



Perioperative and Pathological Outcome of Laparoscopic Radical Nephrectomy for Renal Cell Carcinoma (RCC)

Mohammad Salahuddin Faruque¹, AKM Khurshidul Alam²

Article information

Received: 30-06-2023

Accepted: 20-08-2023

Cite this article:

Faruque MS, Alam AKMK. Perioperative and Pathological Outcome of Laparoscopic Radical Nephrectomy for Renal Cell Carcinoma (RCC). *Sir Salimullah Med Coll J* 2023; 31: 112-115.

Key words:

Laparoscopic radical nephrectomy (LRN), Renal cell carcinoma (RCC), Histopathology.

Abstract

Introduction: Laparoscopy has become a well-accepted technique to treat malignant renal conditions. For renal cell carcinoma laparoscopic radical nephrectomy is the treatment of choice in selected patients.

Objective: To see the feasibility, perioperative and pathological outcome of laparoscopic radical nephrectomy (LRN) in different size of tumour in renal cell carcinoma (RCC).

Materials and methods: A prospective analysis was performed in 29 patients who underwent laparoscopic radical nephrectomy for RCC between October 2017 and September 2019. Patients age, tumor size, co-morbidity index, operating time, duration of hospitalization, complications and pathology were recorded.

Results: Nineteen male and ten female patients were treated laparoscopically and conversion to open surgery was not required in any case. The age ranged from 30 to 72 years, tumor size varied from 5 to 15 cm and one patient had left renal vein thrombus. The operative time ranged from 60 to 180 minutes and blood loss was 50 to 150 mL. Nine patients required blood transfusion. Ileus developed in 3 patients, port site infection in 4 patients, fever in 2 patients and respiratory insufficiency in another two patients post operatively which was treated accordingly. There was no major complications and surgery related mortality. Pathological outcome was recorded after getting histopathology reports.

Conclusion: The laparoscopic radical nephrectomy for RCC is safe and oncologically sound. It may be done in large tumour also. The process constitutes minimal invasiveness, low death rates, minimal intraoperative blood loss and fast rehabilitation of the patients. Different pathological sub type may predict future outcome.

Introduction

Nephrectomy is one of the most common ablative surgeries performed by urologists. Apart from the psychological trauma of losing a kidney, the patient usually undergoes significant discomfort and disfigurement due to the extensive surgical incision. The traditional approaches require a large muscle cutting skin incision in order to reach the organ.

Until the last decade there was no option but to undergo this mutilation in order to achieve the end result.¹

Renal cell carcinoma is the most common malignancy of kidney accounting for 3% of adult malignancies. More sensitive imaging techniques including USG and CT scan with contrast have

1. Associate Professor, Uro-oncology, Department of Urology, Bangabandhu Sheikh Mujib Medical University, Shahabagh, Dhaka 1000.

2. Professor, Department of Urology, Bangabandhu Sheikh Mujib Medical University, Shahabagh, Dhaka 1000.

Correspondence: Dr. Mohammad Salahuddin Faruque, Associate Professor, Uro-oncology, Department of Urology, Room no. 432, Block C, Bangabandhu Sheikh Mujib Medical University, Shahabagh, Dhaka 1000. E mail: faruque24th@gmail.com. Mobile No: 01914292423

helped in the early and incidental detection of renal cancer. Laparoscopic radical nephrectomy has become the preferred method for renal cancer due to the radical removal of tumor with all added advantages of laparoscopic surgery like less pain, rapid convalescence, and improved cosmesis.²

In 1991 Ralph Clayman of St Louis, USA published the first laparoscopic nephrectomy on an 85-year-old woman for an incidental right renal mass, which turned out to be an oncocytoma.³

