Οι Κλινικές Μελέτες
&
Τα αποτελέσματα της σύγκρισης
της da Vinci κυστεκτομής με τις άλλες θεραπευτικές επιλογές

Stand: December 2010

Martin AD, Nunez RN, Castle EP.
Urology 2010 Nov 29. [Epub ahead of print]
Robot-assisted Radical Cystectomy Versus Open Radical Cystectomy: A Complete Cost Analysis.
OBJECTIVES: To perform a complete cost analysis comparing robot assisted radical cystectomy (RARC) versus open radical cystectomy (ORC).
MATERIAL AND METHODS: After institutional review board approval for data collection, we prospectively recorded perioperative outcomes and costs, such as hospital stay, transfusion rate, readmission rate, and medications for consecutive patients undergoing RARC or ORC. Using actual cost data, we developed a cost decision tree model to determine typical perioperative costs for both RARC and ORC. Multivariate sensitivity analysis was performed to elucidate which variables had the greatest impact on overall cost. Breakeven points with ORC were calculated using our model to better evaluate variable influence. In addition to the above modeled analysis, actual patient costs, including complications 30 days from surgery, were also compared for each procedure.
RESULTS: Our model analysis showed that operative time and length of stay had the greatest impact on perioperative costs. Robotic cystectomy became more expensive than open cystectomy at the following break-even points: operating room (OR) time greater than 361 minutes, length of stay greater than 6.6 days, or robotic OR supply cost exceeding $5853. RARC was 16% more expensive when only comparing direct operative costs. Interestingly, actual total patient costs revealed a 38% cost advantage favoring RARC due to increased hospitalization costs for ORC in our cohort.
CONCLUSIONS: RARC can provide a cost-effective alternative to ORC with operative time and length of stay being the most critical cost determinants. Higher complication rates with ORC make total actual costs much higher than RARC.

Richards KA, Kader K, Hemal AK. ScientificWorldJournal 2010; 10: 2215-27.
Robotic radical cystectomy: where are we today, where will we be tomorrow?
Department of Urology, Wake Forest University Baptist Medical Center, Winston-Salem, NC, USA.
While open radical cystectomy remains the gold-standard treatment for muscle-invasive bladder cancer and high-risk non-muscle invasive disease, robotic assisted radical cystectomy (RARC) has been gaining popularity over the past decade. The robotic approach has the potential advantages of less intraoperative blood loss, shorter hospital stay, less post-operative narcotic requirement, quicker return of bowel function, and earlier convalescence with an acceptable surgical learning curve for surgeons adept at robotic radical prostatectomy. While short to intermediate term oncologic results from several small RARC series are promising, bladder cancer remains a potentially lethal malignancy necessitating long-term follow-up. This article aims to review the currently published literature, important technical aspects of the operation, oncologic and functional outcomes, and the future direction of RARC.

Lavery HJ, Martinez-Suarez HJ, Abaza R.
BJU Int 2010 Nov 11. [Epub ahead of print]
Robotic extended pelvic lymphadenectomy for bladder cancer with increased nodal yield.
The Ohio State University Medical Center and James Cancer Hospital – Department of Urology, Columbus, USA.
OBJECTIVES: To report our initial experience with robot-assisted extended pelvic lymph node dissection (ePLND) using a standardized open template.
MATERIALS AND METHODS: In total, 15 consecutive patients underwent robotic radical cystectomy at a single center by a single surgeon using a standard dissection template. Operating time, time to perform ePLND, pathological stage, estimated blood loss, length of hospital stay, number of nodes obtained and nodal positivity were assessed. Postoperative complications and re-admissions were reviewed.
RESULTS: The mean (range) age and body mass index was 66 (46-87) years and 29 (22-43) kg/m(2) , respectively. The mean (range) operating time and ePLND time was 423 (300-506) min and 107 (66-160) min. Mean (range) estimated blood loss was 160 (50-500) mL. The mean (range) and median length of hospital stay were 3.4 (3-7) days and 3 days, respectively. The mean (range) nodal yield was 41.8 (18-67) nodes, with greater than 25 nodes in 13 patients. Three patients were found to have nodal positivity. Of the fifteen patients, four received neoadjuvant chemotherapy. Two patients were re-admitted for postoperative complications within 30 days. There were no complications directly resulting from the ePLND.
CONCLUSIONS: Robot-assisted ePLND at the time of cystectomy can be safely and effectively performed on the robotic platform with comparable nodal yields to open series at centers of excellence for cystectomy. Nodal yields are likely to comprise a factor related to the effort of the surgeon, and not the method by which the lymphadenectomy is performed.

