UROLCHI EN REVISTAS INTERNACIONALES

# Laparoscopic partial nephrectomy: A series of one hundred cases performed by the same surgeon

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## ABSTRACT

INTRODUCTION: Laparoscopic partial nephrectomy (LPN) has become the first-line surgical technique for the management of renal tumors smaller than 4 cm. Its main advantages are an excellent oncologic control together with the preservation of nephron units. Moreover, it implies a shorter length of hospital stay, less postoperative pain, and shorter recovering times for patients. CONTEXT: We included 100 patients who consecutively underwent LPN between years 2000 and 2010 in our institution. AIMS: The aim was to present our experience and to compare it with the results reported in the literature by other centers. SETTINGS AND DESIGN: This was a prospective study. SUBJECTS AND METHODS: One hundred consecutive patients (67 men and 33 women) who underwent LPN within years 2000 and 2010 were included in the study. In all cases, surgery was performed by the same surgeon (JMC). Data were collected retrospectively, including clinical and histopathologic information, as well as surgical and functional results. STATISTICAL ANALYSIS USED: Statistical analysis was performed using the chi-square test and SPSS v17 software. A P–value < 0.05 was considered significant in all the analyses. RESULTS: The indication for LPN was a renal tumor or a complex renal cyst in the 96% of the cases. A retroperitoneal or transperitoneal approach was performed in the 62% and 38% of the cases, respectively. The average size of the tumor was 3.3 cm (range 1–8). The mean surgical time was
103.5 min (range 40–204). The mean estimated blood loss was 193.7 cc. The average hospital length of stay was 50.2 h. Six (6%) patients had complications related to the surgery. The majority (n = 2) was due to intraoperative bleeding. With an average follow-up time of 42.1 months, there is no tumor recurrence reported up to now. CONCLUSIONS: Our results are similar to those reported in the international literature. LPN is a challenging surgical technique that in hands of a trained and experienced surgeon has excellent and reproducible results for the management of small renal masses and cysts.

**Keywords: Partial nephrectomy, renal cancer, laparoscopic.**

## INTRODUCCIÓN

During the last decade, the incidence of renal cell carcinomas (RCCs) has significantly increased mainly due to the better access and quality of imaging techniques, producing a marked increase in the diagnosis of incidental renal masses.[1]

Upon treatment of RCCs, radical nephrectomy is the only accepted curative technique, with excellent oncologic results.[2] However, partial nephrectomy (PN) appears as an alternative to radical surgery in tumors smaller than 4 cm, with equivalent long-term oncologic results in terms of recurrence and survival. In addition, PN offers a better quality of life to patients with RCCs.[3,4]

Since the incorporation of the laparoscopic technique in the urologic practice, laparoscopic partial nephrectomy (LPN) has become a valuable approach in the management of RCCs. LPN has allowed shorter hospital stays, reduced postoperative pain, and shorter recovery times for patients.

The aim of this study is to present our experience and to compare it with the results reported in the literature by other centers.

## SUBJECTS AND METHODS

We conducted a prospective study that included 100 patients who consecutively underwent LPN between years 2000 and 2010. Informed consent was given by all participants. All surgeries were performed by the same surgeon (JMC) with the assistance of two other urologists of the team. All cases were incidentally diagnosed RCCs. Collected data included epidemiologic information, preoperative evaluation, surgical notes, biopsy reports, TNM staging, levels of serum creatinine (pre- and postoperative levels), postoperative complications (Clavien Classification of Surgical Complications), recurrence, and oncologic status of patients during follow-up. Statistical analysis was performed using the chi-square test and SPSS v17 software. A P–value < 0.05 was considered significant in all the analyses. All patients gave their informed consent to participate in the study.

### SURGICAL TECHNIQUE

In all patients, the best suited surgical approach, i.e., trans-

peritoneal or retroperitoneal, was defined considering the localization of the tumor, history of previous surgeries, and patient's anatomic configuration. The dissection of the corresponding kidney was performed, widely exposing the area affected by the tumor. Occasionally, it was necessary to release the perirenal fat completely to mobilize the kidney and allow a better position to perform the partial nephrectomy in a safe and effective way. The dissection of the renal hilium was performed before clamping the hilium for ischemia. Tumor resection was performed under ischemia using scissors over nor mal tissue (not tumor). Samples from the tumor bed were also included for histological defect and decrease the risk of bleeding or urinary fistula formation.[5] After repairing the defect, the clamp was released and the ischemia time registered. The surgical specimen was taken out in an impermeable polyethylene bag through one of the trocar insertion sites. A strict wash with bidistilled water was performed in the surgical area. The kidney was covered with its own fat. Trocar insertion sites were all checked for hemostasia and then stitched.