Renal cell carcinoma (RCC) arises from the tubular epithelial cells in the renal parenchyma and is the most common cancer in the kidneys. The majority of RCC are diagnosed in patients aged between 50 and 70 years. Since localized RCC is not sensitive to radiotherapy or chemotherapy, the most important treatment modality for localized RCC is surgical resection [4]. Laparoscopic RN is now established as a less morbid alternative to open surgery in the management of low- to moderate volume (10 to 12 cm or smaller), localized RCCs with no local invasion, limited or no venous involvement, and manageable lymphadenopathy. Several studies on outcomes after RN for localized RCC have now demonstrated that the risk of postoperative recurrent malignant disease is stage dependent.⁵

Guidelines for the diagnosis and treatment of RCC published by authoritative organizations, such as the National Comprehensive Cancer Network (NCCN)⁶ and European Association of Urology (EAU)⁷, recommend initial treatment with radical nephrectomy for patients with clinical stage I (T1N0M0) RCC who are not suitable for partial nephrectomy and for patients with clinical stage II (T2N0M0) RCC. The oncological prognosis of patients treated by laparoscopic radical nephrectomy has been reported that the clinical outcomes did not differ from those of patients treated using the conventional open procedure.⁸⁻¹² Laparoscopic radical nephrectomy has drawn much attention because of its minimal invasiveness and efficacy, as well as its potential to cause fewer trauma and bleeding, leading to faster postoperative recovery and a shorter length of hospitalization.¹³ Different Fuhrman grade and

subtype of RCC could help urologist to predict cancer related targeted therapy, oncological outcome and prognosis of the disease as well as rational use of adjuvant therapy.

Methods

Between October 2017 and September 2019 cross sectional study conducted in patients with localized RCC who underwent laparoscopic radical nephrectomy at Bangabandhu Sheikh Mujib Medical University hospital by a single surgeon and who met the inclusion and exclusion criteria listed below were included in the study.

Inclusion criteria: (1) complete clinical and followup data, (2) without a history of previous treatment with radiofrequency ablation or cryoablation before laparoscopic radical nephrectomy, and (3) operable primary tumor.

Exclusion criteria: (1) previous nonsurgical treatment such as ablation before surgery, and (2) recurrent or metastatic tumor. A total of 29 patients were operated by laparoscopic radical nephrectomy. Age ranged from 30-72 years, of them 19 patients were male and 10 were female. Laboratory examination, abdominal ultrasound, and chest and abdominal computed tomography (CT) were performed before surgery to determine the clinical stage and exclude distant metastasis and bone scan were performed as necessary to confirm the clinical stage. Tumor size was measured as the longest diameter of each tumor in any single plane of the preoperative imaging study. Laparoscopic radical nephrectomy was performed only by the transabdominal laparoscopic approach, not by hand assisted techniques. Comorbidities were evaluated using the Charlson comorbidity index. The tumor stage was based on the UICC 2017 of the TNM classification of RCC, which was proposed by the Union for International Cancer Control (UICC) and the American Joint Committee on Cancer (AJCC). Histological subtypes were classified according to the UICC and AJCC recommendations and tumor grades were determined according to the grading system of Fuhrman. Standard surgical steps were followed for right or left sided tumour.

Post operative complications were recorded and treated accordingly. Follow-up status was evaluated using physical examinations, laboratory tests, chest CT and abdominal CT scans according to the surveillance protocols. Appropriate referral were sent to medical oncology department for expert opinion.

Results

Age ranged from 30 to 72 years. Right sided RCC was 17 in number and left sided was 12. Male patients were 19 and female were 10 in number. Size of the tumour varied from 5 to 15 centimeter. Renal vein thrombus was found in one patient which was treated laparoscopically with some difficulty. Operating time was 60 minutes for small tumour and upto 180 minutes for larger tumour. Conversion was not done in any patient. Estimated blood loss ranged from 50 to 150ml. Transfusion of whole blood was required in nine patients. Hospital stay ranged from 2 to 5 days.