Choi H, Kang SH, Yoon DK, Kang SG, Ko HY, Moon DG, Park JY, Joo KJ, Cheon J.
Urology 2010 Oct 14. [Epub ahead of print]
Chewing Gum Has a Stimulatory Effect on Bowel Motility in Patients After Open or Robotic Radical Cystectomy for Bladder Cancer: A Prospective Randomized Comparative Study.
Department of Urology, Korea University School of Medicine, Seoul, Korea.
OBJECTIVES: To determine whether chewing gum during the postoperative period facilitates the recovery of bowel function and has different efficacy according to operative method used in patients with radical cystectomy.
METHODS: From July 2007 to September 2009, we randomized open radical cystectomy (ORC) patients into Group AI (ORC without gum chewing) and Group AII (ORC with gum chewing). Robot-assisted radical cystectomy (RARC) patients were randomized into Group BI (RARC without gum chewing) and Group BII (RARC with gum chewing).
RESULTS: A total of 32 ORC (17 Group AI and 15 Group AII) and 28 RARC (13 Group BI and 15 Group BII) patients were completed. The patient's perioperative data between the control (AI + BI) and chewing gum (AII + BII) group showed no differences. The median time to flatus and to bowel movement were significantly reduced in chewing gum group compared with the control patients: 57.1 vs. 69.5 hours 76.7 vs. 93.3 hours. In the ORC patients, decrease in time to flatus and bowel movement were observed in gum chewing (AII) group than control (AI) group: 64.3 vs. 80.3 hours 83.8 vs. 104.2 hours. In RARC patients, decrease in time to flatus and bowel movement were found in gum chewing (BII)

group than control (BI) group: 48.8 vs. 60.3 hours 69.1 vs. 84.6 hours. No adverse effects were observed with chewing gum.
CONCLUSIONS: Chewing gum had stimulatory effects on bowel motility after cystectomy and urinary diversion. Chewing gum was safe and could be used for postoperative ileus regardless of the operative method (ORC or RARC).

Kauffman EC, Ng CK, Lee MM, Otto BJ, Wang GJ, Scherr DS.
BJU Int 2010 Sep 30. [Epub ahead of print]
Early oncologic outcomes for bladder urothelial carcinoma patients treated with robotic-assisted radical cystectomy.
Department of Urology, New York Presbyterian Hospital - Weill Cornell Medical Center, New York, USA.
OBJECTIVE: To determine oncologic outcomes including early survival rates among unselected bladder urothelial carcinoma (BUC) patients treated with robotic-assisted radical cystectomy (RRC).
PATIENTS AND METHODS: Clinicopathologic and survival data were prospectively gathered for 85 consecutive BUC patients treated with RRC. The decision to undergo a robotic rather than open approach was made without regard to tumor volume or surgical candidacy. Kaplan-Meier survival rates were determined and stratified by tumor stage and LN positivity, and multivariate analysis was performed to identify independent predictors of survival.
RESULTS: Patients were relatively old (25% >80 years; median 73.5 years), with frequent comorbidities (46% with ASA class ≥3). Of these patients 28% had undergone previous pelvic radiation or pelvic surgery, and 20% had received neoadjuvant chemotherapy. Extended pelvic lymphadenectomy was performed in 98% of patients, with on average 19.1 LN retrieved. On final pathology, extravesical disease was common (36.5%). Positive surgicalmargins were detected in five (6%) patients, all of whom had extravesical tumors with perineural and/or lymphovascular invasion, and most of whom were >80 years old. At a mean postoperative interval of 18 months, 20 (24%) patients had developed recurrent disease, but only three (4%) patients had recurrence locally. Disease-free, cancer-specific and overall survival rates at 2 years were 74%, 85% and 79%, respectively. Patients with low-stage/LN(-) cancers had significantly better survival than extravesical/LN(-) or any-stage/LN(+) patients, with stage being the most important predictor on multivariate analysis.
CONCLUSION: RRC can achieve adequately high LN yields with a low positive margin rate among unselected BUC patients. Early survival outcomes are similar to those reported in contemporary open series, with an encouragingly low incidence of local recurrence, however long-term follow-up and head-to-head comparison with the open approach are still needed.

