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Combined Robotic-Assisted Laparoscopic Partial Nephrectomy and Radical Prostatectomy

Manish N. Patel, MD, Daniel Eun, MD, Mani Menon, MD, Craig G. Rogers, MD

ABSTRACT

A 59-year-old man with a history of prostate cancer and clear-cell renal-cell carcinoma of the kidney underwent a combined robot-assisted laparoscopic partial nephrectomy and radical prostatectomy. We describe the initial report of a combined robot-assisted operation for both procedures concurrently with a port strategy allowing reuse of ports.

Key Words: Robotics, Surgery, Minimally invasive, Kidney cancer, Partial nephrectomy, Prostate cancer, Radical prostatectomy.

Vattikuti Urology Institute, Henry Ford Hospital, Detroit, Michigan, USA (all authors).

Address correspondence to: Craig Rogers, Henry Ford Hospital, Vattikuti Urology Institute, 2799 West Grand Boulevard, Detroit, MI 48202, USA. Telephone: (313) 916-2641, Fax: (313) 916-7577, E-mail: crogers2@hfhs.org

INTRODUCTION

A 59-year-old man with no previous urologic history was referred to our clinic with an elevated PSA of 21.1 ng/mL. A prostate biopsy showed Gleason 3+3=6 adenocarcinoma, in <5% of 1 of 14 cores, clinical stage T_1C. A bone scan was negative. A computed tomographic (CT) scan showed no evidence of pelvic lymphadenopathy but demonstrated an incidental heterogeneously enhancing solid mass in the lower pole of the right kidney measuring 1.7 cm, suspicious for renal cell carcinoma **(Figure 1)**. His serum creatinine was 1.1 mg/dL. The patient elected to undergo a robotic prostatectomy. He was presented with treatment options for his renal mass that included prostatectomy followed by surveillance, partial nephrectomy, or ablation of the renal mass. However, the patient desired surgical excision of his renal mass at the same time as his prostatectomy, if possible. We felt that a combined approach might be feasible in his particular case and agreed to attempt a concurrent approach, with the understanding that we could stop after the partial nephrectomy, if necessary, and do either a staged prostatectomy or radiation therapy for the prostate.

In this report, we demonstrate the feasibility of performing concurrent upper and lower urinary tract robotic-assisted surgeries by reusing port incisions to decrease surgical morbidity.

METHODS

Partial Nephrectomy

The patient was placed in full flank position with a Foley catheter inserted in the bladder. Due to the superficial nature of the renal mass, cystoscopy and ureteral stent placement was not preformed before surgery. Pneumoperitoneum of 20 mm Hg was established for port placement. Ports were placed for the robotic partial nephrectomy portion of the procedure as depicted in **Figure 2**. A 12-mm port was placed 2 inches below the subcostal margin at the right anterior axillary line for the robotic camera. Two robotic instrument ports were placed approximately 5 cm from the camera port and more medially toward the umbilicus. A 12-mm assistant port was placed

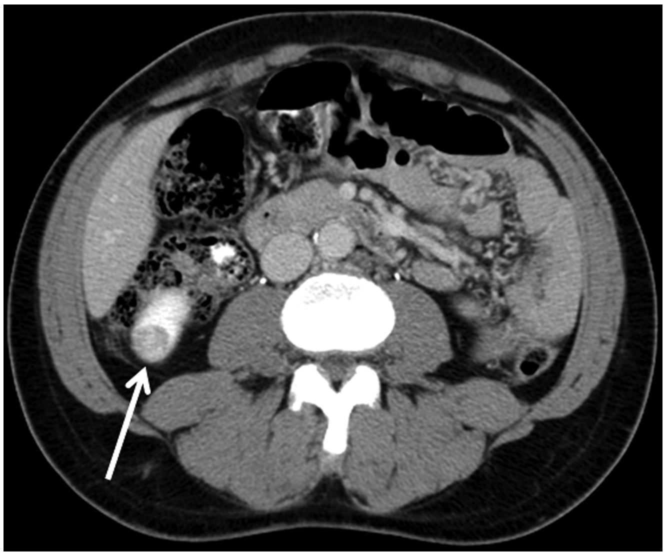

Figure 1. Axial computed tomographic scan showing 1.7-cm right lower pole enhancing solid renal mass (arrow).