Post operative complication was encountered in fewer number of patient, mostly minor. Ileus in 3 patients, port site infection in 4 patients, fever in 2 patients and respiratory insufficiency in another two patients. No post operative 30 day mortality was noted. 19 patients (65.51%) had T1 disease, 9 patients had T2(31.03) and one patient (3.44)had T3a disease who had left renal vein thrombus. Fuhrman grade 1 was found in 19 (65.51%), grade 2 (6.89%) in 9 and grade 3 in 1 (3.44%) cases respectively. 26 patients (89.65%) had clear cell type, 2 patient (6.89%) had papillary type and 1 patient (3.44%) had chromophobe type RCC. Lymphovascular invasion was encountered in 3 cases and one had sarcomatoid differentiation. Resection margin was free from tumour in all 29 patients.

Table -I: Baseline characteristics, n=29

Age	30-72 years
Charlson comorbidity index	
≤3	10
< 3	19
Clinical stage	
cT1bN0M0	19 (65.51%)
cT2aN0M0	5 (17.24%)
cT2bN0M0	4 (13.79%)
cT23aN0M0	1 (3.44%)

Table II: Surgical outcomes of the Patients (n=29)

Outcome	
Tumour size	5-15 cm
Laterality	
Right	17
Left	12
Renal vein thrombus	1 left side
Operative time (min),	60-180 mins
Conversion to open surgery	None
Blood loss (mL),	50-200
Blood transfusion (n)	9 patients
Hospitalization (days),	2-5
Postoperative 30-day complications, n (%)	
Ileus	3 (10.34%)
Port site infection	4 (13.79%)
Fever	2 (6.89%)
Respiratory insufficiency	2 (6.89%)
Intraoperative mortality,	None
Postoperative 30-day mortality, n (%)	None

Table III

Pathological outcomes of the Patients (n=29)

Pathology	Outcome
Pathological TNM stage, n (%)	
cT1bN0M0	19 (65.51%)
cT2aN0M0	5 (17.24%)
cT2bN0M0	4 (13.79%)
cT3aN0M0	1 (3.44%)
Fuhrman grade, n (%)	
1	19 (65.51%)
2	9 (31.03%)
3	1 (3.44%)
4	0
Subtype	
Clear cell	26 (89.65%)
Papillary	2 (6.89%)
Chromophobe	1 (3.44%)
Lymphovascular invasion, n (%)	3 (10.34%)
Sarcomatoid differentiation, n (%)	1 (3.44%)
Positive surgical margins, n (%)	None

Discussion

Localized renal masses, clinical stages T1 and T2, have increased in incidence owing to more widespread use of cross-sectional imaging and now represent a relatively common clinical scenario.

Radical nephrectomy is considered “gold standard” curative operation for localized RCC with their report of 66% and 64% overall survival for stage I and II tumors, respectively.⁶ Laparoscopic approaches are now accepted as standard in the field for RN in appropriately selected patients, providing equivalent oncologic outcomes to the open counterpart with the advantages of more rapid recovery. Laparoscopic radical nephrectomy can be performed by either the transabdominal or retroperitoneal approach, both of which have advantages and disadvantages. The transabdominal route enables a large operating space with a clear view of the anatomic layers, but there is a potential risk of damaging the abdominal organs.⁴ Robotic nephrectomy is another option to treat these malignant renal mass. In our country open radical nephrectomy is the standard of care for organ confined RCC. Laparoscopic radical nephrectomy is gaining popularity now a days in our country. It has a steep learning curve but can be done if instrumental support and guided skill are provided.

In the present study tumour size ranged from 5 to 15 cm, mostly right sided tumour with a male predominance.