Shamim Khan M, Elhage O, Challacombe B, Rimington P, Murphy D, Dasgupta P.
Urology 2010 Sep 7. [Epub ahead of print]
Analysis of Early Complications of Robotic-assisted Radical Cystectomy Using a Standardized Reporting System.
Department of Urology, Guy's Hospital, King's Health Partners AHSC, London, UK.
OBJECTIVE: To analyze the early complications of robotic-assisted laparoscopic radical cystectomy (RARC) with extracorporeal ileal conduit or orthotopic (Studer) bladder reconstruction using the Clavien Classification, the management of these complications, and possible preventive measures.
MATERIALS AND METHODS: Detailed data on all patients undergoing RARC were

recorded prospectively on an encrypted database, including intraoperative or postoperative complications within 90 days of surgery. Outcome data during follow-up of up to 4 years was also collected prospectively.
RESULTS: A total of 50 patients (M:F 44:6) underwent RARC and extracorporeal ileal conduit urinary diversion (n = 45) or orthotopic bladder reconstruction (n = 5) between 2004 and 2008. The overall perioperative complication rate was 17 of 50 (34%), including 3 (6%) Clavien I, 9 (18%) Clavien II, and 5 (10%) Clavien III. Final histology showed 9 (18%) patients had no residual disease pT0, 7 (14%) pTa, 11 (22%) pT1, 9 (18%) pT2, 11 (22%) pT3, and 3 (6%) pT4.
CONCLUSION: Radical cystectomy remains a complex and morbid procedure with significant complication rate regardless of surgical approach. Using the Clavien reporting system, we identified early complications in 34% of patients, of which five required a significant intervention. Use of this standardized reporting system has allowed us to stratify complications after RARC, allowing easy comparison to other techniques and targeting further reductions in the future.

Hayn MH, Hellenthal NJ, Hussain A, Andrews PE, Carpentier P, Castle E, Dasgupta P, Davis R, Thomas R, Khan S, Kibel A, Kim H, Manoharan M, Menon M, Mottrie A, Ornstein D, Peabody J, Pruthi R, Palou Redorta J, Vira M, Schanne F, Stricker H, Wiklund P, Wilding G, Guru KA.
Urology 2010; 76: 1111-6.
Does previous robot-assisted radical prostatectomy experience affect outcomes at robot-assisted radical cystectomy? Results from the International Robotic Cystectomy Consortium.
Department of Urologic Oncology, Roswell Park Cancer Institute, Buffalo, New York, USA.
OBJECTIVES: To evaluate the effect of previous robot-assisted radical prostatectomy (RARP) case volume on the outcomes of robot-assisted radical cystectomy. Little is known regarding the effect of previous robotic surgical experience on the implementation and execution of robot-assisted radical cystectomy.
METHODS: Using the International Robotic Cystectomy Consortium database, 496 patients were identified who had undergone robot-assisted radical cystectomy by 21 surgeons at 14 institutions from 2003 to 2009. The surgeons were divided into 4 groups according to their previous RARP experience (≤ 50, 51-100, 101-150, and > 150 cases). The overall operative time, blood loss, lymph node yield, pathologic stage, and surgical margin status were compared among the 4 groups using chi-square analysis.
RESULTS: The mean operative time was 386 minutes (range 178-827). The mean estimated blood loss was 408 mL (range 25-3500). The operative time and blood loss were both significantly associated with previous RARP experience ($P < .001$). The mean lymph node count was 17.8 nodes (range 0-68). Lymph node yield and increased pathologic stage were significantly associated with previous RARP experience ($P < .001$). Finally, 34 (7.0%) of the 482 patients had a positive surgical margin. Margin status was not significantly associated with previous RARP experience ($P = .089$).
CONCLUSIONS: Previous RARP case volume might affect the operative time, blood loss, and lymph node yield at robot-assisted radical cystectomy. In addition, surgeons with increased RARP experience operated on patients with more advanced tumors. Previous RARP experience, however, did not appear to affect the surgical margin status.

