

# Laparoscopic nephrectomy: impact of implementation

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## Abstract

**Background:** The urologic laparoscopy program started in Calderón Guardia Hospital (Costa Rica) in 2008 at the Urology Department, performing kidney laparoscopic surgeries. After overcoming a steep learning curve, surgical outcomes of minimally invasive laparoscopic surgery were comparable to those established previously by open conventional surgery.

**Methods:** All the patients who had a laparoscopic kidney procedure from 2008 to 2011 were included. The surgical records of the laparoscopic nephrectomy protocol were reviewed. Demographic characteristics, surgical information, surgical technique and approach as well as complications were analyzed. The histological diagnosis was reviewed in the follow up.

**Results:** Since 2008, 200 laparoscopic kidney procedures had been performed, including 150 nephrectomies (radical and simple), 15 pyeloplasties, and 35 symptomatic benign cyst resections.

On average, the neoplastic kidney specimens weighed 479.33 grams and measured 5.94 cms in diameter. More over. Of the 58 benign nephrectomies 45 corresponded to hydronephrosis, 3 pyonephrosis, 8 pyelonephritis and 2 polycystic kidney disease. Only 3% out of the 200 procedures were converted into open surgery, which is comparable to the best urologic centers.

**Conclusion:** The benefits from implementing the kidney laparoscopy program in our institution are clearly established. Variables such as less postoperative pain, postoperative stay, patients reassuming their normal lives and returning to their jobs much faster compared to open surgery. Moreover, oncologic results are the same as in open surgery.

**Keywords:** Nephrectomy, laparoscopy, kidney, surgery, urology

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Since it was described the first laparoscopic nephrectomy (NL), by Clayman in 1991,<sup>1</sup> this procedure has been adopted as the one of choice for the surgical treatment of kidney diseases. Its rapid uptake is due to the clear benefits that it has for the patient, that have been demonstrated in studies with long series.

The experience with laparoscopy in the Hospital “Dr. Rafael Angel Calderon Guardia “(HCG), starts with renal cysts and tumors confined to the kidney, which were not candidates for partial nephrectomy because of anatomic location. The contraindications for laparoscopy are limited.

The adoption of this technique of LN has not widespread throughout the country, mainly outside the central hospitals, because it is perceived as difficult, there is lack of interest in training of the established surgeons, lack of equipment needed for surgery, and lack of time on the part of surgeons to teach.

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**Abbreviations:** HCG, Hospital  
“Dr. Rafael Ángel Calderón  
Guardia”; LN, laparoscopic  
nephrectomy.

The above is because in many cases a great number of surgeries must be performed per day in order to reduce the waiting lists.

This paper describes the experience of setting the program for LN in the Calderon Guardia Hospital, which serves a population of approximately 1,236,997 patients and has 14 beds for men and 4 beds for women, destined to the Urology Department.

## Methods

This study included all patients who underwent a laparoscopic procedure in the kidney in HCG from September 2008 to January 2012. Eligible patients for laparoscopic surgery, initially were those with benign lesions causing pain or morbidity and those suffering from malignant lesions confined to the kidney, with no evidence of extension into the renal vein or surrounding tissues. As experience was

gained, more complex procedures were done. In the present study, we report all LN performed for 45 months from the first laparoscopic nephrectomy in September 2008. All LN are posted, those that were made for benign and malignant pathology.

Surgical reports were reviewed from a protocol of LN, which begins its filling in the operating room prior to the start of the surgery and is completed at the discharge from the hospital. We analyzed demographics, details of the surgery, boarding, surgical technique and complications. Later, in outpatient clinic the histopathological diagnosis is studied.

## Results

In a period of four years, a total of 200 laparoscopic kidney surgeries was performed in the HCG by urologists trained in laparoscopy (RLA / MGS), or by residents under direct supervision. Of these, 150 were nephrectomies, 2, 3 (simple and radical), 15 pyeloplasties and 35 symptomatic cysts. All nephrectomies were developed by transperitoneal approach.

According to the age groups, cases were divided in patients under 50 years old, 51 to 60 years old, 61 to 70 years old and older than 70 years old, corresponding to 39, 24, 23, and 14%, respectively. The 45% of patients were women and 55% were men. There were 70 right and 80 left nephrectomies.

