

Peritoneal Dialysis and Retroperitoneal Laparoscopic Radical Nephrectomy: A Favorable Experience With a Patient Complicated by Renal Cell Carcinoma

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ABSTRACT: Peritoneal dialysis (PD) is an accepted modality for managing end-stage kidney disease. We herein report a 75-year-old female patient on chronic PD who was complicated by renal cell carcinoma. She was successfully treated with retroperitoneal laparoscopic radical nephrectomy followed by a prompt resumption of the procedure. Various surgeries disturbing the abdominal wall integrity often disrupt the regular PD schedule, and using minimally invasive approaches is therefore an attractive therapeutic option. Our experience emphasizes the feasibility and safety of a retroperitoneal approach-based laparoscopic technique based on several empirical examples. However, systemic studies on this topic are obviously lacking, so we strongly recommend the accumulation of more cases similar to our own. Several surgical concerns that need to be dealt with among PD patients are also discussed.

KEYWORDS: peritoneal dialysis, abdominal wall integrity, renal cell carcinoma, surgical intervention, interim hemodialysis

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Introduction

Patients maintained on chronic dialysis are at an increased risk of neoplasms, which often follow a locoregional pattern, with the kidney and bladder being the most common sites.¹ Epidemiologically established risk factors for renal cell carcinoma (RCC) include excess body weight, hypertension, and cigarette smoking.² In patients with end-stage kidney disease (ESKD), the uremic milieu, functional decline in the immune system, and increased expression of several growth factors have been linked with the disease as well,^{3,4} and the risk seems to increase with the duration of renal replacement therapy.⁵ Furthermore, some individuals may have a genetic predisposition, although the genomic disturbances underlying sporadic RCC in the general population differ from those underlying the development of RCC in the setting of ESKD.³ Flank pain, gross hematuria, an increased hematocrit, and a palpable abdominal mass occasionally lead to the prompt diagnosis^{2,6}; however, most of the RCC diagnoses are made incidentally when imaging studies are performed for other medical reasons.² Pathologic evaluations based on renal biopsies may be the ideal diagnostics for evaluating renal masses to select the most appropriate therapeutic management, but the presence of a rich vascular flow on color Doppler ultrasound has been shown to be strongly suggestive of conventional clear cell histology, implying the reliable diagnostic accuracy of current imaging modalities.^{2,7,8}

Peritoneal dialysis (PD) is an accepted modality for managing ESKD.⁹ It offers a rational therapeutic approach in the broader context of overall health care, including minimal variation in the intravascular volume status, reduced stresses on the cardiovascular system, better preservation of the residual renal function, and freedom from frequent hospital visits.^{9,10} However, various surgical interventions that disturb the integrity of abdominal cavity boundaries can disrupt the regular PD schedule^{11,12}; therefore, there may be some subsets of patients on periodic PD who benefit from minimally invasive surgical techniques.^{11–14}

In this report, we describe our experience with one such case in a female chronic PD patient complicated by RCC who was successfully treated with retroperitoneal laparoscopic radical nephrectomy.

Case Report

A 75-year-old woman who had been treated with PD for 2 years because of ESKD secondary to chronic glomerulonephritis was incidentally found to have a solid mass measuring 20 mm in its greatest dimension in the upper pole of the left kidney without any findings of lymphadenopathy by abdominal computed tomography performed as the annual surveillance (Figure 1A), and the subsequent renal sonographic analysis revealed the hypochoic mass associated with a



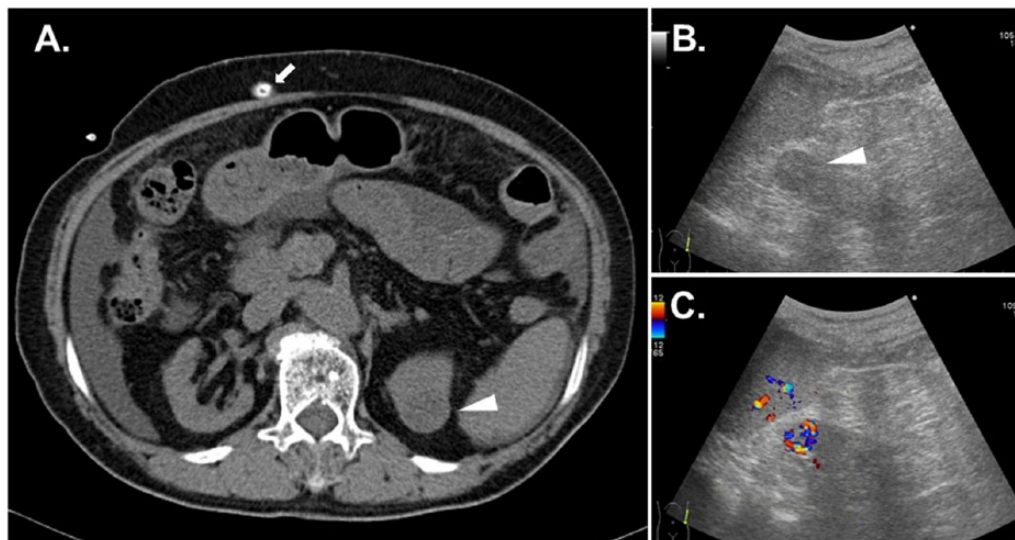


Figure 1. Findings of the imaging studies. A select axial image of a noncontrast abdominal computed tomographic scan (A) shows a solid mass with hypodense appearance deforming the contour in the upper pole of the left kidney (arrowhead). Note that the PD catheter within the wall of the abdomen is indicated (arrow). A longitudinal gray-scale ultrasound image (B) reveals a hypoechoic round shape mass in the corresponding region of the left kidney, whereas a peripheral vascular distribution with some penetration is demonstrated on color Doppler flow mapping (C).

