Robotic Extraperitoneal Radical Prostatectomy: An Alternative Approach

J. V. Joseph,* R. Rosenbaum, R. Madeb, E. Erturk and H. R. H. Patel

From the Sections of Laparoscopic and Robotic Surgery, Department of Urology, University of Rochester Medical Center (JVJ, RR, RM, EE, HRHP), Rochester, New York, and Institute of Urology, University College London (HRHP), London, United Kingdom

Purpose: Laparoscopic radical prostatectomy with or without a robot has been increasingly performed worldwide, primarily using a transperitoneal approach. We report our experience with daVinci® robot assisted extraperitoneal laparoscopic radical prostatectomy.

Materials and Methods: A total of 325 patients underwent robot assisted extraperitoneal laparoscopic radical prostatectomy for clinically localized prostate cancer at our center during a 2-year period. Perioperative data, and oncological and functional results were prospectively recorded.

Results: Perioperative demographics included mean age, PSA and Gleason score, which were 60 years (range 42 to 76), 6.6 ng/ml (range 0.6 to 26) and 6 (range 5 to 9), respectively. Preoperative clinical stage was 81%, 16% and 3% for T1c, T2a and T2b, respectively. Average total operative time was 130 minutes (range 80 to 480). Intraoperative data included a mean blood loss of 196 cc with no open conversions. Bilateral, unilateral and nonnerve sparing prostatectomy was performed in 70%, 24% and 6% of patients, respectively. Of the patients 96% were discharged home within 8 to 23 hours of surgery. Pathological stage was pT2a, pT2b, pT3a and pT3b in 18%, 63%, 14% and 5% of all radical prostatectomy specimens, respectively, with an overall positive surgical margin rate of 13%. Two of 92 patients had positive nodal disease after lymph node dissection. Continence and erectile function were measured.

Conclusions: The extraperitoneal approach offers the advantages of improved dexterity and visualization of the robot, while avoiding the abdominal cavity and potential associated morbidity. As surgeons gain more experience with this new technology, the extraperitoneal approach simulating the standard open retropubic technique is likely to gain popularity.

Key Words: prostate, urinary continence, prostatectomy, prostatic neoplasms, robotics

Although laparoscopic radical prostatectomy was first described in 1992,[1] it has been increasingly performed using various approaches and technologies with more than 3,000 cases reported in the literature.[2] In some countries it has become the standard operation for localized prostate cancer, as confirmed by high case volume, published series.[3–5] The transperitoneal route as initially described remains the most popular approach. Due to concerns arising from violating the peritoneal cavity and its associated risks, groups at a number of centers have developed an extraperitoneal approach to laparoscopic radical prostatectomy.[4,6] The arrival of the daVinci® robot in 1999 also led to further popularization of laparoscopic prostatectomy with the majority of surgeons also using a transperitoneal route. A number of surgeons unskilled in laparoscopy have reported series of laparoscopic prostatectomies performed with the aid of the robot.[7,8]

Laparoscopic prostatectomy using the transperitoneal approach was introduced at our center in 2001. We subsequently developed an extraperitoneal approach, which was later modified to incorporate the daVinci® robot. To date there has been 1 report of 4 cases describing the feasibility of extraperitoneal robotic prostatectomy.[9] Herein we present an analysis of our experience with 325 patients treated at our institution with daVinci® robot assisted extraperitoneal laparoscopic radical prostatectomy.

