



Lateroconal fascia suspension facilitates retroperitoneal partial nephrectomy

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Background: As the development of various imaging techniques, the incidental detection of renal masses is increasing. Laparoscopic partial nephrectomy (LPN) is the current standard of treatment for renal carcinoma. Though the retroperitoneal laparoscopic partial nephrectomy (RLPN) become the prior choice, the edge of lateroconal fascia blocks the sight and make operation more challenging.

Methods: Between October 2018 and December 2020, the clinical data of 28 cases diagnosed with renal cell carcinoma (RCC) in our hospital was collected and analyzed retrospectively. All patients underwent RLPN and for management of curtain effect, we performed lateroconal fascia suspension (LFS) procedure in all cases with prepared Hem-o-lock clip which bound with 2-0 suture.

Results: RLPN for renal tumor was successfully performed in all cases with no conversions to open surgery and other interruptions. In all cases, the free edge of lateroconal fascia and peritoneum partially blocked the sight of surgeon. We managed the curtain effect successfully and got a satisfying field of view for subsequent surgical procedure. The median operation time was 142 [interquartile range (IQR), 110–164] min, median estimated blood loss was 93 (IQR, 50–100) mL. Median warm ischemia time was 29 (IQR, 22–30) min.

Conclusions: LFS is useful for management of curtain effect. It is a simple, economical and less invasive technique and we can get better efficiency with little consumption.

Keywords: Lateroconal fascia suspension (LFS); retroperitoneal; partial nephrectomy (PN)

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Introduction

Partial nephrectomy (PN) is the current standard of care for localized renal cell carcinoma (RCC), especially in patients with tumors <4 cm (1,2). The retroperitoneal laparoscopic partial nephrectomy (RLPN) become popular due to the direct access to retroperitoneum, renal artery and less interference to abdominal organs (3). However, the retroperitoneal approach is technically challenging for surgeon because of the limited workspace and less anatomic landmark (4). Many researches reported that peritoneal tear

is the most common intraoperative complication during the retroperitoneal operation, this may occur when inserting trocars or dissection. Once the integrity of peritoneum is broken, the CO₂ in posterior space leaks into interior space and increase the intraperitoneal pressure. Consequently, the posterior space would be compressed and more limited workspace further increases the difficulty of the surgical procedures. Moreover, after the lateroconal fascia incised longitudinally, the edge of lateroconal fascia blocks the sight like a “curtain”, which called curtain effect (5,6). In this study, for management of peritoneal tear and curtain

Table 1 Patients characteristics

Parameter	Value
Sex	
Male	20
Female	8
Age (years old)	57 (IQR, 47–66)
Side	
Right	11
Left	17
Tumor size (cm)	3.1 (IQR, 2.4–4.0)
R.E.N.A.L	6 (IQR, 5–8)
Anterior/posterior	
Anterior	10
Posterior	18

IQR, interquartile range; R.E.N.A.L, radius-exophytic/endophytic-nearness-anterior/posterior-polar line.

effect, we described an efficient method called lateroconal fascia suspension (LFS) for junior surgeons. We present the following article in accordance with the STROBE reporting checklist (available at <https://tcr.amegroups.com/article/view/10.21037/tcr-21-2467/tcr>).

Methods

Patients information

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by Ethics Board of Ruijin Hospital, Shanghai, China (No. 2020-381) and informed consent was taken from all the patients. Between October 2018 and December 2020, we performed LFS procedure in 28 cases of RLPN in our hospital (17 left and 11 right). The 28 patients included 20 male and 8 female, mean age was 57 [interquartile range (IQR), 47–66] years old. Median tumor size was 3.1 (IQR, 2.4–4.0) cm, 18 tumors were located posterior side and 10 were anterior, median radius-exophytic/endophytic-nearness-anterior/posterior-polar line (R.E.N.A.L) score was 6 (IQR, 5–8). Median preoperative hemoglobin (Hb) was 140 (IQR, 132–146) g/L, median serum creatinine (SCr) was 76 (IQR, 68–88) $\mu\text{mol/L}$ and the estimated glomerular filtration rate (eGFR) was 91 (IQR, 46–109) $\mu\text{mol/L}$ (Table 1).