Yuh BE, Hussain A, Chandrasekhar R, Bienko M, Piacente P, Wilding G, Menon M, Peabody J, Guru KA.
Comparative analysis of global practice patterns in urologic robot-assisted

surgery.
J Endourol 2010; 24: 1637-44.
Department of Urology, State University of New York at Buffalo, Buffalo, New York, USA.
OBJECTIVES: To determine and compare the status of urologic laparoscopic and robot-assisted surgery (RAS) across the world.
METHODS: Two hundred ninety-one surveys were completed by urologists at various national and international conferences in 2008. The 58-item questionnaire assessed the individual and institutional practice patterns of minimally invasive surgery with a focus on RAS. Surveys from Europe and North American continents (ENA) were compared with surveys from the Middle East and Asian continents (MEA).
RESULTS: One hundred sixty-six (57%) surveys were completed by urologists from MEA and 125 (43%) from ENA. Eighty percent of respondents performed minimally invasive surgery, with 64% having prior formal training. Respondents in ENA were more likely to have had formal training in RAS and performed more RAS cases ($p < 0.01$). Sixty percent of those surveyed from ENA had used robotic consoles in training courses compared with only 20% in MEA ($p < 0.01$). Dedicated RAS support teams were less common in MEA ($p < 0.01$). Lack of a robotic system was the most common deterrent for RAS in MEA (56%). Respondents in ENA performed more robot-assisted radical prostatectomy, robot-assisted radical cystectomy, and robot-assisted nephrectomy. In the more established robotic environment of ENA, robot-assisted radical prostatectomy, robot-assisted radical cystectomy, and robot-assisted nephrectomy represented the gold standard in 34%, 14%, and 26% of surveys, respectively. Comparatively, MEA respondents were more likely to believe RAS represented the gold standard.
CONCLUSIONS: Usage of RAS in urology continues to grow across the globe, though to most it represents a surgical alternative rather than benchmark. Even with reduced exposure, training, and access, more urologists in the MEA considered RAS to be the surgical standard for prostatectomy, cystectomy, and nephrectomy. The evolution of attitudinal change should be the focus of further study.

Manoharan M, Katkoori D, Kishore TA, Antebie E.
Urology 2010 Aug 4. [Epub ahead of print]
Robotic-assisted Radical Cystectomy and Orthotopic Ileal Neobladder Using a Modified Pfannenstiel Incision.
Department of Urology, Miller School of Medicine, University of Miami, Miami, Florida.
OBJECTIVES: To report our technique of robotic-assisted laparoscopic radical cystectomy with a modified Pfannenstiel incision. Robotic-assisted laparoscopic radical cystectomy has been gaining in popularity. A completely intracorporeal procedure is a technically difficult and time-consuming procedure. Most surgeons perform the diversion using a small incision, typically midline, that is also used for specimen retrieval.
METHODS: Radical cystectomy and pelvic lymph node dissection was performed using a da Vinci robotic platform in a standard fashion. The robot was undocked and an 8-10 cm modified Pfannenstiel incision made. A self-retaining retractor was used to expose the wound. The specimen was extracted, and an ileal neobladder was reconstructed using the incision.
RESULTS: We have performed this procedure in 14 patients to date. The mean age was 58 years (range 56-61). The mean estimated blood loss was 310 +/- 220 mL, and the mean operating time was 6 +/- 0.8 hours. No intraoperative visceral injuries were noted. None of the patients had positive surgical margins. The mean number of lymph nodes removed was 12 +/- 3. The mean hospital stay was 8.5 days.
CONCLUSIONS: Our initial experience with our technique of robotic-assisted laparoscopic radical cystectomy and neobladder construction using a modified Pfannenstiel incision has

