JOURNAL OF ENDOUROLOGY
Volume 20, Number 4, April 2006


# Techniques in Endourology

# Robot-Assisted Laparoscopic Radical Cystoprostatectomy and Totally Intracorporeal Ileal Neobladder*

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## ABSTRACT

***Purpose*: To describe robot-assisted laparoscopic radical cystoprostatectomy and intracorporeal orthotopic ileal neobladder construction.**

***Methods*: With the use of the daVinci® Surgical System (Intuitive Surgical, Sunnyvale, CA), we performed laparoscopic radical cystectomy and intracorporeal construction of an orthotopic ileal neobladder (modified W pouch).**

***Results*: The total operative time was 12 hours, and the estimated blood loss was 100 mL. There were no intraoperative or postoperative complications, and the patient's hospital stay was 5 days. At early follow-up, oncologic and functional results are good.**

***Conclusion*: Robot-assisted laparoscopic radical cystoprostatectomy with intracorporeal ileal neobladder construction is technically feasible. However, its role in the management of invasive bladder cancer remains to be defined.**

## INTRODUCTION

ALTHOUGH LAPAROSCOPIC RADICAL CYSTECTOMY has been reported in the literature by several highly skilled laparoscopic surgeons,[1–5] this procedure has not been widely accepted because of the technical demands. The daVinci® Surgical System allows even laparoscopically naïve surgeons to perform the most demanding laparoscopic skills, including intracorporeal suturing. In fact, the learning curve for robot-assisted laparoscopic radical prostatectomy has been reported to be as few as 8 to 12 cases.[6]

On the basis of our previous experience with robot-assisted laparoscopic radical prostatectomies, we report our initial case of robot-assisted laparoscopic radical cystoprostatectomy, bilateral pelvic lymphadenectomy, and intracorporeal construction of an orthotopic ileal neobladder.

## SURGICAL TECHNIQUE

Preoperatively, the patient received a standard mechanical and antibiotic bowel preparation. Broad-spectrum intravenous antibiotics were given 1 hour prior to incision. The patient was placed in an exaggerated Trendelenburg position with his arms tucked and legs abducted and lowered on spreader bars.

A six-port transperitoneal approach was used. Pneumoperitoneum was achieved via a Veress needle in the left upper quadrant. A 12-mm periumbilical port was introduced, followed by visual guidance of five additional ports. The two 8-mm ports for the robot arms were placed just lateral to the medial umbilical ligaments about 10 cm caudal and lateral to the umbilical port. Two 12-mm ports were placed about 3 cm medial to the anterior superior iliac spine. Finally, a 5-mm port for suction and irrigation was placed in the right upper quadrant (Fig.

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*Video of this technique can be viewed on the enclosed CD-ROM and online at www.liebertpub.com/end.

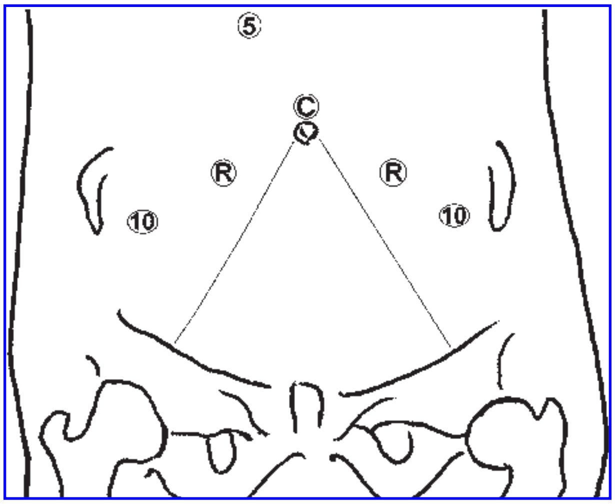


**FIG. 1.** Six-port transperitoneal approach. The 12-mm trocar for camera (C) is placed just above umbilicus. Two 8-mm ports for robot arms (R) are placed just lateral to medial umbilical ligaments (drawn lines). Two lateral 10/12-mm ports (10) are placed about 3 cm medial to anterior superior iliac spine. A 5-mm port (5) is placed in upper right quadrant for suction/irrigator instrument.

1). The daVinci® Surgical System was then aligned between the patient's legs and docked.

Radical cystoprostatectomy was performed first. The right and left colon were mobilized medially, and the posterior peritoneum overlying the iliac vessels and ureters was incised. The ureters were dissected distally toward their insertion in the bladder. The distal ureter was clipped with a 10-mm titanium clip, and a silk tie was secured about 1 cm proximal to the clip. After transection of the ureters, the plane between the bladder and rectum was developed, and the seminal vesicles attached to the bladder were dissected. The superior vesicle arteries were clipped and then transected with the 10-mm Ligasure Atlas™ (Valleylab, Boulder, CO). The remaining lateral and posterior vascular pedicles were then transected with an EndoGIA™ stapler (Ethicon Endo-Surgery, Cincinnati, OH), as the patient was not eligible for nerve sparing. Then, the anterior-wall peritoneum was incised in an inverted-U shape, and the bladder was dropped. The endopelvic fascia was incised bilaterally, and the puboprostatic ligaments were released. The dorsal venous complex was transected with the EndoGIA stapler. The urethra was transected sharply with scissors, and the bladder and prostate specimen was placed in an 8 × 10-inch LapSac™ (Cook Urological, Spencer, IN) and placed high up in the abdomen.

