

Laparoscopic Excision of Local Recurrence of Renal Cell Carcinoma

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ABSTRACT

Background and Objective: To report a single center's experience with laparoscopic excision of local recurrence of renal cell carcinoma.

Methods: Between January and August 2011, 5 patients who underwent laparoscopic excision of local recurrence were identified from the institutional laparoscopic surgery database.

Results: Four radical nephrectomies and 1 partial nephrectomy were performed for primary tumors. The mean ages of the patients were 57.4 y (range, 48 to 68) and 62.8 y (range, 53 to 71) at the time of primary surgery and laparoscopic recurrence excision, respectively. The average size of the primary tumor was 7.2cm (range, 4.5 to 11). The mean size of local recurrence was 3.46cm (range, 2.8 to 4.5). The original tumor T stages were T1b, T2b, and T4 in 3, 1, and 1 cases, respectively. The mean time to diagnosis of recurrence was 51.2 mo (range, 15 to 136). The pathology of one patient who had previously received targeted therapy with sunitinib, was necrosis, unlike the other 4 pathologies which revealed renal cell carcinoma. The mean operative time, estimated blood loss, and length of hospital stay were 86 min (range, 70 to 100), 100 mL (range, 20 to 300), and 4 d (range, 2 to 8), respectively. One pleural injury did not need open conversion and was repaired laparoscopically. At a mean follow-up of 8.4 mo, the cancer-specific and disease-free survival rates were 100% and 60%, respectively.

Conclusion: Laparoscopic excision of local recurrence of RCC is a feasible technique in well-selected patients with low-volume mass not involving the adjacent organs.

Key Words: Laparoscopy, Local recurrence, Renal cancer.

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INTRODUCTION

Local recurrence after radical nephrectomy (RN) is a rare condition in the natural history of renal cell carcinoma (RCC). The prevalence has been reported at between 1% and 2% in different series.¹⁻⁴ In the literature, the interval between RN of the primary tumor and diagnosis of local recurrence varies from 3 mo to 45 y, which has alerted urologists and oncologists about careful long-term follow-up of these patients.^{5,6} Routine imaging with computed tomography (CT) or magnetic resonance (MR) after RN offers the possibility of detecting this uncommon clinical entity at the asymptomatic early stage.

Several approaches, such as aggressive surgical excision, radiotherapy, systemic chemotherapy, and observation, have been suggested for treatment of local recurrence. Among these modalities, aggressive surgical excision without positive surgical margins has been associated with long-term disease-free and overall survival, in comparison with other modalities.³ Open surgery is a well-established technique that has been successfully performed for many years.^{2-4,7-11} Recently, evidence regarding laparoscopic excision with or without the hand-assisted technique for local recurrence has been published by experienced centers.¹²⁻¹⁴ In the present report, our experience with laparoscopic excision of local recurrence of RCC was examined in light of perioperative and oncological outcomes.

MATERIALS AND METHODS

Five patients undergoing laparoscopic excision of local recurrence of RCC were identified from our prospectively collected institutional laparoscopic database, including data from more than 500 cases. Two of these patients were operated on at our institution for their primary tumors, consisting of one partial and one radical nephrectomy; meanwhile, 3 of them underwent RNs elsewhere and were referred to our institution for oncological follow-up. The demographical, perioperative, and oncological outcomes of the patients were retrospectively evaluated.

Operative Technique

In all patients, a 3-port transperitoneal laparoscopic approach was the method of choice. Briefly, the patient was

Table 1.
 Perioperative and Oncological Outcomes of Primary Tumor Surgery and Laparoscopic Recurrence Excision