been favorable. The incision provides good exposure, facilitating neobladder reconstruction, can be used for specimen retrieval, and heals better with a cosmetic scar.

Hellenthal NJ, Hussain A, Andrews PE, Carpentier P, Castle E, Dasgupta P, Kaouk J, Khan S, Kibel A, Kim H, Manoharan M, Menon M, Mottrie A, Ornstein D, Palou J, Peabody J, Pruthi R, Richstone L, Schanne F, Stricker H, Thomas R, Wiklund P, Wilding G, Guru KA.
BJU Int 2010 Jun 18. [Epub ahead of print]
Lymphadenectomy at the time of robot-assisted radical cystectomy: results from the International Robotic Cystectomy Consortium.
Roswell Park Cancer Institute, Buffalo, NY, USA.
OBJECTIVE: To evaluate the incidence of, and predictors for, lymphadenectomy in patients undergoing robot-assisted radical cystectomy (RARC) for bladder cancer.
PATIENTS AND METHODS: Utilizing the International Robotic Cystectomy Consortium (IRCC) database, 527 patients were identified who underwent RARC at 15 institutions from 2003 to 2009. After stratification by age group, sex, pathological T stage, nodal status, sequential case number, institutional volume and surgeon volume, logistic regression was used to correlate variables to the likelihood of undergoing lymphadenectomy (defined as >/=10 nodes removed).
RESULTS: Of the 527 patients, 437 (82.9%) underwent lymphadenectomy. A mean of 17.8 (range 0-68) lymph nodes were examined. Tumour stage, sequential case number, institution volume and surgeon volume were significantly associated with the likelihood of undergoing lymphadenectomy. Surgeon volume was most significantly associated with lymphadenectomy on multivariate analysis. High-volume surgeons (>20 cases) were almost three times more likely to perform lymphadenectomy than lower-volume surgeons, all other variables being constant [odds ratio (OR) = 2.37; 95% confidence interval (CI) = 1.39-4.05; P= 0.002].
CONCLUSION: The rates of lymphadenectomy at RARC for advanced bladder cancer are similar to those of open cystectomy series using a large, multi-institutional cohort. There does, however, appear to be a learning curve associated with the performance of lymphadenectomy at RARC.

Josephson DY, Chen JA, Chan KG, Lau CS, Nelson RA, Wilson TG.
Int J Med Robot 2010; 6: 315-23.
Robotic-assisted laparoscopic radical cystoprostatectomy and extracorporeal continent urinary diversion: highlight of surgical techniques and outcomes.
Department of Urology and Urologic Oncology, City of Hope, Duarte, USA.
BACKGROUND: We report our technique for robotic-assisted laparoscopic radical cystoprostatectomy (RARCP) and extracorporeal urinary diversion and present their clinical outcomes.
METHODS: Between October 2003 and December 2008 we performed 58 RARCPs with extracorporeal continent urinary diversion. Preoperative, operative and postoperative data was evaluated.
RESULTS: Mean patient age was 68 (range 46-89) years, with an average American Society of Anesthesiologists classification of 2.9. Mean operative time was 8 (range 5-11) h. Median blood loss was 450 ml. Thirteen patients received intra-operative blood transfusions and 22 patients received peri-operative blood transfusions. Continent urinary diversions were performed by means of the Studer technique (n = 42) or Indiana pouch (n = 16). Mean number of lymph nodes examined on lymphadenectomy was 27 (range 0-52).
CONCLUSIONS: Our RARCP and continent diversion technique is a safe and feasible

option for primary urothelial carcinoma of the bladder. Oncological and surgical outcomes are comparable to open cystectomy series.

