



Reverse Suture Technique in Retroperitoneal Laparoscopic Partial Nephrectomy for Dorsal Lower Pole Renal Tumors

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Abstract

Objective: To evaluate the safety and effectiveness of reverse suture technique during RLPN for dorsal lower pole renal tumors.

Methods: A retrospective analysis of the clinical data of all patients with dorsal lower pole renal tumors underwent RLPN using reverse suture technique in our hospital from March 2015 to March 2020. All surgeries involved the reverse suture technique, following the same procedure: Reveal and block the renal artery with an artery clamp, completely remove the tumor, defects of the vascular and collecting system were repaired and the continuous reverse suture technique was used for suture of renal parenchyma. Variable analysis included operative time, blood loss, and warm ischemia time, and positive margin rate, length of hospitalization and perioperative complications.

Results: Among the 11 patients, 6 were male and 5 were female. The average age was 56.8 ± 6.8 years old. The tumor diameter was 3.4 ± 0.6 cm. The warm ischemic time was 28.1 ± 5.8 min. All surgeries were successful without conversion to radical nephrectomy or open partial nephrectomy. The average estimated blood loss was 116.4 ± 29.1 ml. The mean operative time was 124.9 ± 28.5 min, the drain removal time was 4.4 ± 1.4 days, the average length of hospitalization was 8.3 ± 1.6 days, and all patients recovered well after the operation without major complications.

Conclusion: The reverse suture technique is safe and effective for management of dorsal lower pole renal tumors during RLPN for selected patients.

Keywords: Nephron-sparing surgery; Laparoscopic partial nephrectomy; Renal tumor

Introduction

The increased use of ultrasonography and cross-sectional imaging has resulted in the clinical dilemma of incidentally detected small renal tumors [1]. Nephron-sparing surgery (Nephron-Sparing Surgery, NSS) has become a classic treatment for small renal tumors [2]. Traditional open partial nephrectomy is already a clinically mature surgical technique. With the development of minimally invasive surgical techniques, laparoscopic partial nephrectomy has matured and expanded. Studies have confirmed that laparoscopic partial nephrectomy has the advantages of less trauma and faster recovery, and has the same therapeutic effect as open partial nephrectomy [3]. Laparoscopic partial nephrectomy can be performed by the transperitoneal or retroperitoneal approach [4,5]. The retroperitoneal route is easier to control the renal artery. The operation time is significantly shorter than the transabdominal route. During the operation, the ligament of the anterior lumbar muscle is used as the anatomical landmark to find the renal pedicle. The retroperitoneal pathway has little interference with the internal organs of the abdominal cavity. It is conducive to the recovery of intestinal function after operation. The retroperitoneal approach is predominant in most centers in China because of direct access to the kidney and urologists' familiarity with the retroperitoneal anatomy [6,7]. However, retroperitoneal space is an artificial space created by surgeons. The space is small, making it difficult for surgeons to suture after tumor resection, especially for the dorsal lower pole renal tumors [8,9]. The purpose of this study was to validate the feasibility and efficacy of Retroperitoneal Laparoscopic Partial Nephrectomy (RLPN) for dorsal lower pole tumors by using a reverse suture technique developed and adopted at our center to manage complicated renal masses undergoing partial nephrectomy.