Standard bilateral pelvic lymph-node dissection was then performed bilaterally with monopolar and bipolar cautery. The lymph nodal packets were separately bagged in Endocatch II entrapment devices (US Surgical, Norwalk, CT) and placed in the upper abdomen.

A W-type ileal neobladder was fashioned from 50 cm of terminal ileum. The bowel was transected with the EndoGIA stapler, and the small-bowel mesentery was transected with the Ligasure Atlas™. Care was taken to maintain good vascularity of the isolated bowel segment by visual inspection of the mesentery and its vessels. Side-to-side anastomosis with the EndoGIA stapler was also used to reestablish small-bowel continuity. The ends of the small bowel were secured together with an interrupted silk suture placed antimesenterically 5 cm from the stapled ends. The EndoGIA stapler was fired along the adjacent antimesenteric sides of the small bowel. Two transverse firings of the EndoGIA stapler were used to close the open ends of the ileal limbs. Interrupted sutures were used to imbricate over the staple lines and close the mesenteric trap.

The urethral–neobladder anastomosis was performed prior to ileal detubularization. The middle of the isolated ileal limb was chosen as the site for the urethral–ileal anastomosis, as it reached the urethra easily under no tension. A 20F opening was made in the antimesenteric portion of this segment, and a running urethral–ileal anastomosis was performed as described by van Velthoven and associates.[8] An 18F Foley catheter was inserted into the neobladder prior to tying the anastomotic sutures. The staple lines from each end of the isolated ileal segment were excised, and the segment was detubularized along its antimesenteric border. The posterior wall of the neobladder was fashioned into a W configuration using multiple running 2-0 polyglactin sutures. The lateral borders of the pouch were then reapproximated starting near the urethral anastomosis and traveling cephalad, leaving the final 8 cm of the pouch open. The ureteroileal anastomoses were fashioned in a refluxing manner. The prior silk suture was used to stabilize the ureter as it was partially transected and spatulated. Interrupted 4-0 poliglecaprone sutures were used for the anastomosis. Prior to completing the ureteroileal anastomoses, double-pigtail ureteral stents (8F × 24 cm) were inserted over 0.035-inch guidewires via the ipsilateral lateral ports. An 18F Malecot catheter was placed though the dome of the neobladder, secured with a pursestring suture, and brought out the left lateral port. The remainder of the pouch was closed. Irrigation of the pouch via the Malecot catheter verified a water-tight anastomosis. A flat Jackson-Pratt drain was placed in the pelvis through the right lateral port site. The daVinci Surgical System was undocked, and the lymph-node and bladder specimens were removed from the umbilical port, which was enlarged to 4 cm.

## CASE REPORT

### *Patient history*

A 70-year-old man presented with gross painless hematuria. Evaluation revealed a 3 × 2-cm necrotic bladder tumor, which proved to be high-grade transitional-cell carcinoma with invasion into the muscularis propria. He had normal renal function with a serum creatinine concentration of 1.2 mg/dL, and his metastatic evaluation was negative. He was counseled on all treatment options and elected to undergo the surgical procedure as described.

### *Results*

The total operative time was 12 hours, and the estimated blood loss was 100 mL. There were no intraoperative complications, and no blood products were required. The patient was observed in the surgical intensive care unit overnight and transferred to the floor on postoperative day (POD) 1. A clear liquid diet was started on POD 3 and advanced to a regular diet on POD 4. The Jackson-Pratt drain was removed on POD 4, and the patient was discharged to home on POD 5. Hemoglobin and serum creatinine at discharge were 10.4 mg/dL and 1.1 mg/dL, respectively.

Pathologic examination revealed a stage $pT_0$ tumor with 15 negative lymph nodes. A pouchogram on POD 18 showed no extravasation (Fig. 2); therefore, the Foley catheter was removed. The suprapubic tube and ureteral stents were removed at 6 weeks post-operative. At the 3 months' follow-up visit the patient had excellent daytime continence but mild leakage at night.