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Mean
Sex	Male	Male	Male	Female	Male	–
Laterality	Right	Right	Right	Right	Right	–
Primary Surgery						
Age	48	56	68	50	65	57.4
Tumor size (cm)	4.5	8	11	6	6.5	7.2
Type of nephrectomy	Open; Partial	Open; Radical	Open; Radical	Open; Radical	Open; Radical	–
Pathology	Clear cell RCC	Clear cell RCC	Clear cell RCC	Clear cell RCC	Clear cell RCC	–
Fuhrmann grade	3	3	2	2	3	2.6
Surgical margin	Negative	Positive	Negative	Negative	Negative	–
Distant metastasis	–	–	Lung	–	–	–
TNM stage	T1bNxM0	T4NxM0	T2bNxM1	T1bNxM0	T1bN0M0	–
Time to Recurrence (mo)	136	64	24	15	17	51.2
Location of Recurrence	Renal bed	Psoas muscle	Psoas muscle	Renal bed	Renal bed	–
Neoadjuvant Therapy	–	Sunitinib	Sunitinib	Sunitinib	–	–
Biopsy Before Surgery	Yes; Clear cell RCC	Yes; Clear cell RCC	–	–	–	–
Recurrence Surgery						
Age	61	62	71	53	67	62.8
Interval between diagnosis and excision of recurrence (mo)	20	3	4	13	1	8.2
Size of recurrence (cm) at the time of diagnosis	2	3	3.6	10	2	4.12
Size of recurrence (cm) at the time of surgery	2.8	3	4.5	3.5	2.6	3.28
Operative time (min)	80	70	90	80	110	86
Estimated blood loss (mL)	30	300	50	100	20	100
Length of hospital stay (d)	3	3	8	2	4	4
Additional organ excision	–	–	–	–	–	–
Intraoperative complications	–	–	–	–	Pleural injury	–
Postoperative complications	–	–	Transfusion, elongated drainage	–	–	–
Pathology	Clear cell RCC	Clear cell RCC-Sarcomatoid	Clear cell RCC	Necrotic tumor cells	Clear cell RCC	–
Open conversion	–	–	–	–	–	–
Fuhrmann grade	3	4	3	ND	3	3.25
Surgical margin	Negative	Positive	Negative	ND	Negative	–

Table 1 continued on next page.

Table 1. (continued)
 Perioperative and Oncological Outcomes of Primary Tumor Surgery and Laparoscopic Recurrence Excision

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Mean
Adjuvant Therapy After Recurrence Surgery	–	Sunitinib	Sunitinib	–	–	–
Follow-up After Recurrence Surgery (months)	10	9	10	10	3	8.4
Current Oncologic Status	Alive without disease	Alive with positive surgical margin controlled under targeted therapy	Alive with lung metastasis	Alive without disease	Alive without disease	–

placed in a 45° to 60° modified flank position. A Veress needle was used to create a 15-mm Hg pneumoperitoneum. A 10-mm trocar was placed lateral to the umbilicus, and a camera was introduced into the abdominal cavity. In right-sided cases, a 12-mm second port was placed at the midclavicular line, 2cm below the costal margin, while a 5-mm third port was inserted between the anterosuperior iliac spine and the umbilicus. In left-sided cases, a 12-mm port was placed between the anterosuperior iliac spine and the umbilicus, while a 5-mm port was placed at the midclavicular line, 2cm below the costal margin. Dissection began with incision of the white line of Toldt, and the ascending or descending colon was reflected, medially exposing the retroperitoneum clearly. In cases with cranial and caudal recurrent mass location, the ports were shifted approximately 3cm superiorly and inferiorly, respectively. The mass was removed using monopolar diathermy scissors and was immediately placed in a specimen bag. The tumor bed was meticulously examined for residual tumor and, in cases of bleeding, was controlled via bipolar diathermy. All of the cases were performed or mentored by a single surgeon (OS).

RESULTS

Between January and August 2011, 5 patients underwent laparoscopic excision of local recurrence, 4 and 1 of whom were men and a woman, respectively. The details of these patients were mentioned in Table 1.

Of these patients, only patient 1 had undergone open partial nephrectomy for a PT1bNxM0 tumor 136 mo before the disease recurred at the flank incision, 3cm below the inferior pole of the operated kidney. In the remaining patients, open radical nephrectomy had been performed.

All of the primary tumors were reported as clear-cell RCC; 2 and 3 of them were Fuhrman grade 2 and 3, respectively.

Only patient 3 had systemic disease (lung metastasis) at the time of the RN.

Among 4 patients who underwent RN for primary tumors, 2 of the tumors recurred at the renal bed, whereas the remaining recurred on the psoas muscle. The other patient is the above-mentioned patient whose tumor recurred on the flank incision of the previous partial nephrectomy. Patients 2 and 3 were systematically treated with adjuvant sunitinib for pathologically reported surgical margin positivity and systemic disease of the lung at the time of primary surgery, respectively. Meanwhile, patient 4 received neoadjuvant sunitinib for her 10-cm local tumor recurrence. This patient’s mass responded to neoadjuvant sunitinib therapy and decreased to 3cm in diameter before her recurrence surgery.