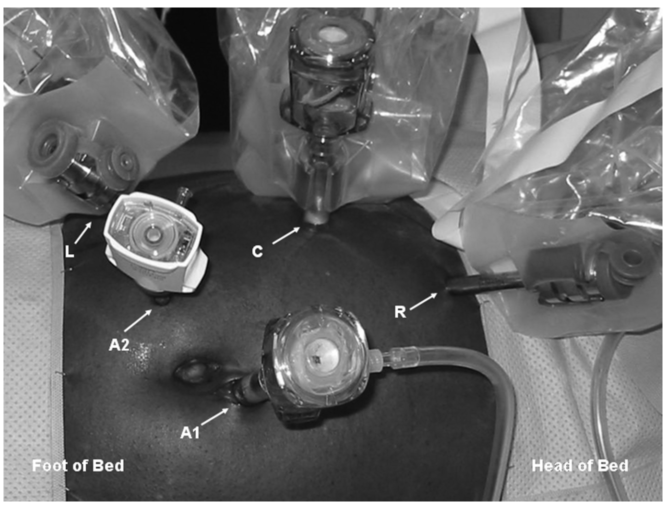

Figure 2. Port placement for robotic partial nephrectomy. A 12-mm port (C) is placed laterally for the robotic camera. Robotic instrument ports are placed medially toward the umbilicus (L-left, R-right). A 12-mm assistant port is placed periumbillically (A1). A second 5-mm assistant port is placed between the left robotic port and the umbilicus (A2).

periumbillically in the midline. A second 5-mm, assistant port was placed between the left robotic port and the umbilicus. A 5-mm subxiphoid port was placed for liver retraction. The robot was docked posteriorly at approximately a 20-degree angle toward the head of the patient.

Robotic instruments used included Maryland bipolar forceps, monopolar cautery scissors, and needle drivers. The colon was reflected medially with robotic assistance, and sharp and blunt dissection was used to expose the kidney. The gonadal vessels and ureter were dissected and retracted anteriorly, exposing the underlying psoas muscle. The renal vessels were dissected. A laparoscopic ultrasound probe (Aloka, Inc. Tokyo, Japan) was used to locate the renal tumor and identify the margins of resection. The renal capsule was scored with monopolar cautery to delineate the boundaries of resection.

Bulldog clamps were then placed individually on the renal artery and renal vein by the assistant, and the tumor was excised with cold excision under warm ischemia. Following excision of the tumor, the robotic instruments were exchanged for robotic needle drivers. A 3–0 Vicryl suture on an SH needle was used to suture the resection bed for hemostasis. No collecting system entry was identified. Renal parenchymal defects were approximated over Surgicel (Ethicon, Johnson and Johnson, Sommerville, NJ) bolsters by using 2–0 Vicryl sutures on an SH needle after application of FloSeal (Baxter, Deerfield, IL) on the resection bed. The assistant removed the bulldog clamps. The specimen was placed in a retrieval bag and simultaneously removed with the periumbilical 12-mm assistant port, avoiding the need to extend the incision.

Prostatectomy

Following the partial nephrectomy, the robot was undocked, the ports were removed, the camera and right robotic port sites were closed, and the port sites and abdomen were covered with a sterile adhesive drape. The patient was repositioned from full flank, to a supine, lithotomy, Trendelenburg position. The sterile adhesive drape was removed, and ports were placed for the robotic prostatectomy portion of the procedure as depicted in **Figure 3**. The 12-mm periumbilical assistant port was replaced for the robotic camera. The new right robotic port was placed in the original left robotic port incision, and a new left robotic port incision was made lateral to the camera port. The original right paramedian incision was reused to place a 5-mm assistant port for suctioning. New 12-mm right iliac fossa and 5-mm left iliac fossa ports were placed. The robot was then redocked between the legs of the patient.

