

Trocar site recurrence after robotic partial nephrectomy to treat of renal cell carcinoma

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Abstract

Introduction: Wound seeding during surgical excision of malignant tumor is known problem in the oncologic surgery. Trocar site recurrence (TSR) is well described in laparoscopic oncologic surgery. Little has been reported about TSR after robotic partial nephrectomy (RPN) performed for renal cell carcinoma (RCC). Here, we report on the incidence of TSR and demonstrate the presentation of this type of RCC recurrence.

Patients and Methods: We reviewed prospectively collected data about patient who underwent RPN at our institute from September 2009 to March 2018. We reviewed the medical record of the patients who had the diagnosis of RCC on the final pathology. We identified the patient with TSR and demonstrated their presentation and treatment along with the outcome.

Results: A total of 335 patients underwent RPN during the study period for renal mass. Two hundred and sixty-nine (80.3%) patients were found to have RCC on the final pathologic evaluation of their mass. We identified two patients (0.7% of all the RCC in the study) who developed TSR during an average follow-up period of 31 months (ranging from 18 to 72 months). The first recurrence appeared 18 months after the surgery. The second recurrence presented 72 months after RPN. Both cases underwent open surgical excision of the trocar site, in which the recurrence appeared.

Conclusion: TSR is potential type of RCC recurrence after RPN, though it is rare and underreported. Special attention should be given to examine the trocar site during the surveillance follow-up of RCC treated with RPN. It can develop up to 72 months after the surgery.

Keywords: Renal cell carcinoma, robotic partial nephrectomy, trocar site recurrence

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INTRODUCTION

Tumor cell spillage direct seeding of the cancer cell in the surgical wound could occur during cancer surgery and manipulating the tumor.^[1] Laparoscopic cancer surgery is no exception. In fact, it has been well reported in the surgical oncology literature tumor recurrence develop at the trocar sites, resulting in trocar site recurrence (TSR).^[2]

TSR was rare phenomenon after laparoscopic urological surgery done for renal cell carcinoma (RCC) with incidence ranging from 0.03% to 0.09%.^[2] Beside cancer cells spillage, tumor biologic aggressiveness and laparoscopic-related immune response are thought to be the culprits.^[2,3] In dead, the real etiology of TSR is not well studied and poorly understood. However, RCC has been demonstrated to be one the least of all abdominal

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malignancy to be complicated with TSR or peritoneal seeding.^[3]

The role robotic partial nephrectomy (RPN) has been established in the treatment of RCC with an oncologic outcome that is comparable to open approach.^[4] The da Vinci® robotic surgical system improves the dexterity, increases visualization, and filter the tremor of the operating surgeon. It also enhances ergonomic setting to boost surgeon personal comfort.^[5] The adoption of the robotic technique in nephron-sparing surgery increased and leading to growth in the experience with RPN to treat small renal mass (SRM).^[4-6] The technique and both functional and oncologic outcome of RPN was replicated by multiple authors from different centers.^[5,6] RPN was adopted in our institute since September 2009 as the treatment of choice for SRM. In this article, we are reporting on the incidence of TSR after RPN in relatively large series of patients to highlight their presentation. We reviewed the literature to find the common factors that lead to TSR.

PATIENTS AND METHODS

RPN was offered to all patients with SRM at our institute since September 2009. We reviewed prospectively collected data about patients who underwent RPN at our institute between September 2009 and March 2018. We studied the medical record of patients who had the diagnosis of RCC on the final pathology. We identified the patient with TSR and demonstrated their presentation and treatment along with the outcome.

Surgical technique

RPN was done transperitoneal with mobilization of the colon medially. The renal hilum was isolated and the tumor was exposed then resected under variable warm ischemia time ranging from 0 to 34 min. Off-clamp RPN was adopted in certain cases with the technique described by Lamoshi and Salkini^[7] Tumor resection was achieved according to the standard technique. Hilar clamping, when utilized, was achieved using the bulldog clamps or laparoscopic Satinsky clamp according to the situation and complexity of the hilum. After the resection, the tumor was placed in all the cases in the Endo Catch™ specimen pouch. This pouch is used usually to prevent tumor cell spillage during the extraction of the specimen.

RESULTS

A total of 335 patients underwent RPN during the study period for renal mass. Two hundred and sixty-nine (80.3%) patients were found to have RCC on the final pathologic evaluation of their mass. We studied 269 (81%) patients

with the final diagnosis of RCC of the 335 patients who underwent RPN at our institute. The mean age of the patients was 67 years (ranging from 28 to 81), and 183 were males (58%), as shown in Table 1.

The mean RENAL nephrometry score for the resected masses was 6.4 (ranging from 4 to 10). The pathological distribution of the tumors was as follows: 192 (71%) patients had clear-cell RCC, 50 (19%) patients had papillary RCC, 16 (6%) patients had chromophobe RCC, and 11 (4%) patients had unclassified RCC. Forty-five (17%) patients had Fuhrman Grade 1 tumor, 187 (70%) patients had Grade 2 tumors, and 37 (14%) patients had Grade 3 tumors. None of the patients had Grade 4 tumors. The tumors were distributed into 215 (80%) T1a, 42 (16%) T1b, and 12 (4%) T3a. Tumor characteristics are displayed in Table 2.

