More than 63,210 Americans were expected to be diagnosed with bladder cancer in 2005 (American Cancer Society [ACS], 2004). While the majority of bladder cancers were termed superficial, which do not invade the bladder wall muscle, about one-third were invasive cancer. Superficial tumors respond well to local therapy but 30% to 70% can recur. Additionally, the risk of progression to invasive cancer during followup can be as high as 10% to 30% (Messing, 2002). In 2004, the ACS predicted that more than 13,000 Americans would die of bladder cancer. The expected prognosis for persons with advanced metastatic bladder cancer is less than 1 year (Dreicer, 2001). Understanding the differences in bladder cancer treatment approaches is important as health care providers help patients in their decision-making process. Treatment for invasive bladder cancer includes many options: (a) surgery, (b) radiation, (c) radiation plus chemotherapy, and (d) chemotherapy. One approach, robotic-assisted laparoscopic cystectomy for invasive bladder cancer, is reviewed here.

Radical cystectomy or cystoprostatectomy with urinary diversion is the gold standard for the treatment of muscle-invasive bladder cancer. Cystectomy can be through an open or robotic-assisted laparoscopic approach. Advances in laparoscopy, robotic surgery, and urological oncology have made it possible for select surgeons to perform nerve-sparing robotic-assisted laparoscopic radical cystoprostatectomy. Advantages of robotic surgery may be minimal blood loss, shorter hospital stay, quicker recovery, and possibly more precise and rapid removal of the bladder depending on the experience and expertise of the surgeon. Appropriate patient selection and thorough pre-operative evaluation, however, are key in maximizing positive surgical outcomes. The experience at the University of Virginia with robotic-assisted laparoscopic radical cystectomy will be discussed.

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Note: CE Objectives and Evaluation Form appear on page 125.
While a patient may be a candidate for robotic-assisted surgery, he may not be a candidate for each type of urinary diversion. This may influence the type of surgical approach. While the cystectomy is performed robotically, the diversion is still performed in a traditional open approach. Advances in robotic abilities to perform the diversions laparoscopically will likely be a future goal.

Cystectomy and Urinary Diversion

When the bladder is removed surgically with cystectomy (or cystoprostatectomy in males), urinary diversion management is a key aspect of pre-operative and postoperative care. Types of urinary diversion include (a) ileal conduit where part of the intestine provides for urinary drainage through a stoma, or (b) an internal pouch made with part of the intestine to allow for catheterization of urine (Indiana pouch) or normal voiding (neobladder). All approaches to cystectomy and to urinary diversion are not for every patient. The cancer stage, previous radiation and/or fibrosis, and other cancers may influence the approach the surgeon offers to the patient. The urologist discusses with the patient the most appropriate urinary diversion recommended and provides educational diagrams of each type of procedure prior to finalization of plans. It is also important that patients spend time in discussing urinary diversion types with other health care providers who are well versed in postoperative expectations for optimal outcomes. A team approach is recommended to adequately prepare the patient for this complex surgery. The patient is seen by the surgeon, the wound ostomy continence (WOC) nurse, the nurse practitioner, and the clinic nurse to review postoperative care, expectations, and answer questions.

Robotic-Assisted Laparoscopic Surgery

Robotic-assisted laparoscopic surgery has gained attention in recent years and can offer patients and surgeons many advantages. It may offer the surgeon a more precise operation with less physical demands on the body as the surgeon is comfortably seated at a console versus leaning over the patient. Advantages of this specialized surgery may include (a) minimal blood loss, (b) shorter hospital stay, (c) quicker recovery, and (d) possibly more precise and rapid removal of the bladder depending on the experience and expertise of the surgeon (Menon et al., 2003). Understanding patient selection, risks, and potential complications as well as advantages are important while helping patients navigate the pre-operative and postoperative process (Anvari, Birch, Bamehriz, Gryfe, & Chapman, 2004).