PATIENTS AND METHODS

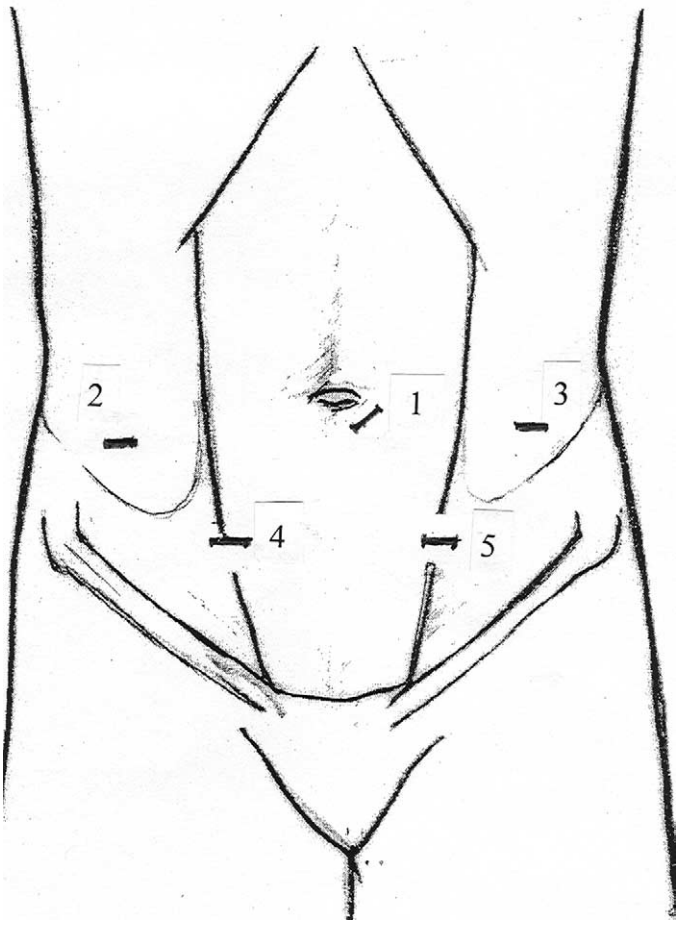
During a 2-year period 325 men with localized prostate cancer underwent daVinci® robot assisted laparoscopic radical prostatectomy at our institution. The indications for surgery were identical to those in patients undergoing open radical retropubic prostatectomy with regard to cancer characteristics. Patients with prior abdominal surgeries requiring a low midline incision were excluded. A history of laparoscopic abdominal surgeries, mesh hernia repair, appendectomy, transurethral prostate resection and neoadjuvant hormone therapy were not considered contraindications.

Data were prospectively collected on demographics and patient characteristics such as age, serum PSA, prostate volume, Gleason score and clinical stage. All patients underwent digital rectal examination under anesthesia to help with clinical staging and assist in the decision regarding nerve sparing. Potency status, comorbidities and previous abdominal surgical interventions were recorded. Perioperative, intraoperative and postoperative data were prospectively recorded.

Submitted for publication May 2, 2005.

* Correspondence: Section of Laparoscopic and Robotic Surgery, Department of Urology, University of Rochester Medical Center, 601 Elmwood Ave., Box 656, Rochester, New York 14642-8656 (telephone: 585-341-7795; FAX: 585-756-5457; e-mail: jean_joseph@URMC.rochester.edu).

DOI:10.1016/S0022-5347(05)00340-X



Port placement. Two assistants each use 1 lateral port. Six port techniques can have 2 lateral ports on 1 side posterior to and to either side of robotic port. There is adequate space for assistant to use instruments while seated next to patient. *1*, 2 cm periumbilical incision. *2*, 10 mm assistant port. *3*, 5 mm assistant port. *4*, 5, 8 mm daVinci® ports.

Preoperative care. Patients are admitted to the hospital 90 minutes prior to surgery. A bowel preparation is self-administered the day before surgery, including a clear liquid diet, 8 ounces of magnesium citrate, Fleet enema, 1 gm neomycin 3 times daily and 500 mg metronidazole 3 times daily. One hour before surgery intravenous cephalosporin or clindamycin in penicillin allergic patients and enoxaparin subcutaneously are administered. General anesthesia is administered, followed by placement of an orogastric tube. The patient is positioned supine on a split leg table with the arms abducted in protective foam and all pressure points padded. Velcro® thoracic straps are used to secure the patient to the table.

