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Laparoscopic nephrectomy in renal pathologies: A single-center experience

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ABSTRACT

Introduction: This study aimed to retrospectively evaluate our first experience of laparoscopic nephrectomy for benign or malignant renal pathologies.

Materials and Methods: This study evaluated the data of 32 patients who underwent laparoscopic simple nephrectomy and laparoscopic radical nephrectomy for benign and malign kidney pathologies in our clinic between March, 2016 and January, 2020. Demographic characteristics, operation time, blood loss, duration of hospital stay, pathology, and intraoperative and postoperative complications were examined.

Results: Laparoscopic simple nephrectomy was performed in 17 (53.2%) and laparoscopic radical nephrectomy was performed in 15 (45.8%) of 32 patients. The median age was 57.8 (range, 19–86) years. While 19 (59.4%) of the renal pathologies were on the right side, 13 (40.6%) were on the left side. The median operation time was 136 (range, 102–262) min. Open surgery was started because the kidney was highly adherent to the surrounding tissues in two (6.3%) patients. In the postoperative period, one unit of blood was transfused to one (3.1%) patient. The median hospital stay was 4.1 (range, 3–8) days.

Conclusion: Laparoscopic nephrectomy is a minimally invasive surgical method that can be performed safely and effectively. The most important advantages of laparoscopic nephrectomy over open surgery are better tolerance, shorter hospital stay, less need for postoperative pain relief, and better cosmetic results.

Keywords: Experience; laparoscopy; nephrectomy.

Introduction

Today, laparoscopic methods have started to replace open interventions with new techniques developed in urological surgery, as in many surgical branches.[1,2] Thanks to the increase in the skills of urologists in this field and the laparoscopic devices and techniques developed in parallel with this, many urological procedures have started to be successfully performed laparoscopically.[3]

Laparoscopic nephrectomy (LN) has become an alternative method to open nephrectomy in experienced cen-

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ters. Laparoscopic nephrectomy was first performed by Clayman et al.[4] in 1991. Later, the application of the first partial nephrectomy by Winfield[5] and the introduction of laparoscopic retroperitoneal nephrectomy with Gaur[6] expanded the application area of laparoscopy in the kidney. The application of laparoscopic nephrectomy in benign renal pathologies in many centers and successful results have led to the application of this method in malignant renal tumors. Laparoscopic renal operations provide less hospital stays, faster return to normal activities, better cosmetic results, and desired oncological control.[7]

In our study, the first results are presented considering the indications, technique and complications of our patients treated with LN method in our clinic.

Materials and Methods

Study Setting and Population

This retrospective observational study was approved by the Ethics Committee of Sutcu Imam University Medical Faculty with decision number 2020/12/13. The data of 32 patients were evaluated who underwent LN due to renal pathologies in our clinic between March 2016 and January 2020. Laparoscopic simple nephrectomy (LSN) was performed in 17 (53.2%) patients with the diagnosis of non-functioning kidney, and laparoscopic radical nephrectomy (LRN) operation was performed in 15 (46.8%) patients with the diagnosis of kidney tumor. The patients were evaluated retrospectively in terms of age, gender, laterality, mass size, smoking and hypertension history, pathology result, blood transfusion, operation time, hospital stay, peroperative and postoperative complications, and drain removal time.

Operation Technique

The transperitoneal approach was preferred for the operation in all patients. Under general anesthesia, 45° lateral decubitus position was given to the patients. The first entry was made with an optical trocar. Then pneumoperitoneum was created. Using a visual trigger trocar, a 10 mm trocar was inserted 2–3 cm below the arcus costarum above the navel level in the midclavicular line. A second 10 mm trocar was placed from the lateral border of the rectus muscle just below the arcus costarum. The third 5 mm trocar was placed 1–2 cm below the 11th rib in the anterior axillary line. While 3 ports were generally used on the left, a 5–mm 4th port was inserted when liver retraction was required on the right. Intraabdominal working pressure was reduced to 12 mmHg after the trocars were inserted. Both ultrasonic energy source (Harmonic Scalper-Ethicon ®) and thermal energy source (Ligasure-Covidien ®) were used during dissection. Hem-o-lok clip (Teleflex ®) was used to close the important (larger than 7 mm) vascular structures in the renal hilum, while metal clips or ligasure were used for insignificant (less than 7 mm) vascular structures. Bleeding control was performed under low pressure (6 mmHg). The specimens were taken out of the body with the help of the incision slightly enlarged and after the 20 Fr pezzer drain was placed.

Statistical Analysis

The analysis of the data was done in the IBM SPSS Statistics 22.0 (IBM Corporation, Armonk, NY, USA) package program. Continuous variables were presented as median and categorical data were presented as number and percentages.

Results

All demographic and clinical data of the patients are presented in Table 1. 15 (46.8%) of the patients were male and

Table 1. Demographic and clinical data of the patients

Parameters	
Patients, n	32
Age, years	57.8 (19-86)
Gender, n (%)	
Male	15 (46.8)
Female	17 (53.2)
Operation type, n (%)	
LSN	17 (53.2)
LRN	15 (46.8)
Laterality, n (%)	
Right	19 (59.4)
Left	13 (40.6)
Operation time, minutes	136 (98-262)
Bleeding (ml)	200 (200-250)
Blood transfusion, n (%)	1 (3.1)
Drain duration (day)	2.2 (2-4)
Complication, n (%)	2* (6.3)
Hospital stay, day	4.1 (3-8)

n: Number; *Starting open operation; LSN: Laparoscopic simple nephrectomy; LRN: Laparoskopik radical nephrectomy.