peripheral vascular distribution in the corresponding region (Figure 1B and 1C). At 73 years of age, a Tenckhoff PD catheter was implanted through a classic transverse surgical incision when her serum creatinine (Cr) levels increased to around 5.4 mg/dL. Renal sonography at this point revealed declines in the renal long axis dimensions (right: 89 mm, left: 78 mm) and increased renal cortex echogenicity accompanied by poorly maintained corticomedullary definition, although no parenchymal solid masses were noted. Thereafter, she was exclusively treated with continuous ambulatory PD (CAPD) consisting of 3 daily exchanges (1.5 L of Midperiq® 135 × 3; Terumo Co., Tokyo, Japan), thereby leading to serum levels of Cr ranging from 4.13 to 4.97 mg/dL. The patient's other blood parameters were acceptable, and her general condition was satisfactory as well. Her medical history included hypertension and a uterine myoma, for which she had undergone total hysterectomy at 62 years of age.

The patient was strongly suspected of having RCC and finally underwent retroperitoneoscopic radical nephrectomy, as described with some modification,¹⁵ approximately 2 months after the recognition of the renal mass by the imaging analyses. The CAPD was continued until the day before the surgery. The patient was placed in the lateral position adjusted to expose and stretch the left iliocostal space following general anesthesia with endotracheal intubation. The first incision was performed along the elongation of the 12th rib at its intersection with the midaxillary line, and the retroperitoneal space was created with the index finger and then extended with a balloon trocar. The second and third 12-mm trocars were placed on the anterior axillary line and the paraspinous region at the level of the costovertebral angle, respectively. The procedure was started with a wide incision through the lateroconal fascia, and the renal vessels were divided and severed with a stapling device after identification of

the renal hilum. Following upward dissection as far as the diaphragm, the kidney and the adrenal gland were extracted, and the muscular as well as cutaneous wounds were treated with two-layer suturing. The postoperative course was uneventful, and the pathological survey revealed the round-shaped 20-mm × 20-mm neoplastic tissue. The patient was ultimately diagnosed with stage I (T1aN0M0) clear cell-type adenocarcinoma in accordance with the American Joint Committee on cancer TNM classification for RCC.¹⁶ Although she received interim hemodialysis (HD) with a femoral vein puncture on postoperative day 1, the patient's regular CAPD program was restarted 2 days later without any complications. At 1-year follow-up, she is still doing well with serum Cr levels of approximately 7.5 mg/dL with PD using 3 daily exchanges (1.5 L of Midperiq® 135 × 3 [total dwell time of 12 hours]), and no evidence of recurrence or metastasis of the disease has been noted on repeat imaging studies.

Discussion

The clinical scenario of the current patient, characterized by a set of conditions including ESKD treated with PD and RCC requiring surgical intervention, may not be surprising.^{4,17} However, the significance of the present case should be evaluated carefully in terms of how to surgically access the complicated kidney. This report emphasizes the feasibility and safety of retroperitoneal laparoscopic radical nephrectomy, which is a minimally invasive surgery retaining the integrity of the peritoneum and thereby allowing for the prompt resumption of PD.

Given the stretching and/or tractive nature of PD characterized by increased intra-abdominal pressure accompanying peritoneal dialysate infusion,^{11,18–21} postoperative leakage of the dialysate through wounds is a matter of concern that needs to be dealt with among patients who receive surgeries

disturbing the abdominal wall integrity.^{11–14} Suspending PD after such interventions until the wounds stabilize enough to overcome the increased intra-abdominal pressure resulting from the dwells may be required.^{11,19,20} In this regard, radical nephrectomy using a retroperitoneal approach and/or laparoscopic technique may be attractive modes of surgery for RCC in some subsets of patients with PD-dependent ESKD, when applicable. Our experience with the present patient is not substantially different from several previously reported empirical examples, wherein such interventions were successfully applied, followed by the timely resumption of the procedure with or without interim HD.^{12–14} However, systemic studies on this topic are obviously lacking, so we strongly recommend the accumulation of more cases similar to our own. Evaluating more such cases will help clarify the nature of the disease as well as the validity of the therapeutic approach among patients on periodic PD.

Currently, the optimum surgical regimens in this population remain to be standardized, and we believe that thoroughly weighing all options and risks of complications as well as disease severity on a case-by-case basis should still be mandatory. Establishing selection criteria for the procedure is therefore a pivotal concern that needs to be addressed carefully, as a retroperitoneal approach only provides a small working space, and we need to deliberate the structural characteristics of the kidney as well as the size and location of the renal neoplasm.²¹ Alternatively, or in addition, determining the optimum intervals for longitudinal surveillance and flexible follow-up policies of the disease should be another prerequisite, although it seems to be quite a challenge in the current clinical settings,^{4,17,22} as the delayed metachronous presentation of metastasis, despite performing unilateral nephrectomy with a curative intent, is not very rare.^{17,23}

Author Contributions

RI and TA drafted the manuscript. MK, TK, TS, KO, MS, MA, IN, and ST made contributions to the acquisition of the clinical data. TY, SM, and DN provided a detailed review of the contents and structure of the manuscript, resulting in significant changes to the original document. All the authors have read and approved the final manuscript.

Disclosures and Ethics

As a requirement for publication, the authors have provided the publisher with signed confirmation of their compliance with legal and ethical obligations including, but not limited to the following: authorship and contributorship, conflicts of interest, privacy and confidentiality, and (where applicable) the protection of human and animal research subjects. The authors have read and confirmed their agreement with the ICMJE

authorship and conflict of interest criteria. The authors have also confirmed that this manuscript is unique and not under consideration for publication or published in any other journals and that they have permission from the rights holders to reproduce any copyrighted material. The external blind peer reviewers report no conflicts of interest.

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