Hellenthal NJ, Hussain A, Andrews PE, Carpentier P, Castle E, Dasgupta P, Kaouk J, Khan S, Kibel A, Kim H, Manoharan M, Menon M, Mottrie A, Ornstein D, Palou J, Peabody J, Pruthi R, Richstone L, Schanne F, Stricker H, Thomas R, Wiklund P, Wilding G, Guru KA.
J Urol 2010; 184: 87-91
Surgical margin status after robot assisted radical cystectomy: results from the International Robotic Cystectomy Consortium.
Department of Urologic Oncology, Roswell Park Cancer Institute, Buffalo, New York, USA.
PURPOSE: Positive surgical margins at radical cystectomy confer a poor prognosis. We evaluated the incidence and predictors of positive surgical margins in patients who underwent robot assisted radical cystectomy for bladder cancer.
MATERIALS AND METHODS: Using the International Robotic Cystectomy Consortium database we identified 513 patients who underwent robot assisted radical cystectomy, as done by a total of 22 surgeons at 15 institutions from 2003 to 2009. After stratification by age group, gender, pathological T stage, nodal status, sequential case number and institutional volume logistic regression was used to correlate variables with the likelihood of a positive surgical margin.
RESULTS: Of the 513 patients 35 (6.8%) had a positive surgical margin. Increasing 10-year age group, lymph node positivity and higher pathological T stage were significantly associated with an increased likelihood of a positive margin ($p = 0.010$, <0.001 and $p <0.001$, respectively). Gender, sequential case number and institutional volume were not significantly associated with margin positivity. The rate of margin positive disease at cystectomy was 1.5% for pT2 or less, 8.8% for pT3 and 39% for pT4 disease.
CONCLUSIONS: Positive surgical margin rates at robot assisted radical cystectomy for advanced bladder cancer were similar to those in open cystectomy series in a large, multi-institutional, prospective cohort. Sequential case number, a surrogate for the learning curve and institutional volume were not significantly associated with positive margins at robot assisted radical cystectomy.

Hayn MH, Hussain A, Mansour AM, Andrews PE, Carpentier P, Castle E, Dasgupta P, Rimington P, Thomas R, Khan S, Kibel A, Kim H, Manoharan M, Menon M, Mottrie A, Ornstein D, Peabody J, Pruthi R, Palou Redorta J, Richstone L, Schanne F, Stricker H, Wiklund P, Chandrasekhar R, Wilding GE, Guru KA.
Eur Urol 2010; 58: 197-202.
The learning curve of robot-assisted radical cystectomy: results from the International Robotic Cystectomy Consortium.
Department of Urologic Oncology, Roswell Park Cancer Institute, Buffalo, USA.
BACKGROUND: Robot-assisted radical cystectomy (RARC) has evolved as a minimally invasive alternative to open radical cystectomy for patients with invasive bladder cancer.
OBJECTIVE: We sought to define the learning curve for RARC by evaluating results from a multicenter, contemporary, consecutive series of patients who underwent this procedure.
DESIGN, SETTING, AND PARTICIPANTS: Utilizing the International Robotic Cystectomy Consortium database, a prospectively maintained and institutional review board-approved database, we identified 496 patients who underwent RARC by 21surgeons at 14 institutions from 2003 to 2009.
MEASUREMENTS: Cut-off points for operative time, lymph node yield (LNY), estimated blood loss (EBL), and margin positivity were identified. Using specifically designed

