SHORT COMMUNICATION

Initial experience of laparoscopic retroperitoneal partial nephrectomy in an academic hospital in Malaysia

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SUMMARY

Laparoscopic retroperitoneal partial nephrectomy (LRPN) is a technically demanding kidney surgery due to the limited space and unfamiliar approach in the retroperitoneal space. The aim of this study is to review the outcome of our initial experience in performing this procedure. All patients who underwent LRPN between 2019 to 2022 were included in this retrospective review. A total of 23 patients underwent LRPN. The mean operating time was 178±43 minutes and mean warm ischemia time was 20±5 minutes. The average estimated blood lost was 89±68ml and the mean postoperative hospital stay was 3.6±0.8 days. Two patients (11.1%) had positive margin and no local recurrence was seen after mean follow up of 15.8±12.0 months. Our initial experience on LRPN showed promising results to perform partial nephrectomy safely and effectively

KEYWORDS:
Nephrectomy, Kidney, Laparoscopy, Surgery

INTRODUCTION

Radical nephrectomy had been the standard treatment of localized renal tumour. It was performed to achieve an optimum oncological outcome, but this is associated with loss of renal function and a potential increase in cardiovascular events.[1,2] Hence, nephron sparing surgery or partial nephrectomy was recommended for the treatment of small renal tumour with comparable oncological outcome and less adverse events.[3]

Laparoscopic partial nephrectomy subsequently gained traction with comparable oncological outcomes to open surgery and better peri-operative outcome such as less blood loss, less transfusion, and shorter hospital stay.[4] Laparoscopic retroperitoneal partial nephrectomy (LRPN) is one of the more technically demanding kidney surgeries due to the limited space and unfamiliar approach. There are advantages with this approach including avoiding hostile intraperitoneal environment, containment of spillage in the retroperitoneal space, and faster postoperative recovery.[5-7]

Our centre started performing LRPN in February 2019 and since then, it has been our preferred technique for partial nephrectomy. This paper highlights our surgical technique and the outcome of our initial experience in performing LRPN.

MATERIALS AND METHODS

A retrospective data collection was done for all consecutive patients who underwent LRPN in Hospital Canselor Tuanku Muhriz, Universiti Kebangsaan Malaysia between February 2019 and April 2022. Patients' demographic data, characteristic of lesions, peri-operative data, histopathology findings, pre-, and post-operative serum creatinine were collected and analysed. Post-operative serum creatinine is defined as serum creatinine level taken at least one month after surgery.

Statistical analyses were performed using SPSS ver. 26.0 for Windows (IBM Corp., Armonk, NY, USA). Data with parametric distribution were expressed as mean ± SD while data with non-parametric distribution were expressed as median (interquartile range (IQR)). The correlation between various factors, i.e., characteristic of lesions, peri-operative parameters, and serum creatinine, were analysed using Pearson correlation (continuous variables) and Chi-square test (categorical variables).

Patients who were suitable for LRPN were selected and consented for surgery. Following general anaesthesia, patient was placed in flank position with ipsilateral side up on a flexed table. A 3-cm skin incision was made at the posterior axillary line below the 12th rib and thoracolumbar fascia was breached with forceps. Retroperitoneal space was created with finger dissection and expanded using an inflated sterile glove with 700–800 ml of air. A 12-mm camera port was inserted above the iliac crest and another two working ports were inserted at the anterior axillary line and the initial incision site.

After identification of the peritoneal reflection and lateroconal fascia, the fascia was incised to expose perirenal fat which was then mobilised to expose the tumour. Renal artery was identified, skeletonized, and prepared for clamping. Tumour margin was then identified and marked. Intraoperative ultrasound was used for endophytic tumour and tumour margin identification if required.