Next, a standard nerve-sparing robot-assisted radical prostatectomy with bilateral pelvic lymph node dissection was performed according to our previously described technique.[1] Given the preoperative PSA and biopsy Gleason grade, the pelvic lymph node dissection was performed first, and frozen section analysis of the lymph nodes was

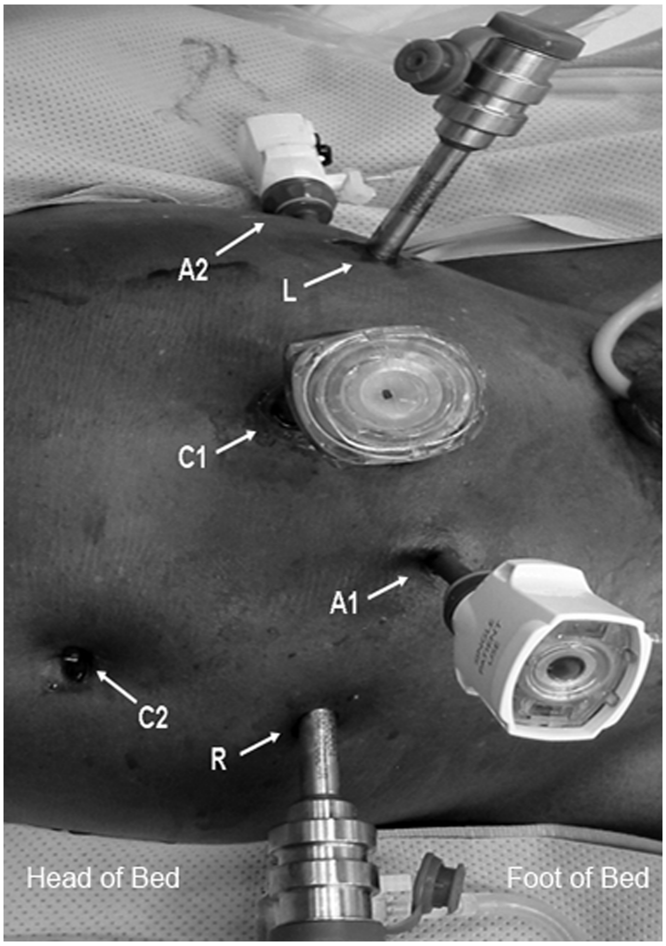

Figure 3. Port placement for robotic radical nephrectomy after robotic partial nephrectomy. The 12-mm periumbilical assistant port is replaced for the robotic camera (C1). A new right robotic port (R) is placed in the original left robotic port incision, and a new left robotic port (L) is placed lateral to the camera port. The original right paramedian incision is reused to place a 5-mm assistant port (A1) for suctioning. A new 5-mm left iliac fossa port (A2) is placed. The original camera port was closed (C2).

obtained. The prostatectomy specimen was placed in a retrieval bag and removed by extending the periumbilical port incision. A suction drain was left through the 5-mm assistant port.

RESULTS

Total operative time was 427 minutes. Total console time was 335 minutes (partial nephrectomy, 177 minutes; prostatectomy, 158 minutes). Warm ischemia time for the robotic partial nephrectomy was 24 minutes. Estimated blood loss was 200 mL (partial nephrectomy, 25 mL; prostatectomy, 175 mL); the patient did not require a blood transfusion. Frozen sections from the pelvic lymph node dissection were negative. The patient's postoperative course was unremarkable, and he was discharged on postoperative day 2. Final pathology from his prostatectomy demonstrated adenocarcinoma, Gleason 4+3=7, organ confined, with negative margins. Final pathology from his partial nephrectomy demonstrated clear-cell carcinoma, Fuhrman grade 2, pathologic stage T1a with negative margins. At 4-month follow-up, his PSA was undetectable, and no evidence was present of residual kidney cancer.