Patient Selection

Successful surgical outcomes for robotic-assisted laparoscopic cystectomy are influenced by multiple variables and starts with appropriate patient selection and thorough pre-operative evaluation. Selection is influenced by the patient’s height and weight. Obese patients may not be candidates because of body habitus in relationship to laparoscopic instruments. A thorough surgical history must be elicited from the patient and considered in relationship to the type of urinary diversion. Patients who have received radiation therapy to the abdomen are not candidates for robotic-assisted laparoscopic surgery due to risk of scarring, adhesions, and friable tissue. Previous abdominal hernia repairs with mesh placement would be another obstacle to robotic-assisted laparoscopic cystectomy. Any history of colon resection would likely make the operation more difficult due to potential for adhesion. This may also influence the type of urinary diversion that could be offered to the patient.

To optimize positive outcomes, it is imperative to consider the patient’s medical history while ascertaining if he/she is a good candidate for robotic-assisted surgery. As experience in robotic-assisted surgery is gained, we can begin to determine and define “red flags” that can negatively affect surgical outcomes (see Table 1). A positive “red flag” does not mean the patient is not a candidate for a robotic approach to surgery (Menon et al., 2004). However, it is prudent to use caution in counseling the patient with regards to expectations and postoperative outcomes.

Pre-Operative Evaluation

At the University of Virginia Health, we have extrapolated from prior surgical experiences and standards to develop our pre-operative robotic-assisted laparoscopic planning algorithm. The pre-opera-

### Table 1. Clinical Conditions That May Affect Robotic-Assisted Surgery Candidacy

- History of ruptured viscera and peritonitis
- Marked obesity, body mass index (BMI) > 40
- Previous abdominal/Pelvic radiation therapy
- History of transurethral or suprapubic prostatectomy
- Large volume prostates (> average 70 grams)
- Large median or lateral lobe of prostate
- Narrow pelvis
ative evaluation includes a complete history and physical examination. Focus is paid to functional status (ability to perform activities of daily living), exercise tolerance, and cardiopulmonary status. A bleeding history, such as patients with coagulopathy or hemophilia, should be considered to assess for disorders of homeostasis. A complete blood count, chemistry, and coagulation studies are done preoperatively as well as a type and hold for at least three units of packed red blood cells. A complete set of vital signs, oxygen saturation, and ECG are obtained on men over 40 years and women over age 50 or on anyone with a cardiac history, hypertension, smoking history, or with cardiac symptoms (Shurpin & DeSimone, 1998). Patients with valvular heart disease will require endocarditis prophylaxis, if at moderate risk, with intravenous gentamicin and ampicillin. Preoperative echocardiograms may be considered for patients with heart murmurs or history of heart disease. A referral to a cardiologist is often indicated for preoperative clearance in these individuals undergoing robotic-assisted cystectomy. A major referral center such as UV often operates on high-risk patients with the potential for a cardiac event intra-operatively. A cardiac stress test is often obtained pre-operatively to assess for ischemia and the need for intervention prior to surgery. Optimizing preoperative cardiac risks with these tests can lead to positive patient outcomes.

Robotic-assisted laparoscopic surgery for radical cystectomy requires significant insufflation of the abdomen and it is imperative that this is considered in selection of patients with pulmonary disease. A history of pulmonary disease such as chronic obstructive pulmonary disease, emphysema, or asthma may require a referral to a pulmonologist. Pulmonary function tests with arterial blood gases can help determine lung capacity and risk assessment in relationship to weaning from the ventilator after anesthesia. A chest radiograph is obtained on all patients with pulmonary disease and for those at risk of metastatic disease.

Another critical component of preparing the patient for robotic-assisted surgery is review of medications and instructions on pre-operative medication management. In our institution, patients are instructed to take any blood pressure medication, cardiac medication, and seizure medications with a small sip of water the morning of surgery. Metformin is held 48 hours before surgery to decrease risk of lactic acidosis. If on insulin, patients are instructed to take only two-thirds of bedtime insulin dose and no insulin the morning of surgery. Patients are instructed to hold aspirin and vitamin E for 1 week prior to surgery to decrease the risk of perioperative bleeding. Patients on warfarin are instructed to hold their anticoagulation for 5 days before surgery with approval from their prescribing physician. Some patients will need bridging with enoxaparin if at high risk for blood clots while holding anticoagulation. This may be best assessed with referral to a hematologist.