## COMPLICATIONS

Complications were defined as adverse events happening within 30 days after surgery and were classified as intra- and postoperative.

## EVALUATION OF RENAL FUNCTION, TUMOR RECURRENCE, AND MORTALITY

The renal function was evaluated measuring the levels of serum creatinine pre- and postoperatively. Specific mortality causes and recurrence were analyzed with an average follow-up time of 3.5 years.

## STATISTICAL ANALYSIS USED

Statistical analysis was performed using the chi-square test and SPSS v17 software. A P–value < 0.05 was considered significant in all the analyses.

## RESULTS

A total of 100 patients who underwent LPN between 2000 and 2010 were included in this study. The average age

**Table 1: Characteristics and perioperative data on 100 patients undergoing partial nephrectomy**

| | |
|---|---|
| Mean age (years) (range; SD) | 55.4 (16-80; 12.2) |
| Men | 67 (67%) |
| Women | 33 (33%) |
| Mean preoperative creatinine serum levels (mg/dL) (range; SD) | 1.03 (1.0-2.0; 0.14) |
| Mean postoperative creatinine serum levels (mg/dL) (range; SD) | 1.03 (0.8-2.0; 0.2) |

Table 1: Characteristics and perioperative data on 100 patients undergoing partial nephrectomy.

**Table 2: Anatomical and pathological data**

| Diameter and tumor localization | Frequency (n= 100) | |
|---|---|---|
| Diameter | | |
| ≤ 2 cm | 37 | |
| 2 - 4 cm | 43 | |
| > 4 cm | 20 | |
| Localization | Right kidney | Left kidney |
| Upper pole | 9 | 15 |
| Mid portion (central) | 18 | 29 |
| Lower pole | 12 | 17 |
| Total | 39 | 61 |
| Exophytic | 62 | 38 |
| Histology | Frequency (n=100) | |
| Renal cell carcinoma | 72 | |
| Clear-cell RCC | 63 | |
| Cystic RCC | 9 | |
| Collecting duct RCC | 1 | |
| Benign tumors | 28 | |
| Simple renal cyst | 12 | |
| Angiomyolipoma | 7 | |
| Oncocytoma | 6 | |
| Cortical adenoma | 1 | |
| Chronic pyelonephritis | 1 | |
| Atrophy (lithiasis-related) | 1 | |

Table 2: Anatomical and pathological data.

of the group was 55.4 years, with 67% men (n = 67) and 33% women (n = 33). Average pre- and postoperative creatinine serum levels were both 1.03 mg/dL [Table 1]. The frequency of tumors was higher in the left kidney (61%). Regarding localization within the kidney, most were in the mid-portion (47%), followed by lower and then upper pole (29% and 24%, respectively), as shown in Table 2. Histology showed malignant tumors in 72% of the cases, all of them corresponding to RCCs [Table 2]. LPN was performed retroperitoneally in 62 cases and transperitoneally in 38. The mean ischemia time was 33.2 min [Table 3]. Due to an unfavorable position

**Table 3: Surgical outcomes and complications**

| Surgical characteristics | Frequency (*n*=100) |
|---|---|
| Surgical approach | |
| Retroperitoneal | 62 (62%) |
| Transperitoneal | 38 (38%) |
| Mean surgical time (min) (range; SD) | 103.5 (30-204; 39.1) |
| Intraoperative bleeding (ml) (range; SD) | 193.7 (5-3,000; 395.7) |
| Conversion to open surgery | 5 (5.6%) |
| Due to intraoperative bleeding | 2 |
| Unfavourable position | 3 |
| Mean ischemia time (min) (range; SD) | 33.2 (14-60; 11.4) |
| Mean hospital stay (hours) (range; SD) | 50.2 (24-120; 18.4) |
| **Complications** | **Frequency** |
| Intraoperative | |
| Bleeding | 2 |
| Postoperative | |
| Bleeding | 3 |
| Urinary fistulae | 1 |
| Total | 6 |