The mean time to recurrence was 51.2 mo (range, 15 to 136), the mean age at the time of recurrence was 62.8 y (range, 53 to 71), and none of the patients were symptomatic when they were diagnosed during regular follow-up with CT imaging. The mean interval between diagnosis and laparoscopic excision of masses was 8.2 mo (range, 1 to 20), and the mean size of recurrence at the time of excision was 3.28cm (range, 2.6 to 4.5).

Four specimens were reported as clear-cell carcinoma, except for patient 4’s pathology, which was reported as necrosis. Three of the pathologies were reported as Fuhrman grade 3, and one was reported as grade 4, which also had positive surgical margins after both the primary and the recurrence surgery. Patients 2 and 3 received adjuvant sunitinib after recurrence surgery for positive surgical margins and distant metastasis of the lung, respectively. After a mean follow-up of 8.4 mo, the cancer-specific and overall survival rates were 100%, and the disease-free survival rate was 60% due to a patient with a

Table 2.
Reported Outcomes of Open Surgical Experience in the Treatment of Localized Recurrence of RCC.

	Esrig, 1992	Tanguay, 1996	Itano, 2000	Schrodter, 2002	Gögüs, 2003	Master, 2005	Sandhu, 2005	Margulis, 2009	Overall
Number (n)	11	16	30 (10 surgical excision)	16	10	14	16 (14 surgical excision)	54	145
Symptomatic (n; %)	9; 81.81	6; 37.5	18; 60	2; 12.5	3; 30	1; 7.14	NR	19; 35.2	64 in 151; 42.3
Male (n; %)	10; 90.9	11; 68.75	18; 60	10; 62.5	7; 70	10; 71.42	12; 75	44; 81.5	112; 73.0
Mean/Median Age at time of primary surgery	NR	NR	NR	58.6 (48–69)	NR	54 (16–68)	57.4 (29–72)	54.5	55.5
Mean/Median Age at time of recurrence	59 (41–73)	53 (23–74)	67 (35–85)	62.3 (49–69)	51.7 (26–74)	58 (20–69)	NR	NR	60.7
Mean/Median size of primary tumor (cm)	NR	9 (4–18)	NR	NR	NR	NR	NR	9.0	9.0
Fuhrmann Grade of Primary Tumor									
Grade 1	NR	NR	NR	NR	–	2	–	–	–
Grade 2					6	3	8	10	
Grade 3					3	5	6	21	
Grade 4					1	4	–	23	
T Stage of Primary Tumor									
T1	3	1	6	1	1	2	1	10	–
T2	2	7	7	4	5	2	8	11	
T3	5	7	17	6	4	10	5	33	
T4	1	–	–	2	–	–	–	–	
Positive Surgical Margin After RN (n;%)	NR	NR	NR	NR	NR	3; 21.42	NR	6; 11.1	–
Neoadjuvant Therapy (n; %)									
Radiotherapy	NR	2; 12.5	NR	2; 15.3	NR	–	–	–	–
Chemotherapy/Immunotherapy		8; 50		2; 15.3		5; 35.71	8; 57.14	27; 50	
Mean/Median time to recurrence (months)	31 (2–84)	16.5 (5–71)	33.6 (1.5–157)	45.5 (7–224)	33.6 (3–68)	40 (5–80)	26.5 (3–174)	10.0	23.9
Biopsy before surgery (n; %)	NR	1; 6.25	NR	0; 0	0; 0	NR	NR	NR	–
Mean/Median size of recurrence (cm)	NR	NR	NR	5.92 (2–10)	8.45 (3–12)	6.35 (2–17)	NR	6.0	6.30
Morbidity (n; %)	2; 18.18	5; 31.25	3; 30	1; 6.25	–	6; 42.85	4; 28.57	10; 18.51	31; 21.37
Mortality (n; %)	2; 18.18	–	–	–	1; 10	–	–	2; 3.7	4; 2.75

Table 2 continued on next page.

Table 2. (continued)
Reported Outcomes of Open Surgical Experience in the Treatment of Localized Recurrence of RCC.

