CLINICAL CASE

Transperitoneal laparoscopic partial nephrectomy


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Abstract  Partial nephrectomy is recommended by the European Association of Urology and the American Urological Association for managing solid renal masses staged as T1a and for selected T1b cases. The aim of this article was to demonstrate the reproducibility of the laparoscopic technique in partial nephrectomy. We present the clinical case of a 50-year-old woman, with an unremarkable past medical history that was diagnosed with a 3 x 3 cm tumor dependent on the left kidney. A kidney scintigram was done that showed an overall glomerular filtration rate (GFR) of 112 mL/min, left kidney 44%. Surgery duration was 130 minutes, warm ischemia time was 24 minutes, there was blood loss of 140 cc, and hospital stay was 3 days. The final histopathologic study reported a 3.8 cm tumor with negative surgical margins, identifying Fuhrman 2 clear cell renal cell carcinoma (CCRCC). Preoperative creatinine was 0.8 and postoperative creatinine was 1.1. At 12 weeks, a kidney scintigram showed a GFR of 95 mL/min, left kidney 40%. Partial nephrectomy is currently the treatment of choice for organ-confined renal masses. Laparoscopic partial nephrectomy is a safe, effective, and reproducible procedure.

Nefrectomía parcial transperitoneal por laparoscopía

Resumen  La nefrectomía parcial es recomendada por la Sociedad Europea de Urología y la Asociación Americana de Urología, para el manejo de masas renales sólidas, estadificadas como T1a y casos seleccionados T1b. El objetivo es demostrar la reproducibilidad de la técnica laparoscópica en la nefrectomía parcial.
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Introduction

Partial nephrectomy is recommended by the European Association of Urology for the management of T1a and T1b solid renal masses. The absolute indications include cases of patients with one kidney or with bilateral kidney tumors. Relative indications include diminished function secondary to some disease or the possibility of a future decrease in kidney function. Examples of such diseases are: renovascular disease, diabetes, high blood pressure, as well as some hereditary types of renal cell carcinoma (RCC). 1,2 Laparoscopic partial nephrectomy (LPN) remains a method under evaluation that can be established as an alternative to open partial nephrectomy. 3,4 Appropriate tumor excision requires a clear surgical margin of approximately 1 cm. LPN is a changing procedure that is dependent on technological advances in visibility systems, imaging methods, and hemostatic agents. 4-10 Relative contraindications are: pneumoperitoneum intolerance and hilar tumors. LPN includes adequate renal hemostasis after tumor excision and pyelocaliceal reconstruction, all of which is limited in time by warm ischemia. 1-3,11-15 It is currently accepted that this should not be greater than 30 minutes, even though recent studies have proposed 20 minutes as the maximum warm ischemic time. 5,16

Case presentation

A 50-year-old woman with an unremarkable past medical history underwent the study protocol for microscopic hematuria. An upper abdominal ultrasound image revealed a 3 x 3 cm hyperechoic tumor that was dependent on the left renal parenchyma. A computed tomography urography (CTU) scan confirmed the diagnosis of a solid 3.4 cm solid tumor dependent on the left kidney (fig. 1). A kidney scintigram was done showing a global glomerular filtration rate (GFR) of 112 mL/min, left kidney 44%. After general anesthesia and Foley catheter placement, the patient was placed in the left lateral decubitus position.

Pneumoinsufflation at 15 mm of Hg and a flow of 5 L/min was carried out using a Veress needle. Two 10 mm trocars were placed; one for paraumbilical vision and the other for rectal cephalic vision, and two 5 mm trocars were placed; one on the mid axillary line and the other on the posterior axillary line. After exploratory laparoscopy, the colon was mobilized medially until Gerota’s fascia was exposed and opened, locating the tumor (fig.2). The renal hilum vessels were then identified, as was the ureter. Two renal arteries and one renal vein were located. The patient was given intravenous fluids and mannitol before the renal arteries were clamped.

