# Robot-Assisted Radical Cystectomy: Male

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## Introduction

The standard treatment of muscle-invasive bladder cancer is open radical cystectomy (ORC) and urinary diversion. Radical cystectomy can be a challenging operation with significant patient morbidity and mortality. The first laparoscopic simple cystectomy was reported in 1992 by Parra et al. [1]. Since that publication there have been several reports of laparoscopic radical cystectomy for malignant disease with various methods of urinary diversion. With the introduction of the daVinci™ surgical system (Intuitive Surgical, Sunnyvale, CA) the prevalence of robot-assisted radical prostatectomies has increased dramatically. It was a natural progression to apply robotic technology to laparoscopic cystectomies. In 2003, Menon et al. published the first series of robot assisted radical cystectomy (RARC) and urinary diversion [2]. The goal of this chapter is to provide a detailed description of RARC in male patients as well as discuss pertinent literature on outcomes of this procedure.

## Indications

The indications for radical cystectomy includes tumor invasion of muscularis propria, carcinoma in situ refractory to intravesical therapy, recurrent multifocal superficial disease refractory to repeat transurethral resection with or without intravesical therapy, and may be considered for initial therapy in high grade T1 disease, particularly in the setting of concurrent CIS. There are no absolute preoperative contraindications specific to patients being considered for RARC. There are two intraoperative situations that are absolute contraindications to proceeding with RARC. The first situation is hypotension or compromised ventilation with positioning and abdominal insufflation, which is of particular concern in obese patients. The second is $CO_2$ retention with insufflation resulting in unmanageable acidosis. This highlights the need for a careful preoperative cardiopulmonary evaluation in this patient population. Relative contraindications include abnormal anatomy (i.e., ectopic kidney, vascular aneurysm), morbid obesity, prior radiation, and prior abdominal or pelvic surgery. As with all laparoscopic oncology surgery, the principles of open surgery must be followed with RARC. If there is concern these oncologic principles will be compromised, a robot-assisted approach should not be used.

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## Technique

### Port Placement

Six ports are utilized

- Four robotic ports
  - One 12 mm camera port
  - Three 8 mm robotic arm ports
- Two assistant ports
  - 15 mm and 5 mm assistant ports

The ports are arranged in an "inverted-V" fashion (Fig. 6.1). Access and establishment of the pneumoperitoneum can be performed with a Veress needle or Hassan technique. The camera port is placed in the midline cephalad to the umbilicus. If an extended lymphadenectomy is planned then placement of the camera port at least 4 cm cephalad to the umbilicus is key in order to be able to perform and adequate proximal dissection on the great vessels. The two 8 mm robotic ports (right and left arms) are placed 8–10 cm lateral to midline at or above the level of the umbilicus. Two assistant ports on the right (or left) are placed lateral to the right robotic port and the third working arm (also known as the "fourth arm") port is placed superior-lateral to the ipsilateral robotic port and on the opposite side of the assistant ports. If an intracorporeal diversion is planned, the assistant should be placed on the left side with the third robotic arm on the right side of the patient. We recommend using a 15-mm assistant port for one of the ports to make extraction of lymph nodes easier as well as the fact it allows easy passage of a 15-mm specimen retrieval bag to be used for the bladder and prostate. A list of common robotic and laparoscopic instruments used during RARC can be found in Table 6.1.