	Esrig, 1992	Tanguay, 1996	Itano, 2000	Schrodter, 2002	Gögüs, 2003	Master, 2005	Sandhu, 2005	Margulis, 2009	Overall
Mean/Median Operative Values									
Operative time (min.)	NR	NR	NR	NR	NR	450	75 (60–135)	377.5	341.5
Estimated blood loss (mL)	NR	950 (200–3600)	2800 (200–9700)	1933 (300–3500)		1700	NR	600	1184.8
Length of hospital stay (day)	NR	10 (5–22)	12 (5–19)	14 (8–22)		9.2	10 (5–16)	7.0	9.75
Pathologies									
Confirming RCC After Recurrence (n; %)	11; 100	15; 93.75	10; 100	13; 81.25	10; 100	14; 100	14; 100	NR	87 in 91; 95.6
Positive Surgical Margin (n; %)	NR	4; 25	NR	0; 0	NR	NR	6; 42.85	NR	–
Adjuvant Therapy after RS (n; %)									
Chemotherapy/Immunotherapy	NR	4	NR	4	3	NR	6; 42.85	16; 29.6	–
Radiotherapy		1		–	–		3; 21.42	–	
Mean/Median Survival after RS (months)									
Living patients	85 (35–211)	23.5 (3–136)	NR	53.0 (18–101)	16.6 (3–38)	71 (14–86)	NR	NR	–
Deceased patients	8 (4–22)	14.5 (9–26)		23.1 (4–68)	8.5 (3–14)	14 (1–57)			
Overall Survival (%)									
1 year	NR	NR	66	NR	NR	86	NR	NR	–
3 years			40			40	50		
5 years			28			30	50		

NR: Not Reported.

surgically positive margin, and a patient with lung metastasis.

All of the patients underwent laparoscopic excision of local recurrence, and the mean operative time (OT), estimated blood loss (EBL), and length of hospital stay (LoHS) were 86 min (range, 70 to 110), 100 mL (range, 20 to 300) and 4 d (range, 2 to 8), respectively. No mortality was observed in any patient during surgery or hospital stay. One intraoperative complication, pleural injury, was observed (patient 5), and it was repaired laparoscopically with 3.0 Prolene sutures. Patient 3 required one unit of blood transfusion and had elongated lymphatic drainage

(approximately 1400 cc for 7 d), causing a long hospital stay (8 d).

DISCUSSION

Local recurrence of RCC has been described as incomplete resection of the primary tumor or persistent tumor in the regional lymph nodes.¹ Limited evidence has been unable to effectively document whether local recurrence is the progression of a microscopic remnant of primary tumor or whether it is a form of disseminated metastatic disease. For this reason, it was controversial in the past to make a decision on treatment between surgical excision and sys-

Table 3.
Reported Outcomes of Laparoscopic Experience in the Treatment of Localized Recurrence of RCC.

	Nakada, 2002	Bandi, 2008	Yohannan, 2010	Present Study	Overall
Number (n)	1	5	4	5	15
Type of Laparoscopy	Hand-assisted	Hand-assisted	Traditional	Traditional	–
Symptomatic (n; %)	0; 0	1; 20	0; 0	0; 0	1; 6.67
Male (n; %)	0; 0	NR	2; 50	4; 80	6 in 10; 60.0
Mean/Median Age					
At the time of primary surgery	70	61 (34–75)	55.5 (43–63)	56 (48–68)	58.47
At the time of recurrence	72	63 (40–76)	57 (44–66)	62 (53–71)	61.67
Mean/Median size of primary tumor (cm)	NR	6 (4.2–9.5)	9 (7–12)	7.2 (4.5–11)	7.28
Fuhrmann Grade of Primary Tumor					
Grade 1	–	–	–	–	–
Grade 2	1	1	1	2	
Grade 3	–	3	3	3	
Grade 4	–	–	–	–	
T Stage of Primary Tumor					
T1	–	2	1	3	–
T2	1	–	2	1	
T3	–	3	1	–	
T4	–	–	–	1	
Positive Surgical Margin after RN (n; %)	NR	NR	0; 0	1; 20	–
Neoadjuvant therapy (n; %)					
Radiotherapy	–	–	–	–	–
Chemotherapy/Immunotherapy	–	–	1; 25	3; 60	
Mean/Median Time to Recurrence (months)	18	23 (5–46)	11.5 (3–24)	51.2 (15–136)	30
Biopsy Before Surgery (n; %)	0; 0	4; 80	NR	2; 40	–
Mean/Median Size of Recurrence (cm)	3	4.9 (3.0–7.5)	5.0 (3.0–7.0)	3.28 (2.6–4.5)	4.23
Open Conversion (n; %)	–	1; 20	–	–	1; 6.67
Morbidity (n; %)	–	–	1; 25	2; 40	3; 20.0
Mortality (n; %)	–	–	–	–	–
Mean/Median Operative Values					
Operative Time (min)	169	232 (150–300)	195 (170–210)	80 (70–110)	167.26
Estimated Blood Loss (mL)	NR	175 (25–240)	187 (100–250)	50 (20–300)	133.78
Length of Hospital Stay (day)	5	4	2.5 (2–3)	3 (2–8)	3.33
Pathologies Confirming RCC After Recurrence (n; %)	1; 100	4; 80	4; 100	4; 80	13; 86.67