Bulldog clamp was applied to the renal artery. Tumour with a rim of normal tissue was excised using cold scissor. Stratafix™ spiral knotless tissue control device (Ethicon, NJ, USA) size 2/0 was used to close the medula and renal cortex in running fashion and Hem-o-lok clips (Weck Closure Systems, Research Triangle Park, NC, USA) were applied to

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Table I: Characteristics of the renal lesions

	n	%
Radius		
<4cm	14	60.9
4-7cm	9	39.1
>7cm	0	0
Laterality		
Right	17	73.9
Left	6	26.1
Anterior or Posterior		
Anterior	13	56.6
Posterior	10	43.5
Tumour location		
Upper pole	8	34.8
Mid pole	11	47.8
Lower pole	4	17.4
Exophytic or Endophytic		
Exophytic	16	69.6
Endophytic	7	30.4
Complexity (RENAL nephrometry score)		
Low (4-6)	12	52.2
Intermediate (7-9)	11	47.8

RENAL nephrometry score – scoring system to predict the complexity of the renal mass and the potential complications associated with partial nephrectomy. A higher score indicates a more complex renal mass and higher likelihood of complication from surgery.

Table II: Perioperative outcomes

	Mean	SD
Operating time (min)	178	±43
Warm ischaemia time (minutes)	20	±5
Estimated blood loss (milliliter)	89	±68
Mean post-operative hospital stay (days)	3.6	±0.8

keep suture in place. Bulldog clamp was removed and haemostasis was checked (Figure 1).

RESULTS

A total of 15 males (65.2%) and 8 females (34.8%) with a mean age of 60.7 ± 10.3 years underwent LRPN during this period. The characteristics of the lesions were listed in Table I and the peri-operative outcomes were summarised in Table II. The mean nephrometry score was 6 ± 1. There is a significant positive correlation between nephrometry score and warm ischemia time (WIT) (r=0.632, $p<0.05$), and nephrometry score and estimated blood loss (r=0.624, $p<0.05$).

One patient (4.3%) had radical nephrectomy due to segmental artery injury. There were 2 cases (8.7%) of Clavien Dindo Grade ≥2 complications. One patient had severe pain which required patient-controlled analgesia while the other patient had metabolic acidosis required monitoring at intensive care unit.

Twenty patients have post-operative serum creatinine results. Compared with pre-operative creatinine, there was an increase of serum creatinine by 8.5 ± 20.0 umol/L, or 13% (2.2-23.0%) increase. There is a significant positive correlation between warm ischemia time and percentage of change in serum creatinine (r=0.492, $p<0.05$).

The histopathology examinations revealed 18 renal cell carcinoma (RCC) (78.3%), 4 angiomyolipoma (17.4%), and one complex renal cyst (4.3%). Among the patients with RCC, there were two patients who had positive surgical margin (11.1%). No local recurrence or port site metastases was noted in patients with RCC after a mean follow-up of 15.8 ± 12.0 months.

DISCUSSION

LRPN has not been widely adopted due to the technical challenge faced during surgery. However, it provides a direct access to the renal hilum and posterior tumours. Meta-analysis had shown the additional benefits of less blood loss, shorter operating time, and shorter hospital stay in patients