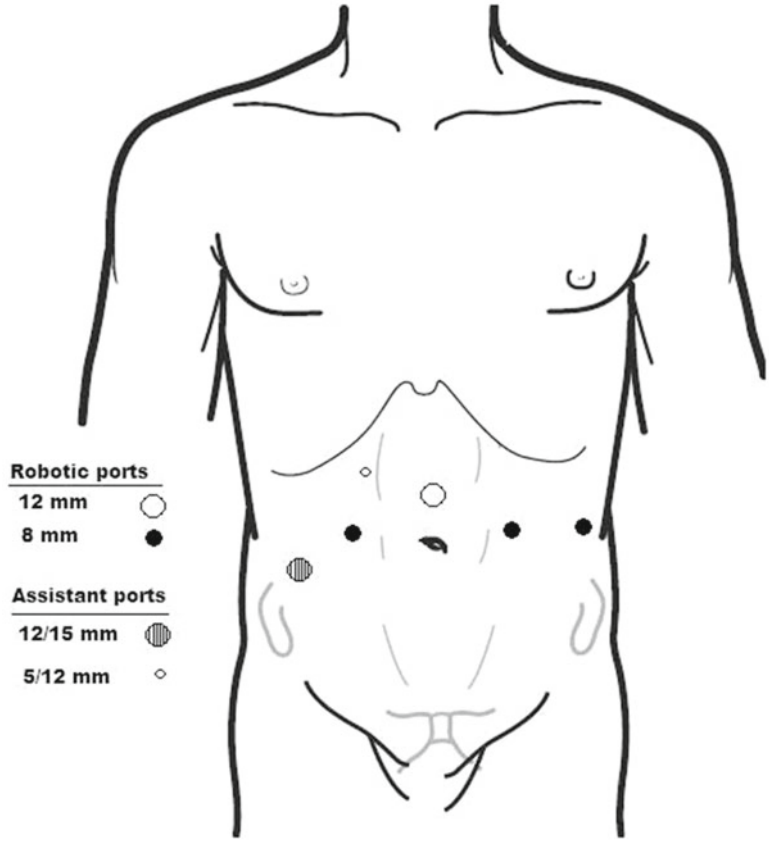


**Fig. 6.1** Port placement for RARC

**Table 6.1** List of commonly used instruments for RARC

| |
|---|
| Robotic instruments |
| Monopolar scissors |
| Maryland bipolar |
| Prograsp™ forceps |
| Large needle drivers × 2 |
| Robotic locking clip applier (*optional*) |
| Fenestrated bipolar (*optional*) |
| Cadiere forceps (*optional*) |
| Laparoscopic instruments |
| Suction/aspirator |
| Needle driver |
| Locking grasper |
| Atraumatic grasper |
| Locking clip applier (*small, medium and large*) |
| Suture |
| 3-0 polyglactin cut to 20 cm for ureteral and bowel tags (*pre-tie the suture to the locking clips to be used on the ureters*) |
| 0 polyglactin cut to 15 cm for ligation of the DVC |
| 2-0 and 3-0 polyglactin cut to 20 cm for over sewing edges of the DVC and any bleeding sites from the neurovascular bundles and pedicles |

## Mobilization of the Sigmoid and Left Colon

A 30° down lens can be used at the outset of the procedure. This allows for better visualization of the pelvis and retroperitoneum during the lymphadenectomy. This will be changed to a 0° lens for the posterior dissection. The procedure is begun by incising the peritoneum lateral to the left colon. The left colon and sigmoid colon should be released from the left sidewall to allow access to the left iliac vessels and left ureter.

## Development of the Left Paravesical Space and Division of the Left Ureter

With the left medial umbilical ligament identified, the peritoneum lateral to the ligament and medial to the left iliac vessels should be incised. Blunt dissection is employed to expose the endopelvic fascia. In male patients, dividing the vas deferens allows the bladder to be retracted medially and facilitates exposure of the pelvic vasculature.

The left ureter is identified crossing over the iliac vessels. The ureter should be dissected free of its underlying structures while preserving as much perireteral tissue as possible. The distal end can be dissected down to its insertion into the bladder. The left umbilical artery and/or left superior vesical artery should be seen just lateral to the insertion of the ureter into the bladder and clipped/ligated to allow for more length on the ureter. The ureter can be clipped distally with a locking clip. The proximal clip on the ureter should have a suture pre-tied to the clip (10–12 in.) so no additional "tagging" or marking of the ureter is required later in the procedure. The ureter should be dissected free of its attachments cephalad. Attempt should be made to preserve any vital blood supply to the ureter from the left common iliac artery. This should be done *before* dividing the ureter as proximal dissection can be difficult once the ureter is divided. The ureter can then be divided sharply. A margin can be sent for frozen section at this point if desired. It should be noted that too much or too aggressive dissection proximal on the ureter can result in devitalization of the ureter and may contribute to anastomotic stricture in the postoperative setting. In many cases, individual vessels from the common iliac or distal aorta can be seen and preserved to maintain ureteral blood flow.