Of the 150 LN, 92 were performed because of kidney cancer and 58 were due to benign pathology. Of the 92 LN due to kidney tumors: 78 were radical, 9 partial and 5 nephroureterectomies. According to the pathology reports: 78 were clear cell carcinoma, 2 oncocytomas, 2 chromophobe, 2 angiomyolipomas, 1 papillar carcinoma, 1 leiomyoma with malignant potential, 1 chronic pyelonephritis and 5 transitional cell tumors.

The average neoplastic kidney weight was 479.33 grams and 5.94 cm in diameter. The pathological stage of renal parenchymal tumors was pT1a-23%, pT1b-39%, pT2, 21%, 13% and pT3-pT4-4% (Table 1). Of the 58 LN performed due to benign pathology, 45 were for hydronephrosis, 3 for pyonephrosis, 8 for pyelonephritis and 2 for polycystic renal disease.

A total of six surgeries had to convert into conventional open surgery (3%) and 4 to hand-assisted surgery (2%). The main reasons for conversion were: 5 laparoscopically uncontrollable bleeding, 4 because of little progress in surgery and one due to ascending colon injury by adhesions. Blood transfusion had to be performed in 3 patients. 58% of the surgeries were performed with three trocars, 31% with four trocars, 7% with five trocars and 4% with a trocar for

**Table 1. General data on the experience of laparoscopic nephrectomy at the HCG, 2008-2012**

<b>Gender</b>	
Male	82 (54,6%)
Female	68 (45,3)
<b>Age</b>	
< 50 years-old	58 (39 %)
50-60 years-old	36 (24 %)
60-70 years-old	34 (23 %)
> 70 years-old	21 (14 %)
<b>Type of Pathology</b>	
Benign renal pathology	58 (38,6%)
Renal tumor	92 (61,3%)
<b>Type of surgery in renal cancer</b>	
Radical nephrectomy	78 (84,8%)
Partial nephrectomy	9 (9,8%)
Nephroureterectomy	5 (5,4%)
<b>Histopathology of the neoplasia</b>	
Clear cells	78 (84,8%)
Transitional	5 (5,4%)
Papillary	3 (3,3%)
Other	6 (6,5%)
<b>Histopathological stage</b>	
pT1a	21 (23%)
pT1b	36 (39%)
pT2	19 (21%)
pT3-pT4	16 (17%)
<b>Types of benign disease</b>	
Hydronephrosis	45 (77,5%)
Pyelonephritis	8 (13,8%)
Pyonephrosis	3 (5,2%)
Polycystic renal disease	2 (3,4%)

hand-assisted surgery. The average bleeding per procedure is 164 cc. Surgical time used during each surgery is 129 min, on average.

The removal of the kidney was performed in 62% of cases, with a Pfannenstiel incision in 17% of the cases, infraumbilical midline on 7%, by the right iliac fossa, on 7%, by the left iliac fossa, 5%, by expansion of a trocar, and 2%, through the navel .

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## Discussion

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Open nephrectomy has been established as the procedure for treating many benign and malignant renal diseases. The morbidity of the procedure is due to the incision made in both transabdominal approach as in lumbotomy.<sup>4, 5</sup> With laparoscopic surgery this wound can be done in a less morbid area in order to remove a diseased kidney and lessen the postoperative pain, analgesic use, hospital stay, recovery time and the rate of transfusion; significantly.

Oncological outcomes, surgical times, esthetic results and complexity of the cases are comparable to global centers of excellence in these procedures.

Nowadays, with the widespread use of ultrasound and computed axial tomography (Fig. 3), the diagnosis of benign and malignant renal diseases is done on earlier stages and in younger patients.

The current goal of minimally invasive surgery is to perform procedures with the same results of traditional surgery, but with less morbidity and mortality. This is achieved with increased surgical skills and overcoming the initial learning curve.<sup>6</sup> Laparoscopic surgery requires a lot of training and dedication.

In the Urology Department of HCG 97% of surgeries due to kidney tumors and benign renal diseases are performed by a laparoscopic approach, which has been of great importance to the Department, because the rotation of hospital beds is very high and more patients can be admitted to solve a greater number of urological disorders.<sup>7</sup> A disadvantage of the program is that because almost all procedures are performed by a laparoscopic approach, residents are less likely to perform open nephrectomies. However, they are acquiring skills in a surgical approach that was almost nonexistent in the country five years ago.

**Conflict of interest:** no conflict of interest.

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