

Oncology

Salvage robotic transmesenteric off-clamp partial nephrectomy after multiple prior open kidney surgeries

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ABSTRACT

Repeat renal surgery is technically demanding with a high morbidity rate. We describe a novel surgical approach, a salvage robotic transmesenteric off-clamp partial nephrectomy for the management of a renal cell carcinoma in a patient with a history of VHL and multiple prior renal surgeries on the affected kidney. Upon pathological review, the specimen was diagnosed as clear cell RCC, Fuhrman Grade 3, with negative surgical margins. The patient suffered no post-operative complications and had a rapid convalescence. This approach is a feasible and safe alternative in select patients with a significant history of renal surgeries and favorable anatomy.

Introduction

Hereditary renal tumors, such as those seen in von Hippel-Lindau (VHL), are commonly managed with active surveillance followed by partial nephrectomy (PN) when tumors reach a size threshold of 3 cm.¹ Given the nature of the disease, many patients require multiple PN during their lifetime to limit oncologic risk while preserving renal function. Inherently, each subsequent operation on the kidneys becomes more challenging due to adhesions and fibrosis from previous interventions.² In this report, we describe an innovative surgical approach: robotic transmesenteric off-clamp PN for the management of a renal cell carcinoma in a patient with a history of VHL and an extensive history of previous surgeries on the affected kidney.

Case presentation

The patient was a 50-year-old man with a history of VHL and bilateral renal cell carcinoma (RCC). His past surgical history was significant for three prior left PNs and one right PN. His renal function was significant for stage 3B chronic kidney disease, with a pre-operative creatinine of 1.75 mg/dL and an estimated glomerular filtration rate (eGFR) of 44 mL/min. The patient has remained on close surveillance with serial magnetic resonance imaging (MRIs) every 12–24 months. The patient's most recent MRI report noted a single left renal mass measuring 3.4 cm (up from 2.7cm in the year prior), along with too numerous to count renal cysts. (Fig. 1). Given a single >3 cm solid tumor that was anterior

and exophytic, the plan was the resect the tumor utilizing a robotic approach.

The patient was placed in the lateral decubitus position and insufflated with a Veress needle without difficulty. Inspection of the patient's prior abdominal incisions revealed bilateral flank incisions as well as a chevron incision. The abdomen was entered under direct vision. Significant adhesions were lysed laparoscopically, before placing robotic trocars along the lateral edge of the rectus. A 15 mm assistant port was placed at the umbilicus and a 5 mm Airseal (CONMED Corporation, Utica, NY) port was placed 6 cm above the umbilicus in an area without adhesions. The robot (da Vinci Xi, Intuitive Surgical Inc., Sunnyvale, CA) was then docked, and instruments were installed. A careful inspection of the abdominal cavity was notable for prior surgeries and we identified the descending colon as well as the renal mass medial to it protruding the colon mesentery (Fig. 2). Intraoperative ultrasound confirmed that the mass was anterior solid mass seen on MRI. This solid mass was the most anterior component of the kidney and surrounded by cysts. There were no other solid renal masses identified on a dedicated surveillance of the ipsilateral kidney.

Given the exophytic nature of the renal tumor as well as the dense fibrotic reaction from prior surgeries, we elected to create a mesenteric window to expose the exophytic renal tumor. Inspection of the mesentery revealed no large caliber blood vessels in the portion overlying the tumor. The edge of the colon was identified to avoid thermal injuries.

Once the mesentery was opened, we exposed the renal mass and the surrounding renal parenchyma. We then scored the renal capsule under

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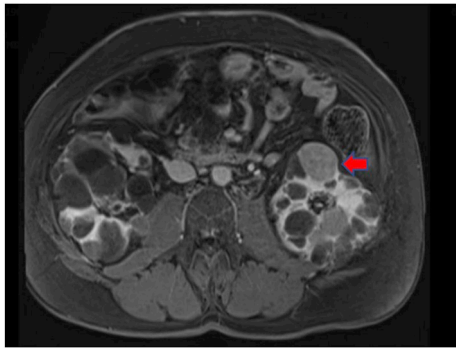


Fig. 1. Imaging of the renal mass. MRI showing an anterior, 3.4 cm mass in the left kidney (red arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