Table 3 continued on next page.

Table 3. (continued)
Reported Outcomes of Laparoscopic Experience in the Treatment of Localized Recurrence of RCC.

	Nakada, 2002	Bandi, 2008	Yohannan, 2010	Present Study	Overall
Positive Surgical Margin (n; %)	0; 0	1; 20	0; 0	1; 20	2; 13.3
Adjuvant Therapy after RS (n; %)					
Chemotherapy/Immunotherapy	–	1; 20	–	2; 40	3; 20.0
Radiotherapy	–	–	–	–	
Mean/Median Survival After RS (months)					
Living Patients	6	48.66 (37–69)	12 (2–26)	8.4 (3–10)	–
Deceased Patients	–	34.5 (13–56)	–	–	
Overall survival (%)					
1 year	NR	100	100	–	–
3 years		80	–	–	
5 years		60	–	–	

NR: Not Reported.

temic therapies, such as chemotherapy, immunotherapy, radiotherapy, or observation.³ However, increasing evidence has supported the success of aggressive surgical excision for treatment.^{2–4,7–11} In a comparative study consisting of 30 local recurrences without distant metastases, Itano et al.³ attained overall 5-y survival rates of 51%, 18%, and 13% in groups of aggressive surgical excision, systemic chemotherapy, or radiotherapy and observation, respectively.

In the past, local recurrence of surgically excised tumors has presented with the symptoms of fatigue, weight loss, lumbar or abdominal pain, vomiting or ileus, which indicated the invasion of adjacent organs and the severity of the disease. Thus, wide-open surgical excision, including several adjacent organs, had been performed to achieve negative surgical margins. These aggressive surgeries were generally related to increased surgical risks, morbidity, and mortality.^{7–10} The details of reported open surgical experiences in the literature, except for case reports, are listed in Table 2. Currently, routine follow-up with imaging modalities (CT or MR) after RN offers detection of asymptomatic recurrence in the early stage, decreases the complications of recurrence surgery, and improves disease-free survival after surgery. This follow-up also provides an opportunity for urologists to excise recurrences with laparoscopic surgery.

At the beginning of the last decade, laparoscopic experiences with resection of local recurrence, with or without the hand-assisted technique, appeared in the liter-

ature. Nakada et al.¹² reported the first patient undergoing laparoscopic resection of local recurrence. They performed a hand-assisted laparoscopic technique in a 72-y-old, nonsymptomatic woman with Fuhrman grade 2, T3 primary RCC that had recurred with a 3-cm mass 18 mo after her right radical nephrectomy. In this case, the total OT was 169 min, and the LoHS was 5 d. Six years later, Bandi et al.¹³ reported their experience with hand-assisted laparoscopic surgical resection of local recurrence in 5 patients. In their series, 1 patient was converted to open surgery because of failure to progress laparoscopically due to adhesions, and this case resulted in incomplete resection of a mass invading the inferior vena cava. Only 1 of the 4 patients who underwent complete resection recurred locally again during the mean 43-mo follow-up, and that patient died at 56 mo after recurrence surgery because of concomitant metastatic disease. The authors suggested that selected patients with low-volume disease not involving adjacent organs should be offered laparoscopic resection. In another series consisting of 4 laparoscopic resections of localized recurrences, Yohannan et al.¹⁴ reported no open conversion in 4 patients, and only 1 intraoperative complication (diaphragmatic injury) occurred. The limited follow-up of this series (mean, 12 mo; range, 3 to 26) revealed no localized recurrence after surgery. The detailed outcomes of laparoscopic experience in the literature and the present study were listed in Table 3.