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Methods

Between March 2015 to March 2020, 11 patients with lower dorsal renal tumors underwent RLPN, including 6 males and 5 females, aged 55 to 68 years, with an average of 54 years; the tumor was (2.7 ± 1.20) cm, the lesions are unilateral, and the diagnosis is confirmed by imaging examinations such as ultrasound, CT and MRI before operation. The tumor diameter is less than 7 cm and there is no distant metastatic. The tumors are located on the dorsal side of the lower renal pole. The R.E.N.A.L. nephrometry score was determined according to preoperative CT images. A small incision 5 mm below the costal margin of the anterior axillary line, a small incision 10 mm above the iliac crest of the axillary line, and a small incision 12 mm below the 12th costal axillary line, using a rubber glove to inflate the posterior abdominal cavity with 600 mL of inflatable balloon dilator, Laparoscope was placed through trocar on the mid axillary iliac crest, and the remaining two holes were placed with operating instruments. Using the psoas muscle as the anatomical landmark, it is separated along the peri-renal fat capsule and reveals the renal pedicle blood vessels and the tumor (Figure 1A, 1G). After blocking the renal artery with an artery clamp, the tumor was removed from the kidney by blunt and sharp dissection (Figure 1B, 1H), defects of the vascular and collecting system were repaired (Figure 1D, 1I), and the continuous reverse suture technique was used for suture of renal parenchyma (Figure 1E, 1J) and the vascular and collecting system repaired [7,10].

Results

The patient characteristics and surgical outcomes are summarized in Table 1. Eleven patients in all, including 6 males and 5 females, aged 55 to 68 years, with an average of 54 years; 6 cases were left-sided defects, and 5 cases were right-sided. The average tumor diameter was 3.4 ± 0.6 cm. The mean intraoperative warm ischemic time was 28.1 ± 5.8 min. All the operations were successfully completed without conversion to open surgery or radical nephrectomy. The average estimated blood loss is 116.4 ± 29.1 ml. The mean operative time is 124.9 ± 28.5 min. Drain removal time is 4.4 ± 1.4 days. We found no uncontrollable massive bleeding. The average length of hospitalization was 8.3 ± 1.6 days, and all patients recovered well after the operation without major complications (≥ 3 grades). Pathology confirmed the diagnosis of clear cell in 6 cases, Angiomyolipoma in 3 cases and papillary in 2 cases. No patient had a positive surgical margin. Patients were followed up for 3 months after operation, no bleeding, urinary leakage, hematuria or kidney atrophy were found.

Discussion

Previously, partial nephrectomy was an important surgical method for early kidney tumors, isolated kidney tumors, bilateral kidney tumors, and renal insufficiency [11]. Recent studies have found that for kidney tumor with a tumor diameter of less than 4 cm, there is no difference in the complication rate and tumor control rate between radical nephrectomy and partial nephrectomy, and partial nephrectomy has become an option for patients with small renal tumors [2,12]. Lane et al. [13] reported that the median follow-up after Laparoscopy Partial Nephrectomy (LPN) and Open Partial Nephrectomy (OPN) were 6.6 and 7.8 years, respectively, and the metastasis-free survival rates were 95.2% and 90.0%, respectively. Canes reported that the proportion of patients without distant metastasis and relapse 5 years after LPN and OPN was 97.5% and 98.3%, respectively [14]. Other scholars have reached similar results. There is no significant difference in the positive rate of LPN and