## The Left Pelvic Lymphadenectomy

At this point the left pelvic lymphadenectomy can be performed. It is the preference of the authors of this chapter to perform the lymphadenectomy at this time. Please refer to Chap. 9 for details. In some cases, the lymphadenectomy can be deferred until after the cystectomy is performed. Early in a surgeon's experience, one may elect to complete the cystectomy first.

## Development of the Right Paravesical Space, Right Ureter, and Right Lymphadenectomy

The right paravesical space is developed similar to the left. Dissection is similar as done on the left, but it should be noted that the incision in the retroperitoneum on this side should be extended

onto the right side of the sigmoid mesentery to develop the preaortic space and allow for passage of the left ureter. It is important to develop a relatively large space in this region. Often there is fear to do aggressive blunt dissection due to concern for the mesenteric vessels; however, if the surgeon stays close to the great vessels, the space is very safe to develop.

## Identification, Ligation, and Division of the Superior Vesical Arteries

The umbilical and superior vesical arteries are clearly seen at the completion of the lymphadenectomy and are clipped—locking clips are preferred. Clipping is recommended and may allow for more distal dissection of the ureters. If the ureters have not already been tagged with a pre-tied clip, then one should switch instruments to needle drivers and tag the distal ends of both ureters.

## Transferring the Left Ureter Through the Sigmoid Mesentery

The left ureter can be transposed behind the sigmoid mesentery with the help of the right side assistant. The right side assistant should gently advance a blunt-tipped instrument below the mesentery along the anterior surface of the aorta. If the robotic "third arm" has been placed on the right side then it can be passed through very easily as well. The tag on the left ureter can be grasped and the ureter should easily pass through the mesenteric window.

## Tagging the Distal Ileum with 8–10 in. 2-0 Vicryl Suture

The ileum should be tagged with a 2-0 Vicryl suture. This too should be left at least 10–12 in. in length. We recommend mobilizing the lateral attachments of the cecum so as to facilitate delivery of the ileum into the abdominal incision and make identification of the distal portion of the ileum easier.

## Development of the Prerectal and Posterior Vesical Space

The camera lens can be changed to a 0° (degree) lens for optimal visualization. The peritoneum extending from the posterior bladder to the anterior sigmoid should be incised. Using blunt and careful cautery dissection, the prerectal space is developed. One must employ the assistant(s) to retract the bladder and its posterior structures anteriorly. In male patients, Denonvillier's fascia needs to be incised to carry the dissection as far caudad as possible. The dissection should be carried down to the rectourethralis muscle. If a nerve sparing is desired then one should dissect anterior to Denonvillier's fascia and leave it on the anterior rectal surface staying close to the prostate.

## Division of the Remaining Inferior Vesical Vessels

Once the limits of dissection are reached along the posterior aspect of the bladder, the lateral attachments of the bladder can be divided. For a non-nerve sparing procedure, this can be done with locking clips or a combination of the bipolar instrument and the monopolar instrument of choice. An endovascular stapler can be used on both sides as well, but we recommend using locking clips as it yielded a more controlled dissection and preserved planes of dissection. It should be remembered that the dissection should be carried caudad through the endopelvic fascia thereby completely mobilizing the bladder from its lateral attachments and the rectum. Often a combination of lateral and posterior dissection is used in an alternating fashion to complete the dissection.

## Preservation of the Neurovascular Bundles

In nerve-sparing procedures, the neurovascular bundles are encountered as they project off the posterior–lateral aspects of the prostate down to

the anterior surface of the colon. The bundles can be mobilized by releasing lateral fascia anterior to the bundles along the surface of the prostate or vagina. This should be done before ligating the inferior vesical pedicles in order to have them visualized. This is particularly important in cases which energy devices and staplers are employed for vascular ligation. This dissection is connected to the incision anterior to Denonvillier's fascia that has already been performed during creation of the prerectal space. The inferior vesical pedicles and prostate pedicles should be clipped and divided with cold scissors to avoid neurovascular injury. The nerve sparing should be carried down to the genitourinary diaphragm to prevent injury during the apical and urethral dissection.