## ROLE IN UROLOGICAL PRACTICE

To our knowledge, this represents the first report in North America of robot-assisted laparoscopic radical cystoprostatectomy with orthotopic neobladder performed entirely intracorporeally. Beecken and associates[7] reported the first case in the world, with an 8.5-hour operative time, a 200-mL blood loss, no complications, and early favorable oncologic and functional outcomes. Our patient also experienced early favorable results despite a long operative time (12 hours). Bowel isolation and neobladder construction were the most time-consuming portions of the case, lasting 8 hours. We anticipate that operative times will decrease as experience is accumulated and techniques are refined. It will be critical to determine whether there is any advantage to creating the urinary diversion completely intracorporeally versus performing the reconstruction extracorporeally.

Menon and colleagues[10] described a three-step technique for robot-assisted radical cystoprostatectomy and urinary diversion where a second surgical team exteriorized the bowel through a small incision and fashioned a urinary diversion. The pouch was internalized and the urethra–neobladder anastomosis performed with robotic assistance. Using this strategy, mean operative times for radical cystectomy and neobladder creation were 140 and 168 minutes, equating to a total operative time of around 5 hours.

In terms of oncologic outcomes, early data suggest results equivalent to those of open surgery.[9,11]

Over the past decade, skilled surgeons have perservered in undertaking the most challenging of open urologic procedures laparoscopically. The daVinci Surgical System is now helping to level the laparoscopic playing field by allowing a far greater number of urologic surgeons to perform complex reconstructive procedures laparoscopically. It appears that robot-assisted surgery will continue to play an increasingly important role in the management of all urologic cancers, including invasive bladder cancer.

**FIG. 2.** Postoperative cystogram prior to stent removal.

## CONCLUSIONS

Robot-assisted laparoscopic radical cystoprostatectomy and intracorporeal ileal neobladder creation is technically feasible. More experience and long-term follow-up is required before its role in the management of invasive bladder cancer is defined.

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## EDITORIAL COMMENT

This article proves that it is possible to perform a radical cystectomy and an orthotopic bladder completely intracorporeally using the daVinci telerobotic system. This procedure has been accomplished laparoscopically (without robotic assistance) in the past.

Our group may have been amongst the first to perform robotic cystectomy (authors' reference 10). We chose to do the cystectomy with the robot, extract the specimen, and perform the bladder construction *ex vivo* utilizing the incision made to extract the robot. Others have used the same approach laparoscopically.

There are small differences between our technique of cystectomy and that of Sala and associates. We do the node dissections *en bloc* and isolate vessels individually rather than using the stapler. It is the bias of our previous training as open oncologic surgeons that pointed us in this direction, rather than any documented advantage of our approach. Nonetheless, we superstitiously believe that any dissection in which all the vital structures and planes are identified individually will be superior in the long run. For the patients with bulky tumors, pelvic bilharziasis, or previous operations that formed the foundation of our series, this skeletonizing approach gave a (false?) sense of security. However, these differences in technique are trivial.

The major difference between our work and the current approach is that we chose to do the bowel work *ex vivo*. Why? Because it saves time, and you are making an incision to remove the bladder anyway. A 2- to 2.5-hour cystectomy followed by dedocking the robot and taking the patient out of the Trendelenburg position is a far cry from a 12-hour operation with the patient in an exaggerated Trendelenburg position. In the early days of laparoscopic and robotic prostatectomy, there were many instances of rhabdomyolysis. In almost every instance, the operation had taken more than 6 hours. Thus, our structured approach to robotic prostatectomy required dedocking the robot and flattening the patient at 4 hours. Unless the operation was almost complete, we would convert to open surgery at that time. We made one exception to this rule early in our robotic experience and regretted it! An elderly gentleman who had an operation that lasted well over 4 hours had a severe exacerbation of knee and hip pain and required physical therapy for several months. We attributed this complication to the length of the surgery and the Trendelenburg position. This experience propelled us to the three-step approach to robotic radical cystectomy outlined in Reference 10. Other surgeons have also found that using the incision made for removing the bladder to do the bowel work reduces overall operative time. And time is money!

Are there any downsides to doing the bladder configuration *ex vivo*? To us, precious few. We had anticipated that pain and ileus may be greater with this approach, but we found it not to be the case. Most patients are eating within 2 days and can be discharged in 3 to 5 days. We had not expected this, but the outcome was reproducible time after time. We can surmise only (and that, too, through the retrospectoscope) that the absence of traction and exposure of the entire intestinal tract to the exterior somehow prevent postoperative intestinal atony. Hard to believe, we admit, but, nevertheless true—in our experience! The same reasons account for the surprising absence of pain postoperatively.

We can think of one anatomic situation in which a completely intracorporeal reconstruction may be better than the approach we chose: in patients with a short thick mesentery, in whom it may be impossible to deliver the small bowel to the exterior. But are these the best candidates for a W-bladder? For sure, the procedure can be done, but it is sometimes very tricky to get the pouch down to the urethra. Ask any "open" surgeon who has done more than a hundred of these procedures.

Our admiration goes to the UCI robotic team. Our comments are not meant to be critical but simply to express a personal point of view.

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