Bulldog clamps 2 were placed at the arteries, initiating the warm ischemic time (fig. 3). Tumorectomy was carried out, followed by pyelocaliceal repair with Monocryl™ 2-0 (fig. 4); all sutures were separate, using the same suture material (fig. 5). The Gelfoam® was left in place, the clamps were removed, and no bleeding was observed. Penrose drains were placed and the surgical specimen was extracted.

Surgery duration was 130 minutes, warm ischemic time was 24 minutes, blood loss was 140 cc, and hospital stay was 3 days. The final histologic study reported a 3.8 cm tumor, Fuhrman 2 clear cell renal carcinoma, and negative surgical margins. Preoperative creatinine was 0.8 mg/dL, postoperative serum creatinine was 1.1 mg/dL, and a kidney scintigram at 12 weeks showed a GFR of 97 mL/min, left kidney 40%.

Figure 1 Contrast-enhanced abdominopelvic tomography scan showing the solid, heterogeneous, mesophytic lesion dependent on the left kidney, measuring approximately 3.4 cm.
The patient was released on the third postoperative day. At the 3, 6, and 9-month follow-up, oncologic and functional control was satisfactory.

Discussion

Hilar control is an essential step in LPN and should not be longer than 30 minutes; Angiotomography (angioCT) was not available in our hospital, but it is important to know the arrangement of the renal artery or arteries. For tumor enucleation, we preferred excision with a 1 cm safety margin at the first sign of not having positive margins. Nephorrhaphy was done with continuous sutures using Monocryl™ 2-0, then 2 or 3 separate sutures using the same Monocryl™2-0, anchored with Hem-o-lok®. In an attempt to reduce the warm ischemic time, we prepared all the material for clamping and nephorrhaphy inside the abdominal cavity. After nephorrhaphy, we removed the clamps, diminished the pneumoinsufflation, and watched for any bleeding, placing the hemostatic silk satin gauze or Gelfoam® over the surgical site. Among the recent advances, Gill et al. 16 presented a “zero ischemia” technique for laparoscopic robotic- assisted partial nephrectomy. It enables tumor dissection without hilar control by the strict monitoring of pharmacologic blood pressure reduction. Eisenberg et al. reported on 15 patients with comorbidities and complex tumors. The mean surgery duration was 3 hours (range: 1-6) and the mean intraoperative blood loss was 150 mL (range: 20 to 400 mL). There were no intraoperative complications and the postoperative complication was a urinary fistula that was conservatively corrected. Hypothermia induction has been proposed as a method for reducing the consequences of kidney ischemia,

Figure 2  Laparoscopic vision of the renal tumor dependent on the upper left pole.

Figure 3  Laparoscopic vision of the renal hilum, vascular structures and ureter, at the moment of clamping one of the renal arteries.

Figure 4  After the tumorectomy, calycorrhaphy and hemostasis of the surgical site was performed with MonocrylTM 2-0 continuous suture. Observe in the circle the presence of the Gelfoam® roll for the nephorrhaphy; this, and the sutures, were introduced into the abdominal cavity prior to the arterial clamping.

Figure 5  Nephorrhaphy with Monocryl™ 2-0 separate sutures anchored with Hem-o-lok®.
and methods have been devised from the laparoscopic application of frappéed ice to the infusion of cold solutions through the ureter, or even the renal artery. A bloodless operative field is essential for adequate tumor excision. Radiofrequency coagulation results in a spherical coagulation that includes a 1 cm margin surrounding the lesion. This area can later be resected with a cold knife even though this procedure has been associated with collecting system and/or vascular damage. Of the hemostatic agents, Floseal® has been related to a significant decrease in hemorrhagic complications, and therefore, its use has been adopted by the majority of centers in which partial nephrectomy is performed.

Conclusions

Partial nephrectomy is currently the treatment of choice for organ-confined renal masses that can anatomically undergo organ-sparing management. Over the past decade, the benefits of partial nephrectomy compared with radical nephrectomy, and the correlation between chronic kidney disease and the risk for cardiovascular events, have been well established.

Conflict of interest

The authors state that there is no conflict of interest.

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References