## Mobilization of the Bladder and Completion of the Apical Dissection

The remaining bladder attachments should only be the urachus, anterior attachments, prostate, and urethra. The medial and median umbilical ligaments should be divided as far proximally as possible with electrocautery. The dissection and peritoneal incision is carried lateral to the medial umbilical ligaments caudad to the anterior surface of the bladder. If not already done, the endopelvic fascia should be incised bilaterally. The apical dissection of the prostate or vagina is then completed. At this point the dorsal venous complex can be ligated with a 1 Vicryl suture in a figure of eight fashion. Although an endovascular stapler can be employed for this step, we feel the suture ligation allows for better visualization and identification of the urethra. Furthermore, when a stapler is used, there is likely to be venous ooze into the pelvis once the abdomen is opened for the diversion.

## Dissection, Ligation, and Division of the Urethra

It is very important to dissect out a generous urethral stump. This is important even in cases without a planned neobladder. A generous urethral stump allows for easier application of a locking clip or suture ligation to prevent tumor spillage during division. If the previous posterior dissection was adequate, there should be minimal posterior tissue other than some minor remnants of rectourethralis. The urethral catheter is removed by the bedside assistant and a locking clip is placed on the urethra by the bedside assistant or the robotic clip applier. The urethra is divided *distal* to the clip. A frozen section can be taken from the proximal portion of the divided urethra if needed.

Following division of the urethra the specimen is placed in a 15-mm specimen retrieval bag and retracted into the superior aspect of the abdomen. It is very important to ensure that there is excellent hemostasis in the pelvis. Often there is venous ooze from structures such as the dorsal venous complex, urethra, rectourethralis, and neurovascular bundles. Dropping the pneumoperitoneum to 5 mmHg can help identify potential bleeding areas. Strategic placement of "figure-of-eight" sutures and additional maneuvers will prevent postoperative pelvic bleeding. This is a key point as many times this bleeding would otherwise go unnoticed until the diversion is being created and the pneumoperitoneum has been released.

## Specimen Extraction

The entire specimen can be entrapped in a 15-mm specimen retrieval bag. It will be extracted though a 5–6-cm infraumbilical or periumbilical incision. Prior to extraction, the tags on the ureters and the ileum should be grasped in a locking grasper by the bedside assistant to allow delivery into and through the extraction incision.

## Lessons Learned and Key Points for RARC

- Use a 15-mm port for one of the assistant ports.
- Use a pre-tied suture on the locking clip placed on the ureter to avoid need for tagging.

- Preserve the blood supply from the common iliac to the ureters during dissection if possible.
- Perform meticulous dissection of the vascular pedicles allowing for locking clips to be used for ligation.
- Make a large mesenteric window for easy passage of the left ureter.
- When performing the posterior dissection, carry the dissection as far distally to adequately release any rectal attachments under direct vision to the prostate and bladder. This will allow completion of the cystectomy to be easier and avoid unidentified rectal injuries. Sharp dissection should be used exclusively around the posterior apex of the prostate and rectourethralis to avoid thermal injury to the rectum.
- Be sure to *completely* control the dorsal venous complex and any bleeding sites from the neurovascular bundles and genitourinary diaphragm with suture ligation to avoid venous ooze postoperatively.
- Make the extraction incision *below* the level of the umbilicus and avoid the temptation to try to incorporate one of the port sites such as the camera port. Keeping the incision below the umbilicus makes extracorporeal creation of the diversion much easier.
- Make the extraction incision as large as is needed to facilitate the ureteroileal anastomosis. A few extra centimeters can make a difference when trying to prevent traction and ischemic injury to the ureters. Cutting back on the ureters and working in the pelvis as one would do with an open approach is recommended.

## Postoperative Care

A nasogastric tube is not routinely left in place. The patients are maintained on broad-spectrum antibiotics for at least 48 h and can be transitioned to oral regimens based on surgeon preference. Epidural catheters are not used. Intravenous morphine and/or ketorolac are usually adequate for pain management and can be promptly switched to oral narcotics once the patient is tolerating a diet.