Table 3: Surgical outcomes and complications.

are excellent.[10] Different repor ted series with an average follow-up of 3–5 years show specific survival rates of 100%.[11] The benefits of LPN are less postoperative pain, shorter hospital stays, and shorter recovery times.[12] The present study shows the results in a hundred-case series performed by the same surgeon. Most patients were between their fifth or sixth decade of life, with a slight male predominance. With regards to localization, central (mid- portion) tumors were the most frequent in both kidneys, representing the 47% of the total. A historical analysis was done upon tumor localization, showing that LPN on central tumors presents the higher increase along time [Figure 1]. However, despite the greater intrinsic difficulty in the management of tumors in this situation, there was no associated increase in complication rates.

of the tumor, conversion to open surgery was necessary in three cases (see "Discussion"). Complications presented in six patients. Two patients had intraoperative bleeding (one required transfusion) and were managed in a conservative way. Three patients had postoperative bleeding: one required nephrectomy but the others could be managed in a conservative way [Table 3]. The average hospital stay length was 50.2 h. This series has an average follow-up time of 42.1 months, with no tumor recurrence reported up to now.

## DISCUSSION

During 2006, malignant renal tumors reported 940 hospital discharges in Chile. In addition, the Chilean Ministry of Health has projected a rising specific kidney cancer death rate since 1999, which converts it into an emergent health problem for Chilean public health, as has happened in other countries. First reports on laparoscopic management of renal tumors are from 1991 and were performed by Clayman et al.[6-8] Since then, the technique has considerably improved and more and more patients are undergoing laparoscopy.[9] The aim of LPN is to reproduce the principles and results of open surgery adding the benefits of a minimally invasive technique. The repor ted oncologic results provided by LPN

The placement of trocars was always decided at the beginning of surgery. In this way, an unfavorable position was defined as that in which the positioning of instruments did not allow the tumor resection with proper oncologic margins or a satisfactory surgical defect repair (e.g., presence of renal polar arteries that restricted kidney rotation or resection of intrarenal tumors). For this condition three cases were converted to open surgery.

Six cases presented with some kind of complication (intra- or postoperatively). T he analysis of the frequency of complications along time showed that there was an increase from 2000 to 2004, but in the last 5 years the frequency has decreased [Figure 1]. This probably reflects the cumulative surgical experience of our laparoscopic surgeon, allowing with time the management of more complex cases (due to tumor localization or size) without necessarily increasing the risk of complications.

We also analyzed four possible conditions that could increase the risk of complications: age over 65, tumor diameter

bigger than 4 cm, central situation of the tumor, or been operated within the first decade of the series, assuming less surgical experience by then. None of these variables showed a significant statistical association with the development of complications. Finally, in our series no cases of tumor recurrence have been reported and the global and specific survival is 100% with a mean follow-up of 3.5 years.

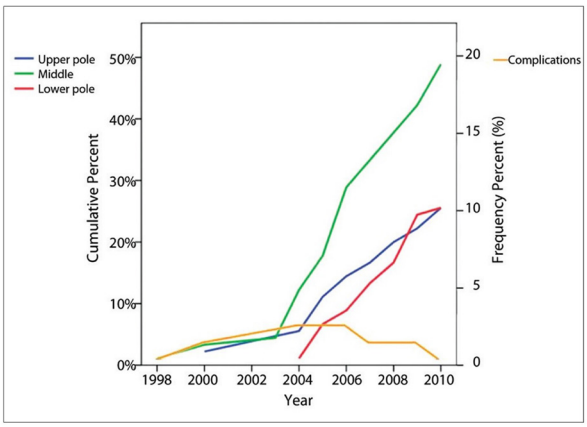


Figure 1: Temporal profile of the localization of the different tumors and frequency of complications along time.

## CONCLUSSION

Our results are similar to those reported in other institutions around the world. With our results we show and emphasize that LPN has an increasingly important role in the actual management of renal tumors, being a safe technique with no differences in oncologic results when compared to results reported with radical surgery. But in order to get these results, LPN has to be performed by surgeons with a solid laparoscopic training, following a rigorous surgical protocol and with the support of a trained team not only to reduce the risk of surgical complications, but also to be able to manage them, if necessary.

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