Surgical techniques

After general anesthesia, the patient was positioned in lateral decubitus position and the tumor side was upward and vertical to the bed. The skin and subcutaneous tissue was incised at about 2 cm above the iliac crest on the mid-axillary line. Using a vessel clamp, the muscles and lumbodorsal fascia were split through the retroperitoneal space. Retroperitoneal workspace was created with finger by pushing forward the peritoneum and pressure-balloon from surgical glove mounted on a red catheter (diameter was 4 mm). The other two ports were inserted at anterior and posterior axillary line close to costal line under the direct view (3,7,8). The CO₂ pressure was maintained at 15 mmHg during the surgical procedure.

Once all ports were placed, we removed the extraperitoneal fat and dissected the renal fascia longitudinally. In all cases, the free edge of lateroconal fascia and peritoneum partially blocked the sight of surgeon. We perform LFS to manage the curtain effect for getting better operation view.

We prepared a Hem-o-lock clip tie which bound with 2-0 suture (Figure 1A) and clamp the free edge of lateroconal fascia with prepared Hem-o-lock clip tie (Figure 1B), pulled out the suture from the anterior trocar (Figure 1C). Open the blocked sight by pulled the suture tightly and clipped with vessel forceps (Figure 1D). At the end of operations, the suture would be cut and taken out.

Statistical methods

Descriptive statistics were used to describe demographic variables, assessments of renal function, and other clinical outcomes. Continuous variables were expressed as median and IQR. All data was analyzed using SPSS version 20.0 (SPSS Inc., Chicago, IL, USA).

Results

RLPN for renal tumor was successfully performed in all cases with no conversions to open surgery and other interruptions. Though the peritoneal tear was not occurred in any case, the curtain effect occurred in all cases. We performed LFS in all cases and got a satisfying field of view for subsequent surgical procedure (Figure 1). The mean duration time of LFS procedure was 2 min.

Postoperative pathology results shows that 25 patients were clear cell carcinoma, the other three were papillary RCC, angiomyolipoma and eosinophilic solid cystic

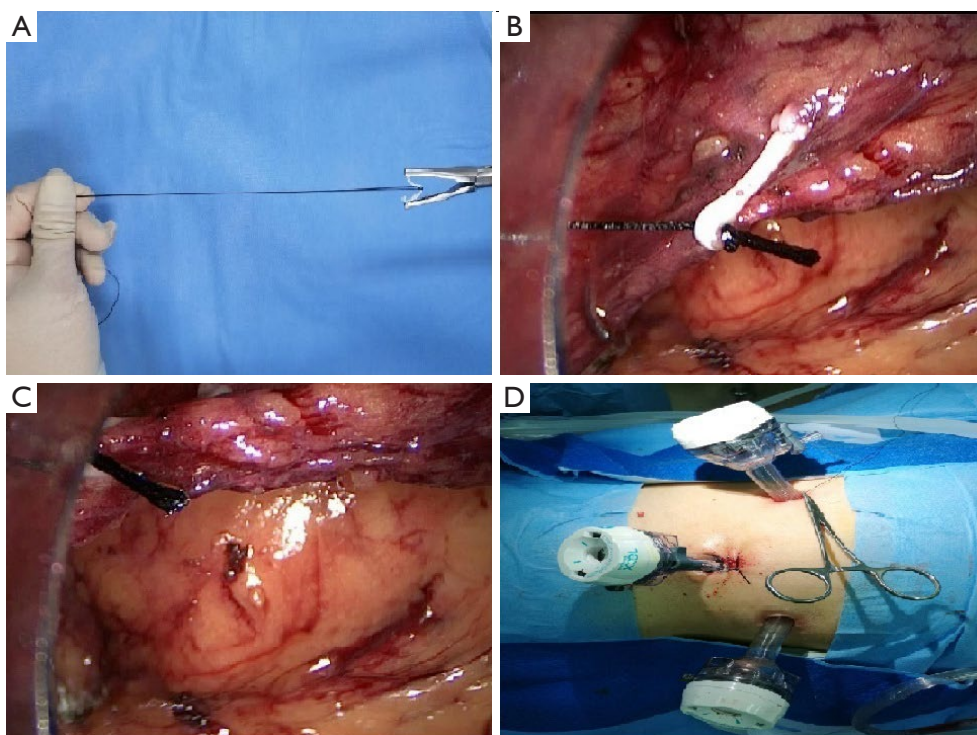


Figure 1 Four steps of LFS. (A) Hem-o-lock clip tie which bound with 2-0 suture. (B) Clamp the free edge of lateroconal fascia. (C) Pull the suture outside. (D) Clip the suture with vessel forceps. LFS, lateroconal fascia suspension.