We identified two patients (0.7% of all the RCC in the study) who developed TSR during an average follow-up period of 31 months (ranging from 18 to 72 months). The first recurrence appeared 18 months after the surgery. The second recurrence presented 72 months after RPN. Both cases underwent open surgical excision of the trocar site, in which the recurrence appeared [Figure 1]. In the first case, TSR developed in the 8-mm trocar site used to introduce the robotic scissors. RCC recurred in the 5–12-mm Versa Step trocar site used to introduce the laparoscopic Statensky used to clamp the renal hilum. Tumor pathology was clear-cell RCC, Grade 2, with tumor size of 2.1 cm (T1a). The trocar site was surgically excised, and pathology was clear-cell RCC, G2. In the second case,

Table 1: Patient demographics

Variable	Value
RPN (patients)	335
Studied RCC (%)	269 (81)
Age (years)	67 (28-81)
Female/male	86/183 (47)

RPN: Robotic partial nephrectomy, RCC: Renal cell carcinoma

Table 2: Tumor characteristics

Variables	Mean (range)
RENAL nephrometry score	6.4 (4-10)
Clear-cell RCC (patients) (%)	192 (71)
Papillary RCC (patients) (%)	50 (19)
Chromophobe RCC (%)	16 (6)
Unclassified RCC (%)	11 (4)
Furman Grade 1 (%)	45 (17)
Furman Grade 2 (%)	187 (70)
Furman Grade 3 (%)	37 (14)
Furman Grade 4 (%)	0
T1a 42 (%)	215 (80)
T1b (%)	42 (16)
T3a (%)	12 (4)

RCC: Renal cell carcinoma

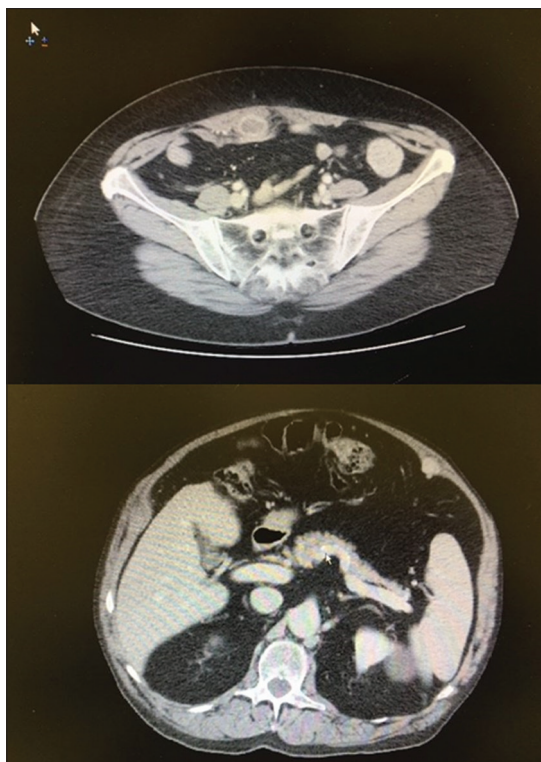


Figure 1: Renal cell carcinoma recurrence at the trocar site. In the first case, the recurrence occurred in the trocar used for clamping, and in the second picture, the recurrence developed in the 8-mm trocar used for robotic instrument

the initial pathology revealed papillary RCC, G3 with tumor size of 5.2 cm T1b. This also was treated with wide excision of the trocar site and pathology concurs with G3 papillary RCC. Imaging after 5 years and 6 months revealed no new tumor recurrence.

DISCUSSION

The phenomenon of tumor recurrence in the surgical wound has been well described in the literature. Manipulation of the tumor during the surgery, open or laparoscopic can lead to spillage and seeding of the cancer cells into the surgical field and wound.^[1] In fact, it has been well reported in the literature tumor recurrence develops at the trocar sites, resulting in TSR, in adrenal, colon, and ovarian cancers.^[2] However, TSR was reported to be rare after laparoscopic resection of RCC, with the incidence ranging from 0.03% to 0.09%.^[2] This study represents a large series of single-center RPN. We found two cases of TSR in our study despite the precautions taken during the surgery. The etiology of TSR is likely to be multifactorial, involving tumor biology, local wound and general host immune processes, gas ambiance, and surgical factors. Similar factors are likely to be involved in the etiology of intraperitoneal dissemination, which can occur during both laparoscopic and open surgery.^[8-10] In fact, Song *et al.*

reported for the first TSR involving the camera trocar in robotic surgery after partial nephrectomy.^[11,12] Extensive literature suggests that CO₂ gas is one of the major factors leading to port-site metastases.^[13] This was further supported in another study by Bouvy *et al.*, who showed that compared with gasless laparoscopy, laparoscopy with CO₂ pneumoperitoneum resulted in increased tumor growth and greater port-site and abdominal wall metastases in both a cell-seeding and a solid tumor model.^[14] However, Iwanaka *et al.* found no difference in the rate of port-site recurrences between gasless laparoscopy and conventional laparoscopy.^[15] Agostini *et al.* assessed the effect of CO₂ pneumoperitoneum on tumor dissemination and the occurrence of port-site metastases in an ovarian cancer model.^[16] They found that tumor dissemination was not influenced by gas pressure or duration of the procedure. The number of port-site metastases was significantly higher in the gasless group. The duration of the procedure did not significantly influence the port-site metastases rate. We reported in our series two cases. Both the first case of TSR was involving the robotic 8-mm metal trocar and the second was involving the assistant trocar. TSR was discovered during the routine follow-up computed tomography (CT) done at 18 months from RPN. Interestingly, our second case presented 7 years after the surgery as a skin lesion, and a CT showed pan involvement of the wound layers at the trocar site. That is considered too late presentation as it happened after the recommended 5 years follow-up.

CONCLUSION

RCC recurrence after RPN can present as TSR, though it is rare and underreported. Special attention should be given to examine the trocar site during the surveillance follow-up of RCC treated with RPN. It can develop up to 72 months after surgery. Surgical removal of the trocar site should be considered with wide excision each time a lump develops after surgery. Further studies are needed to understand the etiology behind this type of recurrence to enable us to avoid it.

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Conflicts of interest

There are no conflicts of interest.

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