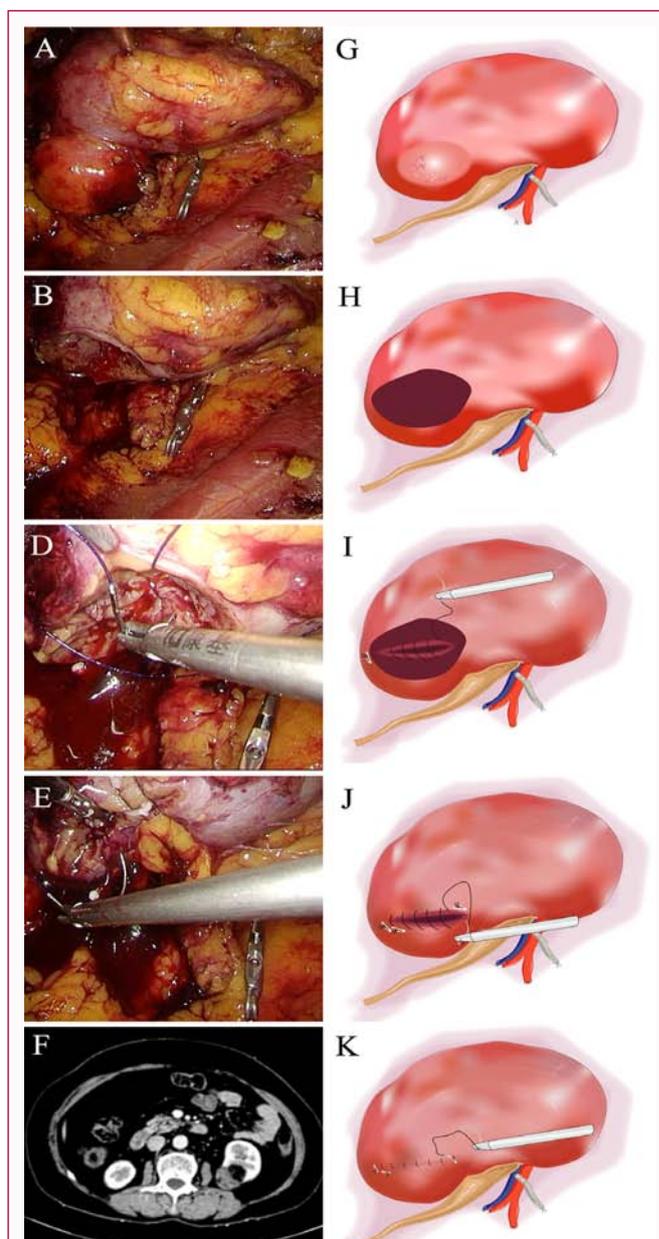


Figure 1: Schematic illustration of surgical procedure and CT images.

A, G: Using the psoas muscle as the anatomical landmark, it is separated along the peri-renal fat capsule and reveals the renal pedicle blood vessels and the tumor. B, H: After blocking the renal artery with an artery clamp, the tumor was removed from the kidney by blunt and sharp dissection. D, I: defects of the vascular and collecting system were repaired using reverse suture technique. E, J: the continuous reverse suture technique was used for suture of renal parenchyma. F: CT images of the tumor. K: The sutures of renal parenchyma were successfully completed.

OPN margins, indicating that the limited operability of laparoscopic instruments does not significantly affect the accuracy of tumor resection [15-17]. LPN can be performed by the transperitoneal or retroperitoneal approach. However, the retroperitoneal approach is predominant in most centers in China because of direct access to the kidney and urologists' familiarity with the retroperitoneal anatomy [5-7,9]. The retroperitoneal route is easier to control the renal artery, and the operation time is significantly shorter than the transabdominal route. The use of the retroperitoneal route has little disturbance to the internal organs in the abdominal cavity, which is beneficial to the recovery of postoperative bowel function and easy control of the renal

artery [4-7]. However, it is difficult to suture after tumor resection under the retroperitoneal laparoscopic space in the dorsal side of the lower pole of the kidney. In our study, we used a novel renography method, a reverse suture technique; to manage complicated the dorsal side of the lower pole renal tumors. Among the 11 consecutive patients with dorsal side of the lower pole renal tumors, the mean tumor diameter was 3.4 ± 0.6 cm and these were complicated cases and difficult to manage by traditional renography. All the operations were successfully completed without conversion to open surgery or radical nephrectomy. The average estimated blood loss was 116.4 ± 29.1 ml. We found no uncontrollable massive bleeding. The average length of hospitalization was 8.3 ± 1.6 days, and all patients recovered well after the operation without major complications (≥ 3 grades). Renography is a crucial step in LPN and has a close relation with both hemostasis and minimizing postoperative complications. Several techniques devised to facilitate the suture procedure include the sliding clips technique and V-Hilar Suture Renography for renal hilar tumor [18]. Renography is difficult after tumor resection under the retroperitoneal laparoscopic space for the dorsal side of the lower pole renal tumor. But if reverse stitching is applied, it becomes very easy.