Table 2 Clinical outcomes of retroperitoneal PN

Parameter	Value
Operation time (min, median)	142 (IQR, 110–164)
Warm ischemia time (min, median)	29.0 (IQR, 22.0–30.5)
Blood loss (mL, median)	93 (IQR, 50–100)
Recovery of gastrointestinal function (day)	1.0
Postoperative ambulation time (days, median)	4.1 (IQR, 4.0–5.0)
Preoperative	
SCr (μmol/L, median)	75.9 (IQR, 67.8–84.3)
eGFR (mL/min/1.73 m ² , median)	91.1 (IQR, 87.6–98.0)
Postoperative (1 day after surgery)	
SCr (μmol/L, median)	86.2 (IQR, 69.8–98.3)
eGFR (mL/min/1.73 m ² , median)	80.8 (IQR, 70.6–88.6)
Three months after surgery	
SCr (μmol/L, median)	80.2 (IQR, 68.0–91.3)
eGFR (mL/min/1.73 m ² , median)	86.0 (IQR, 75.7–94.2)

PN, partial nephrectomy; IQR, interquartile range; SCr, serum creatinine; eGFR, estimated glomerular filtration rate.

RCC respectively. The median operation time was 142 (IQR, 110–164) min, median estimated blood loss was 93 (IQR, 50–100) mL. Median warm ischemia time was 29.0 (IQR, 22.0–30.5) min. Postoperative hospitalization and ambulation time were 4.1 (IQR, 4.0–5.0) and 5.1 (IQR, 5.0–6.0) days respectively which presented on *Table 2*. The examination results before discharge and 3 months after surgery showed that there was no significant renal hypofunction in all patients (*Table 2*).

Discussion

Renal cancer represents 2% to 3% of all cancers (9). The incidental detection of renal masses is increasing according to more frequent utilization of ultrasonography, computed tomography (CT) and other imaging techniques (10). Laparoscopic partial nephrectomy (LPN) is the current standard of treatment for renal carcinoma, especially in patients with tumors <4 cm (1,2,11,12), we perform laparoscopic radical nephrectomy when there is no possibility for preserving the kidney. Laparoscopic renal surgery can be performed either transperitoneally (TP) or

retroperitoneally (RP).

Since the Gagner firstly described the retroperitoneal approach in 1992 when performing adrenalectomy (4). The RP approach slowly became the prior choice for adrenal and renal surgery due to its inherent advantages (13-15). The direct access to the retroperitoneum without the need to violate the peritoneal cavity minimize the risk of intraperitoneal injury and postoperative adhesion, resulting in quicker gastrointestinal recovery and shorter hospital stay. Avoidance of obviating adhesions from previous interventions, can help surgeon minimize the risk of bleeding and save time. Moreover, the RP approach has the advantage of avoiding peritonitis and the incidence of hernia (6,16,17).

Though the RP approach has many advantages, it is challenging due to the limited workspace and less anatomical symbols. In transperitoneal approach there is plenty of space with familiar landmarks. The peritoneal tear and curtain effect are the most common problem when performing retroperitoneal surgery (6). Rassweiler *et al.* (18) described a blunt finger-dissection technique to create a retroperitoneal space. We can get relatively adequate space by inflating a surgical glove in peritoneal which created by finger previously. This way can greatly minimize the incidence of peritoneal tear.

The curtain effect is the other factor making the operation further challenging by blocking the sight of surgeon. When Gerota fascia was incised longitudinally close to the dorsal side, the remaining fascia was retracted to the ventral side and affect exposure of ventral field of view. Yin *et al.* (7). reported that they performed LFS procedure in 30 cases of retroperitoneal laparoscopic surgery including adrenalectomy (12 cases), PN (9 cases) and radical nephrectomy (9 cases). The average operation time of PN in LFS group and control group is 134 ± 26 versus 130 ± 23 min ($P>0.05$). In our study, the primary surgeon was the doctor who had just started the operation independently for 2 years. We performed LFS during 28 cases of RLPN and effectively managed the curtain effect. Full exposure of surgical view helped us to shorten the operating time and warm ischemia time and got a better perioperative outcome. LFS is easy to perform and helpful for junior surgeons to perform dissection and suturing. The warm ischemia time and operation time are related to the doctor's experience and there will be a better outcome as accumulation of experience with the help of this technique. All patients recovered and discharged smoothly and no significant decrease in renal function after 3-month follow-up.