Pre-operatively, patients are started on a 2-day clear liquid diet. Aggressive bowel cleansing with bisacodyl tablets (20 mg) and Phospho-Soda® is started on day 1. On day 2, the patient continues with a clear liquid diet and takes neomycin base 1,000 mg and erythromycin base 1,000 mg at 1300, 1400, and 2300 the day before surgery. This is crucial secondary to bowel manipulation for bladder reconstruction and risk of perforation of colon with laparoscopic surgery. Patients receive verbal instructions and written examples of appropriate foods for the preparation period during the pre-operative teaching session. Preoperative orders in the presurgical holding area include (a) two liters of warm lactated Ringer's®, (b) 5,000 units of heparin SQ, and (c) two grams of IV cefotetan for patients who are not allergic to penicillin. Patients with penicillin allergies are substituted clindamycin 900 mg and aztreonam 2 grams. Thrombo-embolic stockings are placed on the patient pre-operatively and sequential compression devices are applied during the perioperative period.

Surgical Description

The surgery itself is complicated, and Menon et al. (2003) provide a detailed description. Briefly, general anesthesia is induced and the patient is placed in extended lithotomy with a 45 degree tilt. A nasogastric tube and Foley catheter are inserted. A six-port transperitoneal approach is used. The surgeon sits at a robotic console and the surgical support staff remain at the patient’s side (see Figure 1). The surgeon guides the laparoscopic arms via the robot. Most of the dissection is carried out by the surgeon’s guidance of the robot with the forceps and cautery hook. The laparoscopic team (the first and second assist) use grasping forceps and suction for retraction and exposure. Bilateral pelvic lymphadenectomy is undertaken utilizing the robotic capabilities and the bladder is dissected. The specimen is entrapped in a laparoscopic bag and retrieved through a 5 cm to 6 cm incision placed midway between the umbilicus and pubis symphysis. From this point on, the surgeon carries out the diversion of choice (such as ileal conduit and orthotopic diversion) in an open fashion through the 5 cm to 6 cm incision (Menon et al., 2003).

Postoperative Care

Postoperative nursing care of the patient who has undergone robotic-assisted laparoscopic cystectomy is no different than the care of the patient who has undergone an open radical cystectomy. Nursing care employs all the general principles of surgical nursing.
The general care of these patients will include a need for early ambulation and a focus on return of bowel function. The most common cause of prolonged hospital stay for radical cystectomy is paralytic ileus (Baumgartner, Wells, Chang, Cookson, & Smith, 2002). The length of hospitalization can range from 7 to 10 days. This is dependent upon (a) toleration of a light diet, (b) return of bowel function, (c) ability to perform some self-care, and (d) ability to ambulate. When the bowel function has returned as evidenced by passing of flatus and small stools, the patient can be switched to oral pain medication and an advancing diet regimen. The bowel function usually returns in 7 days so parenteral hyperalimentation is not required. In select cases when poor wound healing is anticipated (such as diabetes or post pelvic radiation cases), the use of immediate postoperative hyperalimentation may be useful until bowel function returns and the patient is showing signs of granulation tissue. A nasogastric tube is placed to provide gastric drainage and bowel decompression until the bowel function returns. Once passing flatus, the nasogastric tube can be removed and the patient can have the diet slowly advanced starting with ice chips and clear liquids. Epidural catheters can be used for postoperative pain management supplemented with parenteral narcotics for breakthrough pain. After return of bowel function, the epidural may be discontinued and the patient switched to an oral narcotic pain medication regimen along with stool softener to prevent constipation.