Operative steps. Creation of Extraperitoneal Space and Port Placement: All procedures are performed using a 5-port technique (see figure). A 2.5 cm incision is made adjacent to the umbilicus. A 1 cm opening is made in the anterior rectus sheath. The exposed muscle is swept lateral to locate the posterior rectus sheath. This maneuver can be difficult in obese patients and, thus, good retraction in a vertical direction helps. After the latter is visualized a 0-degree camera is inserted in an OMS-XB2 Extra View™ balloon dilator and introduced in the extraperitoneal space to the level of the pubic symphysis in the midline. The space is developed under direct vision with care taken to avoid compressing the iliac vessels and damaging or pulling down the epigastric vessels from the abdominal wall. After the space is adequately created the balloon is replaced by a 150 mm trocar (10/12 mm 512 XD, Ethicon Endo-Surgery, Cincinnati, Ohio). Insufflation of the extraperitoneal space is achieved using carbon dioxide with patient pressure set at 12 to 15 mm Hg. Two assistant ports (a 5 × 100 mm 355LD and a 10/12 × 100 mm long 512 SD, Ethicon Endo-Surgery) are placed, 1 on each side of the abdomen, and 5 cm medial and cephalad to the anterior superior iliac spine. Two 8 mm daVinci® ports are placed along the pararectal lines 8 to 10 cm caudal to the umbilicus, forming the base of a triangle with the umbilical camera port as the apex. The surgical robot is then docked with prior setup and priming done as previously described.[7] We use a 3-arm system with a 0-degree camera lens and 3-1 scaling for all parts of the procedure.

Isolation of the DVC: The endopelvic fascia previously exposed with the balloon dilator is incised bilaterally. A bipolar grasper and hook monopolar dissector are used for this part of the procedure. The levator ani muscles are pushed lateral to allow exposure of the postero-apical aspect of the prostate. The puboprostatic ligaments are generally severed, allowing further prostate mobilization. Attachments of the levator ani muscles to the lateral aspects of the dorsal vein are lifted off using the hook cautery. Using 2 daVinci® needle holders 2 sutures (2-zero polyglactin on a CT-1 needle) are placed on the DVC. Two proximal DVC sutures (2-zero polyglactin on an SH1 needle) are placed on the anterior aspect of the prostate base.

Bladder Neck Dissection: The bladder neck is dissected off of the prostate using the bipolar grasper and hook cautery. The plane between bladder and prostate is identified by placing 30 cc of fluid in the previously placed 16Fr Foley catheter. Using a 10 mm fan retractor pressure is applied to the bladder, which facilitates visualization of the vesicoprostatic junction. The groove between the bladder and prostate is visualized after cauterizing the perivesicular fatty tissue stretching from the anterior bladder neck to the prostate. Magnification allows visualization of the detrusor fibers and their connections to the prostatic capsule. Traversing vessels are selectively cauterized, ensuring complete hemostasis. Once in the correct plane the bladder neck can be easily separated from the prostate by gently pushing the bladder tissue cephalad and posterior. This is done circumferentially until the anterior layer of Denonvilliers' fascia is exposed on either side of the bladder neck. The urethra is transected sharply using scissors.

Seminal Vesicle Dissection: The bladder neck is further reflected cephalad, exposing the anterior layer of Denonvilliers' fascia. The latter is incised transversely about 5 cm from the prostate base, leading to visualization of the ampulla of the vas deferens and the adjacent seminal vesicles. The ampulla is first dissected using the hook to burn and push in an anterolateral dissection, leading to the tip of the seminal vesicles. The ampulla is transected with subsequent dissection of the seminal vesicles. The artery to the vas and adjacent vessels supplying and indenting the seminal vesicles are selectively cauterized and transected. Contralateral seminal vesicle dissection is facilitated by pushing on the posterior layer of Denonvilliers' fascia in a posterolateral