Some limitations of this study are un-avoidable for clinical setting nature. There is only a small amount of data analyzed in this study, because the aim of our study is to show the specific technique for facilitating surgical approach which worth further promotion.

Conclusions

In conclusion, it is important to keep integrity of peritoneum and minimize the curtain effect for a successful retroperitoneal renal surgery. LFS is a simple, economical and less invasive procedure and we can get better efficiency with little consumption. It is easy to operate and helpful for junior surgeons to manage exposure and limited workspace during the RLPN approach.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at <https://tcr.amegroups.com/article/view/10.21037/tcr-21-2467/rc>

Data Sharing Statement: Available at <https://tcr.amegroups.com/article/view/10.21037/tcr-21-2467/dss>

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://tcr.amegroups.com/article/view/10.21037/tcr-21-2467/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by Ethics Board of Ruijin Hospital, Shanghai, China (No. 2020-381) and informed consent was taken from all the patients.

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References

- Cai Y, Li HZ, Zhang YS. Comparison of Partial and Radical Laparoscopic Nephrectomy: Long-Term Outcomes for Clinical T1b Renal Cell Carcinoma. *Urol J* 2018;15:16-20.
- Lee RA, Strauss D, Kutikov A. Role of minimally invasive partial nephrectomy in the management of renal mass. *Transl Androl Urol* 2020;9:3140-8.
- Klap J, Butow Z, Champy CM, et al. 1,000 Retroperitoneoscopic Procedures of the Upper Urinary Tract: Analysis of Complications. *Urol Int* 2019;102:406-12.
- Lombardo R, Martos R, Ribal MJ, et al. Retroperitoneoscopy in urology: a systematic review. *Minerva Urol Nefrol* 2019;71:9-16.
- Ou CH, Yang WH. Consequences of peritoneal tears during hand-assisted retroperitoneoscopic nephroureterectomy. *Urology* 2011;77:350-3.
- Kumar M, Kumar R, Hemal AK, et al. Complications of retroperitoneoscopic surgery at one centre. *BJU Int* 2001;87:607-12.
- Yin X, Cui L, Li F, et al. Lateroconal fascia suspension for management of peritoneal tear and "curtain" effect during retroperitoneal laparoscopic operations. *Int Urol Nephrol* 2016;48:201-6.
- Gao J, Guo G, Jie Z, et al. A fast method to identify renal vessels during retroperitoneal laparoscopic nephrectomy. *J Endourol* 2008;22:1705-8.
- Sanchez A, Feldman AS, Hakimi AA. Current Management of Small Renal Masses, Including Patient Selection, Renal Tumor Biopsy, Active Surveillance, and Thermal Ablation. *J Clin Oncol* 2018;36:3591-600.
- Perez-Ardavin J, Sanchez-Gonzalez JV, Martinez-Sarmiento M, et al. Surgical Treatment of Completely Endophytic Renal Tumor: a Systematic Review. *Curr Urol Rep* 2019;20:3.
- Rezaeetalab GH, Karami H, Dadkhah F, et al. Laparoscopic Versus Open Partial Nephrectomy for Stage T1a of Renal Tumors. *Urol J* 2016;13:2903-7.
- Long G, Liu M, Zhang Y, et al. Robot-assisted laparoscopic partial nephrectomy is a safe and effective option for clinical T2 renal cell carcinoma: a case-series from single-institution. *Transl Cancer Res* 2020;9:7140-8.
- Gill IS, Delworth MG, Munch LC. Laparoscopic retroperitoneal partial nephrectomy. *J Urol* 1994;152:1539-42.
- Hemal AK, Aron M, Gupta NP, et al. The role of retroperitoneoscopy in the management of renal and adrenal pathology. *BJU Int* 1999;83:929-36.
- Hemal AK, Gupta NP, Wadhwa SN, et al. Retroperitoneoscopic nephrectomy and nephroureterectomy for benign nonfunctioning kidneys: a single-center experience. *Urology* 2001;57:644-9.
- Zonča P, Bužga M, Ihnát P, et al. Retroperitoneoscopic Adrenalectomy in Obese Patients: Is It Suitable? *Obes Surg* 2015;25:1203-8.
- Srivastava A, Sureka SK, Vashishtha S, et al. Single-centre experience of retroperitoneoscopic approach in urology with tips to overcome the steep learning curve. *J Minim Access Surg* 2016;12:102-8.
- Rassweiler JJ, Seemann O, Frede T, et al. Retroperitoneoscopy: experience with 200 cases. *J Urol* 1998;160:1265-9.

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