One patient had left renal vein thrombus which was successfully treated laparoscopically. For T1 tumour operating time was within an hour but if the tumour is big like T2 or T3 it may take several hours because of excessive oozing or difficult organ retraction. Blood loss is more if the tumour is big and it was from 50 to 150 ml. Nine of my patient needed blood transfusion, the number is more compared to other investigators may be due to our pre anesthetic requirement. Post operative ileus was treated by restricted oral diet, and rectal stimulant, port site infection was treated by regular dressing and appropriate antibiotics. Fever and respiratory complications were treated accordingly. There were no major complications encountered. Post operative wound related morbidity and analgesic requirement was low. Of the histologic subtype Clear cell types was found commonest in 26 patients (89.65%), where as 2 patients (6.89%) had papillary type and 1 patient (3.44%) had chromophobe type RCC. Surgical margin was negative In all patients. Follow up period was extremely low which was short term only for 18 months.

However, this study has several limitations. First, it was based on a single-center based, second, the sample size was small, and the follow-up period was not very long. These limitations should be considered when interpreting our results.

Conclusion

The laparoscopic radical nephrectomy for RCC is safe and oncologically sound. It may be done also for large size tumours. For organ confined RCC it is the standard of care and the process constitutes minimal invasiveness, low mortality rates, minimal intraoperative blood loss and fast rehabilitation of the patients. Different Fuhrman grade and subtype of RCC could help urologist to predict cancer related targeted therapy, cancer specific survival and prognosis of the disease as well as rational use of adjuvant therapy.

References

1. Zaidi Z, Samad L, Aquil S. Laparoscopic nephrectomy: technique and outcome. *JPMA*. 2007 Jul;57:355-8.
2. Clayman RV, Kavoussi LR, Soper NJ, Dierks SM, Meretyk S, Darcy MD, Long SR, Roemer FD, Pingleton ED, Thomson PG. Laparoscopic nephrectomy. *New England Journal of Medicine*. 1991 May 9;324(19):1370-1.
3. Deo SV, Kelkar DS. Laparoscopic right radical nephrectomy. *Journal of Surgical Technique and Case Report*. 2011 Jul;3(2):106.
4. Liu J, Song R, Cai h, Lu C. Outcomes of laparoscopic radical nephrectomy for elderly patients with localized renal cell carcinoma. *JBUON*, 2019; 24(5): 2147-2154.
5. Steven C. Campbell, Brian R. Lane. Malignant Renal Tumors. In: Wein, Kavoussi, Partin and Peters (eds); *Campbell-Walsh urology*, 11th ed, Elsevier PP 1314-1364.
6. Motzer RJ, Jonasch E, Agarwal N et al. Kidney Cancer, Version 2.2017, NCCN Clinical Practice Guidelines in Oncology. *J Natl Compr Canc Netw* 2017;15:804-34.
7. Ljungberg B, Bensalah K, Canfield S et al. EAU guidelines on renal cell carcinoma: 2014 update. *Eur Urol* 2015;67:913-24.
8. Bragayrac LA, Abbotoy D, Attwood K et al. Outcomes of Minimal Invasive vs Open Radical Nephrectomy for the Treatment of Locally Advanced Renal-Cell Carcinoma. *J Endourol* 2016;30:871-6.
9. Bianchi M, Becker A, Abdollah F et al. Rates of open versus laparoscopic and partial versus radical nephrectomy for T1a renal cell carcinoma: a population-based evaluation. *Int J Urol* 2013;20:1064-71.
10. Golombos DM, Chughtai B, Trinh QD et al. Minimally invasive vs open nephrectomy in the modern era: does approach matter? *World J Urol* 2017;35:1557-68.
11. Permpongkosol S, Chan DY, Link RE et al. Laparoscopic radical nephrectomy: long-term outcomes. *J Endourol* 2005;19:628-33.
12. Steinberg AP, Finelli A, Desai MM et al. Laparoscopic radical nephrectomy for large (greater than 7 cm, T2) renal tumors. *J Urol* 2004;172:2172-6.
13. Hung SF, Wang SM, Chung SD, Kuen Lai M, HowHuang K. Long-term oncologic outcomes of hand-assisted retroperitoneoscopic radical nephrectomy to treat clinically localized renal cell carcinoma. *Journal of the Formosan Medical Association*, 2012;111(1), 41-44.