Early ambulation is important to prevent cardiovascular and pulmonary complications (Sims, in press). Ambulation can be initiated as early as day 1. Drains and tubes to be supported should not be a deterrent to staff or the patient during ambulation. Deep venous thrombosis prevention is of key importance due to length of surgery and immobilization. The use of subcutaneous heparin and compression stockings is standard for any abdominal surgery and is continued throughout the hospitalization and discontinued only at discharge. Patients with lower-extremity edema may elect to continue the support/compression stockings at home for several more days to assist with mobilization of postoperative fluid retention. Incentive spirometry, coughing, deep breathing, and turning can help prevent respiratory complications.

**Postoperative Complications**

Potential long-term sequelae and complications for these surgically unique patients do not differ based on approach, robotic versus open. There are several potential complications and issues as a result of cystectomy with urinary diversion. The potential of ureteral anastomosis stricture, urethral stricture (with neobladder), and reservoir rupture (neobladder or Indiana pouch) are rare but must be discussed pre-operatively and taken into account as patient and surgeon discuss options for urinary diversion (personal communication, D. Theodorescu, May 2005).
Metabolic complications are monitored with regular lab work and are managed with medications as appropriate. If the patient is undergoing surgery for cancer, the potential for recurrence must be monitored vigilantly. Ideally, this should be by the urologist who performed the surgery for continuity. Incontinence, as a result of a failed pouch sphincter or neobladder sphincter, can be an outcome that is frustrating for patients and caregivers. Often incontinence can be addressed surgically but must be evaluated carefully. If the incontinence arises in the face of an intact sphincter with poor pouch emptying, then the urologist may implement a regimen of clean intermittent catheterization to allow for consistent reservoir decompression and hopefully return of reservoir tone (personal communication, D. Theodorescu, May 2005).

Sexuality for both men and women is often affected with cystectomy surgery. For women, it can affect sexual function since usually the uterus and ovaries are removed with cystectomy. This may lead to menopausal symptoms such as hot flashes or vaginal dryness. If part of the vagina is removed during surgery, then sexual intercourse may be difficult. For men, surgery may damage the nerves that control erections resulting in erectile dysfunction. Fortunately, there are treatments available to address these problems. Patients should be encouraged to discuss their feelings and explore available options with their health care providers.

Skin issues are rare but bothersome for patients with an ileal conduit, ileocecal, or Indiana pouch. With the ileal conduit, pouch changes can lead to skin excoriation and tears. Education about proper skin care regimens is important pre and postoperatively, and on return clinic visits. This is often done by the nurse practitioner or WOC nurse. Since the ileocecal pouch may produce a small amount of mucous at the exit site, a small adhesive bandage or gauze dressing can be placed over the stoma to prevent leakage on clothing. Many patients use mineral oil to keep the stoma moist between catheterizations. Signs and symptoms of urinary tract infection should be taught to patients and caregivers. These are rare but can occur. Fevers and flank pain can be signs of pyelonephritis or pouchitis. Abdominal pain can indicate a sign of infection that may or may not be localized to the urinary reservoir. Urine collected for laboratory assessment will have bacterial colonization due to the use of bowel for reservoir construction. If urine is needed, a double catheter-

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<tr>
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<td>Surgical drains output</td>
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<td>Self-care, catheterizing, and irrigation of the Malecot</td>
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ORIZATION method can be used to secure a more accurate upstream specimen that can have culture and sensitivity evaluated. Treatment should be guided by culture and sensitivity results.

Conclusions

Robotic-assisted laparoscopic surgery is here to stay. This surgery may offer patients and the surgeon many advantages. However, widespread acceptance of robotic-assisted surgery has been slow because of the learning curve, expenses in starting a program, and limited use outside of the university setting. It is essential to have a team approach in providing care to the patient undergoing radical cystectomy with a robotic-assisted approach to optimize outcomes during the preoperative, perioperative, and postoperative process (Steers, LeBeau, Cardella, & Fulmer, 2004).

References