DISCUSSION

Minimally invasive procedures can be utilized in the majority of patients with urologic malignancies, including those patients with synchronous primary urologic malignancies.[2,3] Finley and colleagues[3] reported a combined robot-assisted laparoscopic radical prostatectomy and hand-assisted laparoscopic nephroureterectomy. We present a unique combination of robotic assistance for upper and lower urinary tract surgery in that hand-assistance was not used, and a partial nephrectomy was performed instead of a radical nephroureterectomy. Although robotic partial nephrectomy has been described by several groups,[4–11] we believe that our report constitutes the first case of a combined upper and lower tract surgery utilizing robotic assistance for a partial nephrectomy and radical prostatectomy performed in a single session.

We believe this report to be unique because of the reuse of ports to minimize the number of incisions needed for this combined robotic partial nephrectomy and prostatectomy. We modified the location of the right paramedian assistant port to a more inferior location **(Figure 4)**, allowing access to both surgical sites while avoiding interference with the camera and robotic arms. We were able to reuse 3 of the 5 port locations from the partial nephrectomy to perform the prostatectomy. We chose to perform the partial nephrectomy first because if the situation arose in which the patient could only complete one procedure, the patient could still receive radiation therapy for the prostate cancer, whereas we felt that the ideal oncologic management of the renal mass was with surgical extirpation.

Our combined approach had several potential benefits for the patient. The patient was potentially spared the morbidity associated with 2 separate procedures. The patient wished to minimize his length of stay in the hospital and desired to have a combined approach that would require a single hospital admission instead of 2. The combined

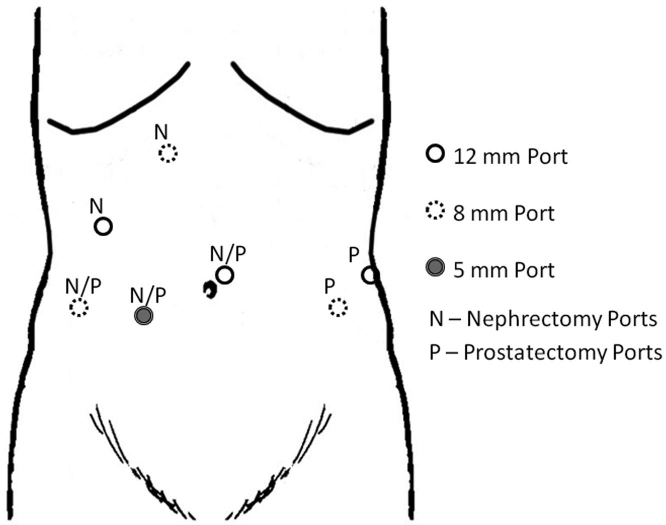

Figure 4. Diagram depicting port placement for both procedures. The 5-mm right paramedian assistant port was moved caudally for use during both procedures. To transition from the partial nephrectomy to the radical prostatectomy, the original camera port and the right robotic port were closed. A new left robotic port and 12-mm assistant port were added. Three ports were used for both procedures.

approach also allowed for the reuse of ports so the patient would not have to have 2 independent sets of trocar incisions thus improving cosmesis. Combining the procedures reduced the cardiac and pulmonary risks associated with multiple inductions of anesthesia.

Potential limitations to combining a robotic partial nephrectomy with a robotic prostatectomy include the location of the renal mass. In our case, the mass was located at the lower pole, allowing us to place ports inferiorly that could be used to access the kidney tumor and the prostate. Had the mass been in the mid or upper pole of the kidney, the reuse of ports would likely have been challenging, because a more superior port placement would have been necessary for the partial nephrectomy. In addition, patients with medical comorbidities may not be ideal candidates for a combined procedure due to potential complications of prolonged anesthesia and pneumoperitoneum. There is a potential for similar complications with both procedures, such as urine leak or bleeding, that could make it difficult to diagnose the source postoperatively. We recommend limiting these combined procedures to small, exophytic kidney tumors in which the potential for urine leak or bleeding is less. We do not necessarily advocate performing concurrent robotic-assisted surgeries on all patients with both kidney and prostate tumors. However, for select patients, a combined procedure may minimize total anesthesia time and recuperation time as well as the inconvenience of multiple hospital admissions.

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