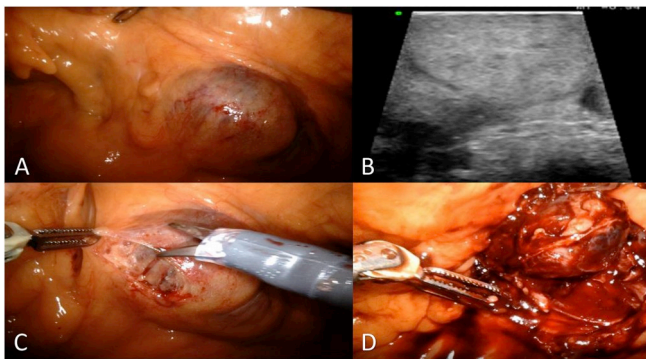


Fig. 2. Surgical images showing removal of renal mass. Anterior mass protruding through mesentery (A); intraoperative ultrasound confirming presence of renal mass (B); transmesenteric approach of renal mass (C); successful excision of renal mass (D).

ultrasound guidance. The decision for an off-clamp resection was made. The capsule was incised circumferentially and the tumor was enucleated away from the normal renal parenchyma. The tumor and the resection bed were evaluated ensuring adequate resection of the entire renal mass. Blood loss for this off-clamp resection was estimated at 100 cc. A 2-layer renorrhaphy was subsequently performed by using a 3-0 barbed suture for the inner layer and a 2-0 polyglactin to close the renal capsule. The tumor was placed in an EndoCatch bag (Covidien, Dublin, Ireland) and extracted.

Upon pathological review, the specimen was diagnosed as clear cell RCC, Fuhrman Grade 3, with negative surgical margins (Fig. 3). The Foley catheter was removed on post-operative day 2, and the Jackson-Pratt drain was removed on post-operative day 3 as there was no increased output. He was discharged to home on post-operative day 3, after all post-operative milestone for discharge were met. Notably, his

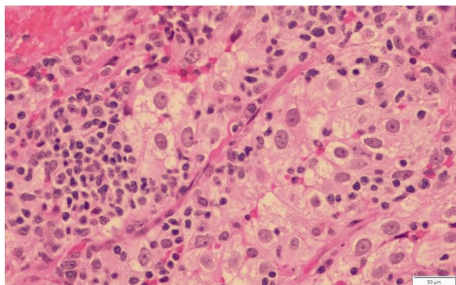


Fig. 3. Histopathologic image of renal mass. Pathological review showed clear cell RCC, Furham Grade 3.

serum creatinine was 1.57 mg/dL, slightly lower than his pre-operative creatinine of 1.75 mg/dL.

Discussion

Here we describe a transmesenteric robotic PN in a patient with VHL who underwent multiple prior bilateral open PNs. Given his complex surgical history, we sought to minimize dissection where not necessary. Given the fact that the exophytic renal mass was protruding into an area of colon mesentery devoid of large vessels, a transmesenteric approach without hilar clamping seemed feasible and attractive.

Salvage PN (PN after ≥ 2 prior PN) is a technically demanding procedure, with a historically high complication rate and rate of renal loss.² Minimizing dissection of critical structures such as the renal hilum are often beneficial in these cases, as the degree of fibrosis can make identification and dissection challenging. Even mobilizing the kidney is often difficult, as one can encounter fibrotic reaction to the abdominal wall, prior incision sites, psoas muscles and diaphragm. In this case, these areas were completely avoided.

While the transmesenteric approach belongs to the urologists repertoire and has been utilized by urologists performing pyeloplasty procedures,³ this is the first reported case describing a transmesenteric approach for a PN.

Compared with open PN, robotic nephrectomies have similar functional and oncologic outcomes while demonstrating less blood loss, shortened length of hospital stay, and a lower rate of postoperative complications.⁴ Furthermore, we routinely use off-clamp resection for patients with hereditary cancer syndromes. Even for complex renal tumors, the safety of off-clamp PN has been documented.⁵ In this case, we elected to forego accessing the renal hilum and proceed with an off-clamp resection through the mesentery but should note for deeper renal tumors or those near the hilum, the hilum should be dissected even in off-clamp cases.

The robotic transmesenteric PN requires knowledge of abdominal and retroperitoneal anatomy, as well as training in minimally-invasive surgery. Moreover, this approach may not be possible for patients with a highly vascular mesentery or if the surgeon requires access to the renal hilum for vascular clamping.

Conclusion

In this report, we describe an off-clamp transmesenteric robotic PN in a patient with multiple prior open renal surgeries. This approach was a technically and oncologically sound technique that allowed for rapid convalescence in a patient with a significant history of renal surgeries and favorable anatomy.

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Declaration of competing interest

None.

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