It is important to increase patient activity as early as the day of surgery. Patients are encouraged to sit in a chair the same night of surgery. They are ambulated on the first postoperative day. Bisacodyl suppositories may be administered each morning starting on the first postoperative day until bowel function returns. A liquid diet is started once bowel function returns which may be as early as the second or third postoperative day. Daily serum chemistry and hematocrits may be followed until discharge based on surgeon preference. Most patients do not seem to have significant third spacing and will rarely require additional fluid replacement other than standard maintenance fluids. Although postoperative hemorrhage and delayed bowel injury are rare, patients need to be monitored closely for these complications, as the incidence with RARC is unknown.

Ureteral stents and abdominal drains should be managed according to surgeon preference. Currently, the authors remove stents from a urostomy at 7–10 days. Foley catheters are removed from neobladders in 14–21 days. If the stents were not secured to the Foley during creation of the neobladder, then they are removed cystoscopically at the time of foley removal in the office. The decision to perform a cystogram at the time of foley removal is based on surgeon preference and can be decided on an individual case basis.

It should be noted that patients can be discharged home rather quickly which may require leaving drains or stents in place until the first office follow-up. The authors have found that some patients may have a continued leak of lymphatic fluid through a drain site up through the fifth or sixth postoperative day. We believe this is seen because patients are discharged home before their lymphatic channels have completely sealed. Consequently, the abdominal drain may be left in place until their first postoperative follow-up which is on postoperative day 7. If the drain is removed before discharge, then a urostomy appliance can be placed over the drain site to collect the fluid until the incision heals and drainage ceases. We have found this drainage to be self-limiting and uniformly resolves spontaneously

as the lymphatic fluid is absorbed intraperitoneally. If there is any concern of a urine leak, the fluid may be sent for creatinine analysis.

## Perioperative Outcomes

There have been several large series demonstrating promising perioperative outcomes of patients undergoing RARC [3–6]. Operative times range from 275 to 380 min, blood loss from 270 to 400 $cm^3$, length of stay from 4.9 to 10 days, with overall and high grade complication rates from 34 to 52 % and 8 to 24 %, respectively. These outcomes are summarized in Table 6.1. RARC has been shown to decrease complications compared to open radical cystectomy in a nonrandomized study [7].

## Pathologic Outcomes

Two important pathologic issues that need to be addressed during RARC are incidence of positive surgical margins (PSM) and an adequate pelvic lymph node dissection (PLND). The importance of achieving negative surgical margins during radical cystectomy cannot be overstated as patients with positive soft tissue margins have increased recurrence rates and almost a threefold decrease in survival [8, 9]. The reported rate of PSM for RARC ranges from 0 to 7.6 % [3–5, 10, 11]. Novara et al. provided a benchmark from the open radical cystectomy literature in a multi-institutional series of over 4,000 patients where the PSM rate was 6.3 % [12]. The inclusion of a pelvic lymphadenectomy at the time of cystectomy provides both prognostic information and potential therapeutic benefit [13, 14]. Furthermore, the number of lymph nodes removed has been shown to have prognostic significance by several authors and it is also well established that an extended template will improve lymph node yield [13–16]. The reported lymph node yield for lymphadenectomy during RARC ranges from 17 to 43, with most centers performing an extended template [3–5, 17–19]. In a prospective randomized trial, Nix et al. demonstrated to difference in lymph node yield between robotic and open cystectomy [20]. In a unique study by Davis et al., robotic lymph node dissections had a yield of 93 % compared to open lymphadenectomy when a "second look open dissection" was used following the robotic PLND [18]. The bottom line is that a complete pelvic lymphadenectomy should be performed and is clearly possible with the robotic approach.