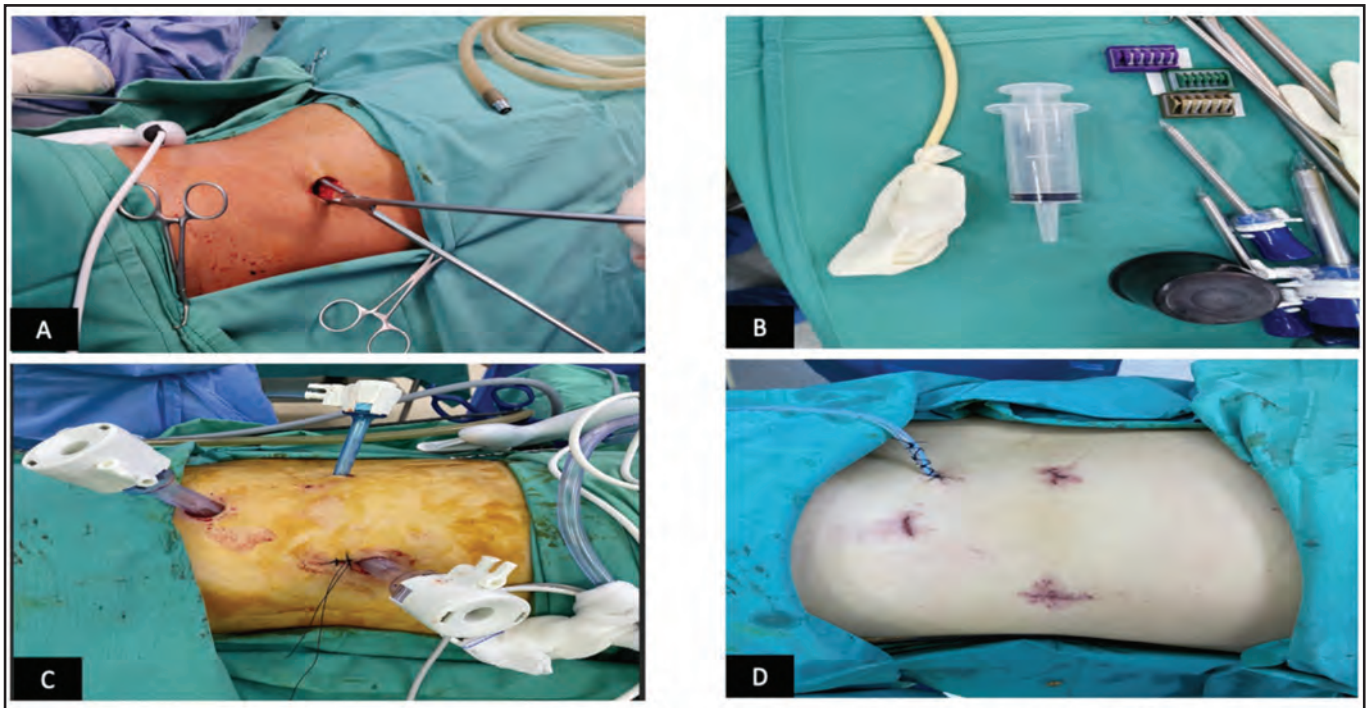

Figure 1: (A) Thoracodorsal fascia breach with forceps. (B) Sterile glove expander. (C) Port position. (D) Wound closure with drain insertion (*photographs with permission from patient)*

with LRPN.[6] Even a recent prospective multi-centre trial showed that minimally invasive retroperitoneal approach had lower complication rate and faster recovery.[7]

In our initial experience, our mean operating time was 178 minutes. The time was slightly longer compared to other series by Porpiglia et al. (median 150 min), Kumar et al. (mean 132.5 min), and Ouzaid et al. (mean 154 min).[7-9] Despite a longer operating time, our WIT was an average of 20 minutes which was comparable to the other series in the range of 20–35 minutes.[5,7-9] The longer operating time was likely due to our initial learning curve but by keeping the WIT short, the impact on the renal function was minimised.

The patients had an average increased serum creatinine of 8.5 umol/L (13%) postoperatively. The differences were less compared to the series reported by Pyo with an increase of 0.2mg/dL (17.7 umol/L).[5] The rise in serum creatinine was expected due to the loss of renal parenchyma from the surgery itself and the effect of ischaemia.

Two patients (8.7%) had Clavien Dindo Grade ≥2 complications in our series. This result was higher compared to results seen in the large multi-institutional cohort reported by Porpiglia et al. (3.4%), but lower than those reported in smaller series by Kumar et al. (16.7%) and Ouzaid et al. (29.9%).[7-9] Complications reported included deep vein thrombosis, bleeding requiring transfusion and embolization, fistula requiring stenting or nephrostomy, acute pulmonary embolism and acute renal failure requiring dialysis.[7-9] With increasing volume and experience, the number of complications is expected to decrease.

Patients with higher nephrometry score had longer WIT and estimated blood loss. This was expected due to the complexity of the tumour requiring more careful dissection and suturing. Similar result was seen in a retrospective review which showed higher complexity tumour and tumour size predicted higher WIT.[10]

Two patients had positive surgical margin with 8.7% positivity rate which was slightly higher than reported by Porpiglia et al. (5.6%), Kumar et al. (4.1%), and Ouzaid et al. (3%).[7-9] Both lesions were endophytic and thus highlighted the difficulty to identify the margins of endophytic tumour even with intraoperative ultrasound.

Despite the positive outcomes, there were limitations associated with this study. This was a retrospective analysis from a single centre with a small sample size. There was also a lack of comparative arm. Despite these limitations, we believe that the encouraging results will provide a framework for further study on the long-term oncological and functional outcome in our centre.

CONCLUSION

Our initial experience showed that LRPN can be a safe and good alternative to perform partial nephrectomy. Further study is required to assess the peri-operative, long-term oncological, and functional outcome of this procedure.

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