The results of the present study are in line with other laparoscopic series. All 5 operations were completed without open conversion and with one intraoperative and one postoperative complication, consisting of a pleural injury and an elongated drainage that occurred. The pleural injury in patient 5 was repaired laparoscopically, and no respiratory complications were seen during the postoperative period. The other patient's elongated drainage was lymphatic in origin and subsequently ceased in 7 d. Only patient 2, whose recurrence was a Fuhrman grade 4 sarcomatoid variant of clear-cell RCC, was reported as having microscopically positive surgical margins that could not be observed macroscopically during surgery. This patient has been receiving adjuvant sunitinib for positive surgical margins. All 5 patients are alive without evidence of rerecurrence after surgery. The cancer-specific survival rate was 100% after a mean follow-up of 8.4 mo.

The reported parameters of open (n = 145) and laparoscopic (n = 15) experiences were compared. The advantages of laparoscopic surgery, in terms of mean OT (341.5 min vs. 167.2 min), EBL (1184.8 mL vs. 133.7 mL) and LoHS (9.75 d vs. 3.33 d) were remarkable in comparison with open surgery. Conversely, the morbidity rate was not different between open and laparoscopic approaches (31 in 145, 21.3% vs. 3 in 15, 20%, respectively). Meanwhile, the mortality with open surgery was higher than with laparoscopy (4 in 145, 2.75% vs. 0 in 15, 0%, respectively). The increased rate of symptomatic patients in the open surgery group, which indicates the aggressiveness of disease, must be underlined among the characteristics of the patients. Additionally, the mean size of recurrence, which may cause selective bias, was significantly greater in open surgery (6.68cm vs. 3.97cm). These comparative findings support that the advantages of laparoscopic surgery should be obtained in patients whose tumor is low-volume in the early stage, without any adjacent organ invasion.

Of note, patient 4 in the present study merits specific mention. This patient's 10-cm-diameter recurrence on the renal bed appeared at 15 mo by CT scanning after RN of her pT1bNxM0 primary tumor. With the diagnosis of recurrence, the patient received targeted therapy with sunitinib (an inhibitor of tyrosine kinase receptor) at a daily dose of 25 mg. During therapy, the mass responded to sunitinib and decreased to 3cm in diameter after 13 mo. The pathology of her mass was reported as necrosis. The patient is alive without evidence of disease after 10 mo of follow-up. Baccala et al.¹⁵ reported a similar patient, whose pathology was necrosis after neoadjuvant sunitinib

therapy for local recurrence. In this report, a Fuhrman grade 3 and a pathologically staged T3aNxM0 RCC tumor recurred as a 7-cm mass on the psoas muscle and a 3-cm mesenteric nodule 2 y after radical nephrectomy, respectively. With response to 2 mo of neoadjuvant sunitinib therapy, the mass decreased to 5cm diameter and was resected together with the 3cm mesenteric nodule via open surgery. Both the mass and nodule were reported as necrosis, similar to patient 4 in the present study.

Sunitinib, a tyrosine kinase receptor inhibitor that has antiproliferative and antiangiogenic activity in several tumors, including RCC, has been used successfully in patients with metastatic RCC.^{16,17} However, its role in the treatment of local recurrence is not well known because of the rarity of the condition. The above-mentioned case report and patient 4 in the current study show that neoadjuvant sunitinib therapy might decrease recurrence size and surgical morbidity and offer a histopathological response. This limited evidence must be supported with large series to standardize neoadjuvant sunitinib therapy before recurrence surgery and for suitable patient selection for this therapy.

This study has limitations that merit being mentioned. One of them is the limited size of the study cohort, consisting of 5 patients. This limitation may be explained by the rarity of local recurrence in the natural history of RCC. The other limitation is the short-term oncological follow-up with 8.4 mo. Despite the lack of rerecurrence in all of the patients during this follow-up, long-term follow-up is necessary to describe the success of laparoscopic excision in local recurrence treatment.

CONCLUSION

Local recurrence of RCC can be operated via laparoscopic technique in early-stage, low-volume disease not involving the adjacent organs. Laparoscopic excision of local recurrence is as feasible as open surgery in the treatment of this well-selected patient group with similar oncological outcomes, with superior OT, EBL, and LoHS. However, this limited experience needs to be supported with large series and multicenter studies.

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