## Survival Following RARC

Robot-assisted radical cystectomy is in its infancy so no long-term oncological follow-up exists, but there are several reports of short and intermediate-term follow-up that have emerged. Pruthi and Wallen reported short-term cancer outcomes in 50 patients [21]. They had a mean follow-up 13.2 months and experienced an overall and disease-specific survival of 90 and 94 %, respectively. Dasgupta et al. published their RARC experience in 20 patients with >6 months follow-up [22]. This cohort had a mean follow-up of 23 months, with overall and disease-free survival of 95 and 90 %. Martin et al. reported outcomes in series of 80 patients with the longest mean follow-up to date from Mayo Clinic in Arizona [23]. Fifty-nine patients had >6-month follow-up with a mean follow-up of 25 months (range 6–49) The overall survival at 12, 24, and 36 months was 82, 69, and 69 %, respectively, and recurrence free survival at 12, 24, and 36 months was 82, 71, 71 %, respectively (Fig. 6.1—Kaplan Meier curves from Martin paper). The Karolinska Institute found 83 % disease specific survival with a mean follow-up of 25 months [11]. Kauffman et al. report 2-year disease-free, cancer-specific, and overall survival of 74 %, 85 %, and 79 %, respectively [24]. Clearly, oncological outcomes as measured by survival are equivalent in the intermediate-term. Additional data from Mayo Clinic Arizona and University of North Carolina were published on node positive patients having undergone RARC [25]. A total of 275 patients were reviewed with focus on 50 patients with N1 disease. With a mean follow-up of 42 months the oncological outcomes compared

favorably to open cohorts reported on in the literature. Nevertheless, long-term follow-up is still eagerly awaited.

## Conclusion

Robot-assisted radical cystectomy in the male patient is a feasible and reproducible operation. With appropriate steps and adherence to a standardized technique, results are often superior with regards to recovery in the immediate postoperative period and complications can be kept to a minimum. Intermediate oncological outcomes are favorable and with increasing application, RARC will become a part of the urologist's armamentarium to treat invasive bladder cancer.

## Editors' Commentary

### Erik P. Castle and Raj S. Pruthi

The chapter seeks to provide a stepwise and reproducible approach to robot-assisted radical cystectomy in the male patient. Hopefully, this description will help guide and launch the surgeon just initiating their robot-assisted radical cystectomy experience to success. Also, we hope that even the more experienced surgeon, already performing RARC, will gain insights, tips, and tricks to perform the procedure in a more effective and efficient manner.

It has been over 8 years since both of us have initiated our experience with RARC. Early, the approach was a careful and even guarded approach studying feasibility, safety, and oncologic integrity with every case. Over the years, and with the ongoing assessment by ourselves and by others (critics and enthusiasts alike), we have witnessed the development of the technique into an increasingly common and appropriate procedure that has served our patients well—all the time preserving the time-tested principles and outcomes of bladder cancer surgery. Today, the careful evidence has demonstrated that RARC has very real benefits and without any suggestion of a compromise to the oncologic outcomes. With a large, multi-institutional, prospective randomized trial well underway, we look forward to the results which will provide the highest levels of evidence-based analysis comparing the open versus robotic approach—putting scientific rigor and patient safety above a rush to novelty, procedural numbers, and marketing. We believe that it is essential to assess this procedure, and any new intervention or technique for that matter, in such a scientifically rigorous manner.