Conclusion

The reverse suture technique is safe and effective for management of dorsal lower pole renal tumors during retroperitoneal laparoscopic partial nephrectomy for selected patients. Larger series with longer follow-up to confirm the value of the technique are warranted.

References

- 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(36):3591-600.
- Gershman B, Thompson RH, Boorjian SA. Radical versus partial nephrectomy for cT1 renal cell carcinoma. *Eur Urol*. 2018;74:825-32.
- Ng AM, Shah PH, Kavoussi LR. Laparoscopic partial nephrectomy: A narrative review and comparison with open and robotic partial nephrectomy. *J Endourol*. 2017;31:976-84.
- Mittakanti HR, Heulitt G, Li HF, Porter JR. Transperitoneal vs. retroperitoneal robotic partial nephrectomy: A matched-paired analysis. *World J Urol*. 2020;38:1093-9.
- Song S, Zhang H, Ma L. The application of "Renal Pedicle Rotation" method in retroperitoneal laparoscopic partial nephrectomy for renal ventral tumors. *J Endourol*. 2015;29:1038-43.
- Yang F, Zhou Q, Li X, Xing N. The methods and techniques of identifying renal pedicle vessels during retroperitoneal laparoscopic radical and partial nephrectomy. *World J Surg Oncol*. 2019;17:38.
- Zhang C, Li X, Yu W, Zhang Q, Zhou L, He Z. Ring suture technique in retroperitoneal laparoscopic partial nephrectomy for hilar cancer: A new renorrhaphy technique. *J Endourol*. 2016;30:390-4.
- Benoit T, Peyronnet B, Roumiguie M. Laparoscopic nephrectomy for polycystic kidney: Comparison of the transperitoneal and retroperitoneal approaches. *World J Urol*. 2016;34:901-6.
- Fan X, Xu K, Lin T. Comparison of transperitoneal and retroperitoneal laparoscopic nephrectomy for renal cell carcinoma: A systematic review and meta-analysis. *BJU Int*. 2013;111:611-21.
- Gin GE, Maschino AC, Spaliviero M, Vertosick EA, Bernstein ML, Coleman JA. Comparison of perioperative outcomes of retroperitoneal and transperitoneal minimally invasive partial nephrectomy after adjusting for tumor complexity. *Urology*. 2014;84:1355-60.
- Escudier B, Porta C, Schmidinger M. Renal cell carcinoma: ESMO clinical practice guidelines for diagnosis, treatment and follow-up dagger. *Ann Oncol*. 2019;30:706-20.
- Liatsikos E, Kallidonis P, Do M. Laparoscopic radical and partial nephrectomy: Technical issues and outcome. *World J Urol*. 2013;31:785-91.
- Lane BR, Campbell SC, Gill IS. 10-year oncologic outcomes after laparoscopic and open partial nephrectomy. *J Urol*. 2013;190:44-9.
- Canes D. Long-term oncological outcomes of laparoscopic partial nephrectomy. *Curr Opin Urol*. 2008;18:145-9.
- Becker A, Ravi P, Roghmann F. Laparoscopic radical nephrectomy vs. laparoscopic or open partial nephrectomy for T1 renal cell carcinoma: Comparison of complication rates in elderly patients during the initial phase of adoption. *Urology*. 2014;83:1285-91.
- Benway BM, Cabello JM, Figenshau RS, Bhayani SB. Sliding-clip renorrhaphy provides superior closing tension during robot-assisted partial nephrectomy. *J Endourol*. 2010;24:605-8.
- Xu B, Zhang Q, Jin J. Retroperitoneal laparoscopic partial nephrectomy for moderately complex renal hilar tumors. *Urol Int*. 2014;92:400-6.
- Khalifeh A, Autorino R, Hillyer SP, Kaouk JH. V-hilar suture renorrhaphy during robotic partial nephrectomy for renal hilar tumors: Preliminary outcomes of a novel surgical technique. *Urology*. 2012;80:466-71.