifications will be required to formalize its use and detailed comparisons will need to be made with standard procedures.

Fig. 3 – (A) Venous terminolateral anastomosis; (B) arterial terminolateral anastomosis.

Fig. 4 – Ureterovesical reimplantation.

Fig. 5 – External view of the patient.
Conflicts of interest: The authors have nothing to disclose.

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Question:

The incidence of incisional hernia when using the classic open surgical approach for kidney transplantation is:

A. 0.5%
B. 3–4%
C. 10%
D. 25%

References