## References

1. Parra RO, Andrus CH, Jones JP. Laparoscopic cystectomy: initial report on a new treatment for the retained bladder. J Urol. 1992;148:1140–4.
2. Menon M, Hemal AK, Tewari A, et al. Nerve-sparing robot-assisted radical cystoprostatectomy and urinary diversion. BJU Int. 2003;92:232–6.
3. Kauffman EC, Ng CK, Lee MM, et al. Critical analysis of complications after robotic-assisted radical cystectomy with identification of preoperative and operative risk factors. BJU Int. 2009;105:520–7.
4. Khan MS, Elhage O, Challacombe B, et al. Analysis of early complications of robotic-assisted radical cystectomy using a standarized reporting system. Urology. 2011;77:357–62.
5. Pruthi RS, Nielsen ME, Nix J, et al. Robotic radical cystectomy for bladder cancer: surgical adn pathological outcomes in 100 consecutive cases. J Urol. 2010;183:510–5.
6. Hayn MH, Hellenthal NJ, Hussain A, et al. Defining morbidity of robot-assisted radical cystectomy using a standardized reporting methodology. Eur Urol. 2011;59:213–8.
7. Ng CK, Kauffman EC, Lee MM, et al. A comparison of postoperative complications in open versus robotic cystectomy. Eur Urol. 2010;57:274–82.
8. Dotan ZA, Kavanagh K, Yossepowitch O, et al. Positive surgical margins in soft tissue following radical cystectomy for bladder cancer and cancer specific survival. J Urol. 2007;178:2308–12.
9. Hadjizacharia P, Stein JP, Cai J, Miranda G. The impact of positive soft tissue surgical margins following radical cystectomy for high-grade, invasive bladder cancer. World J Urol. 2009;27:33–8.
10. Hellenthal NJ, Hussain A, Andrews PE, et al. Surgical margin status after robot assisted radical cystectomy: results from the international robotic cystectomy consortium. J Urol. 2010;184:87–91.
11. Schumacher MC, Jonsson MN, Wiklund NP. Robotic cystectomy. Scand J Surg. 2009;98:89–95.
12. Novara G, Svatek RS, Karakiewicz PI, et al. Soft tissue surgical margin status is a powerful predictor of

outcomes after radical cystectomy: a multicenter study of more than 4,400 patients. J Urol. 2010;183: 2165–70.
13. Leissner J, Hohenfellner R, Thuroff JW, Wolf HK. Lymphadenectomy in patients with transitional cell carcinoma of the urinary bladder: significance for staging and prognosis. BJU Int. 2000;85:817–23.
14. Poulsen AL, Horn T, Steven K. Radical cystectomy: extending the limits of pelvic lymph node dissection improves survival for patients with bladder cancer confined to the bladder wall. J Urol. 1998;160: 2015–20.
15. Herr H, Lee C, Chang S, et al. Standardization of radical cystectomy and pelvic lymph node dissection for bladder cancer: a collaborative group report. J Urol. 2004;171:1823–8.
16. Herr HW, Faulkner JR, Grossman HB, et al. Surgical factors influence bladder cancer outcomes: a cooperative group report. J Clin Oncol. 2004;22:2781–9.
17. Hellenthal NJ, Hussain A, Andrews PE, et al. Lymphadenectomy at the time of robot-assisted radical cystectomy: results from the International Robotic Cystectomy Consortium. BJU Int. 2011;107: 642–6.
18. Davis JW, Gaston K, Anderson R, et al. Robot assisted extended pelvic lymphadenectomy at radical cystectomy: lymph node yield compared with second look open dissection. J Urol. 2010;185:79–84.
19. Lavery HJ, Martinez-Suarez HJ, Abaza R. Robotic extended pelvic lymphadenectomy for bladder cancer with increased nodal yield. BJU Int. 2011;107:1802–5.
20. Nix J, Smith A, Kurpad R, et al. Prospective randomized controlled trial of robotic versus open radical cystectomy for bladder cancer: perioperative and pathologic results. Eur Urol. 2010;57:196–201.
21. Pruthi RS, Wallen EM. Is robotic radical cystectomy an appropriate treatment for bladder cancer? Short-term oncologic and clinical follow-up in 50 consecutive patients. Urology. 2008;72:617–22.
22. Dasgupta P, Rimington P, Murphy D, et al. Robotic assisted radical cystectomy: short to medium term oncologic and functional outcomes. Int J Clin Pract. 2008;62:1709–14.
23. Martin AD, Nunez RN, Pacelli A, et al. Robot-assisted radical cystectomy: intermediate survival results at a mean follow-up of 25 months. BJU Int. 2010;105: 1706–9.
24. Kauffman EC, Ng CK, Lee MM, et al. Early oncologic outcomes for bladder urothelial carcinoma patients treated with robotic-assisted radical cystectomy. BJU Int. 2011;107:628–35.
25. Mmeje CO, Nunez-Nateras R, Nielsen ME, et al. Oncologic outcomes for lymph node-positive urothelial carcinoma patients treated with robot assisted radical cystectomy: with mean follow-up of 3.5 years. Urol Oncol. In press 2012.