17 (53.2%) were female. The median age of our patients was 57.8 (19–86) years. While 19 (59.4%) of the renal pathologies were on the right side, 13 (40.6%) of them were on the left side. LSN was applied to 17 (53.2%) patients and LRN was applied to 15 (45.8%) patients. 11 (34.4%) of our patients had a history of smoking and 9 (28.1%) of them had hypertension. While a 4th port was required in 12 (37.5%) patients, 3 ports were used in other cases. No blood transfusion was applied to any patient during the surgery. Open surgery was performed in 2 (6.3%) patients because the kidney was highly adherent to the surrounding tissues. The median operation time was 136 (102–262) minutes. In the postoperative period, one unit of blood was transfused to one (3.1%) patient. Postoperative analgesia was provided with diclofenac sodium or narcotic analgesic in all patients. In the postoperative period, 3 (9.4%) patients had nausea and vomiting, 2 (6.3%) patients had fever, and 3 (9.4%) patients had subileus. There were no postoperative complications in other patients. The drains were removed in a median of 2.2 (2–4) days. The median length of stay in the hospital was 4.1 (3–8) days. Postoperative patients were called for a control at the postoperative 2nd week and at the 1st and 6th months afterwards.

The result of the pathological examination of the specimens; 17 cases (53.2%) were reported as benign and 15 cases (46.8%) as malignant. Surgical margins were pathologically negative in all malignant cases. The average follow-up periods of these patients were 6 (1–21) months. There are still no signs of local or systemic metastasis and they continue to follow-up. The details of the pathology results are given in Table 2.

Table 2. Pathological results of patients who underwent laparoscopic nephrectomy

	n	%
Malign	15	46.8
Clear cell	10	31.2
Chromophobe	1	3.1
Papillary	1	3.1
Multilocular cystic	3	9.4
Benign	17	53.2
Oncocytoma	2	6.3
Angiomyolipoma	1	3.1
Chronic pyelonephritis	12	37.5
Others	2	6.3

Discussion

After Clayman et al.'s[4] definition of LN, this method is widely used in renal surgery. It has replaced open surgery in benign and malignant diseases of the kidney.[8] There is no significant difference between open radical nephrectomy and LRN in terms of surgical success.[9] However, LRN has less blood loss, less morbidity, shorter hospital stay, early return to daily life and better cosmetic results.[10]

The different methods can be applied in LN such as transperitoneal and retroperitoneal. Although the choice of method is decided according to the patient's previous surgical history, the presence of systemic disease, and if there is a malignant mass, the location of the mass, the most important criterion is the surgeon's experience.[11] Advantage of the transperitoneal approach; It provides a wider working area, the presence of organs such as the spleen, liver and colon with distinct anatomical boundaries, and better maneuverability since the distance between the port sites is sufficient.[12] In the retroperitoneal approach, the short operation time, better postoperative bowel function due to the work away from the abdominal organs, and shorter hospital stay are advantageous. On the other hand, in the retroperitoneal approach, the working area is narrow, the abdominal organs are not easily recognized, and the learning curve is long.[13,14] Although it was thought that ileus may develop in operations performed with the transperitoneal method at first, in a prospective study comparing these two techniques, it was observed that there was no difference in postoperative ileus.[15] We performed all the procedures in this series transperitoneally and we did not find any major complications in any of our patients due to this method.

The complications in LN are generally discussed under three headings. The first of these is seen during the insertion of ports such as liver damage and abdominal wall hematoma. Second, intraoperative complications can be seen. These can be in the form of vascular injury, bowel injury, spleen injury, and failed organ removal. Finally, they are postoperative complications in which respiratory and gastrointestinal problems are seen.[16,17] Gill et al. reported the complication rate of 16% in laparoscopic nephrectomies, and the rate of conversion to open surgery as 5% in a multi-center study, Chan et al. 4% and 1.7%, and Keeley and Tolley reported these rates as 3% and 5% in the first 100 cases.[18] In our series, 2 patients with non-functioning kidneys with stones were converted to open surgery due to difficulty in dissection. Our conversion rate to open sur-

gery was 6.3%, and this rate was comparable to the rates in large series in the literature.

Although LRN is most commonly applied in T1 and T2 tumors, it has been reported that it is also applied in larger tumors. With increasing experience, LRN is applied to patients with lymph node involvement, patients with preoperative level 1 renal vein involvement and patients with locally invasive disease.[19] The median tumor diameter was 5.8 cm of 15 patients in whom we applied LRN and all of these cases were completed laparoscopically.

The mean operation time was 181 minutes in Demir et al.'s[12] LN series of 32 cases, 115.6 minutes in the series of 54 cases by Dağgülli et al.,[20] while it was 136 minutes in our series. Although these were our first experiences in laparoscopy, we observed that as our experience of surgery increased, the duration of surgery was significantly shortened in later cases, so we think that our operations were completed in accordance with the literature.

The long learning curve is one of the challenges in laparoscopic surgery. Vallancien et al. reported that at least 50 cases were required for the initial learning curve.[21] However, we think that this may vary depending on the person and the type of procedures performed. For a surgeon who is new to laparoscopy, we think that the practices and training courses on training boxes before the operating room are extremely important. Additionally, we believe that the increasing experience with the number of laparoscopic surgeries, as well as the increase in the experience of assistant healthcare personnel, is an important factor in shortening the operation time.

Conclusion

As a result, laparoscopy has developed rapidly in recent years and has found wide application area in urological operations and it has now replaced open nephrectomy. Especially the factors to be considered in the initial period are good preparation and patient selection. We think that LN can be performed with low complication rates even in the first experiences, if we stick to the basic principles of laparoscopic surgery.

Disclosures

Ethichs Committee Approval: The study was approved by the Kahramanmaras Sutçu Imam University Local Ethics Commitee with decision number 2020/12/13.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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