statistical mixed models, we were able to inversely predict the number of patients required for an institution to reach the predetermined cut-off points.
RESULTS AND LIMITATIONS: Mean operative time was 386 min, mean EBL was 408 ml, and mean LNY was 18. Overall, 34 of 482 patients (7%) had a positive surgical margin (PSM). Using statistical models, it was estimated that 21 patients were required for operative time to reach 6.5h and 8, 20, and 30 patients were required to reach an LNY of 12, 16, and 20, respectively. For all patients, PSM rates of <5% were achieved after 30 patients. For patients with pathologic stage higher than T2, PSM rates of <15% were achieved after 24 patients.
CONCLUSIONS: RARC is a challenging procedure but is a technique that is reproducible throughout multiple centers. This report helps to define the learning curve for RARC and demonstrates an acceptable level of proficiency by the 30th case for proxy measures of RARC quality.

Kasraeian A, Barret E, Cathelineau X, Rozet F, Galiano M, Sanchez-Salas R, Vallancien G.
J Endourol 2010; 24: 409-13.
Robot-assisted laparoscopic cystoprostatectomy with extended pelvic lymphadenectomy, extracorporeal enterocystoplasty, and intracorporeal enterourethral anastomosis: initial Montsouris experience.
Montsouris Institute, University of Paris Descartes, Paris, France.
BACKGROUND AND PURPOSE: Radical cystectomy is the gold standard for management of invasive and recurrent high-grade superficial bladder cancer. We present our initial experience with robot-assisted laparoscopic cystoprostatectomy (RALCP) with extended pelvic lymphadenectomy (epLAD) and intracorporeal enterourethral anastomosis (IEUA). A video demonstrating our technique is available online at www.liebertonline.com/end.
PATIENTS AND METHODS: Between April 2008 and March 2009, nine patients underwent RALCP with epLAD and IEUA at our institution. Operative technique, as described in detail (with video), was assessed for feasibility. A video demonstrating this technique is available online at www.liebertonline.com/end. Preoperative patient characteristics, operative data, as well as perioperative and pathologic outcomes were analyzed. All data were collected prospectively.
RESULTS: Median total operative time was 270 minutes (range 210-330): 60 minutes, bilateral epLAD; 90 minutes, RALCP; 60 minutes, open enterocystoplasty; 60 minutes (range 45-90), IEUA. Median blood loss was 400 mL (range 200-900 mL). All surgical margins were negative. Median number of lymph nodes removed was 11 (range 4-21). Postoperative complications were noted in three patients and included urinoma (n = 1), pyelonephritis (n = 1), and hematoma (n = 1).
CONCLUSION: RALCP is feasible and can be performed safely and effectively with acceptable operative, pathologic, and short-term clinical outcomes. More experience with longer follow-up is necessary to further assess clinical and oncologic outcomes of robotic assisted laparoscopic cystectomy for treatment of bladder cancer.

Mansour AM, Marshall SJ, Arnone ED, Seixas-Mikelus SA, Hussain A, Abol-Enein H, Peabody JO, Guru KA.
Can J Urol 2010; 17: 5002-11.
Status of robot-assisted radical cystectomy.
Department of Urologic Oncology, Roswell Park Cancer Institute, State University of New York, Buffalo, New York, USA.

PURPOSE: Robot-assisted radical cystectomy (RARC) is an alternative approach for treatment of bladder cancer. We provide a critical review of the current status of RARC and pelvic lymph node dissection with a focus on feasibility, safety and oncological efficacy of the procedure.
MATERIALS AND METHODS: The PubMed literature database was reviewed for RARC series that have been reported in the English language until the present time. Surgical technique, operative parameters, pathologic outcome, complications and quality of life were examined.
RESULTS: RARC is progressing steadily. With nearly 500 published cases worldwide, RARC proves to be technically feasible and oncologically effective. It is associated with less blood loss, shorter hospital stay, and improved postoperative quality of life. Intracorporeal urinary diversion is still in the experimental phase, and effort is needed to make it technically easier and widely accepted.
CONCLUSIONS: With the worldwide rapid spread of robot-assisted surgeries, RARC is evolving as a reliable minimally invasive alternative to standard open surgery. Awaiting long term oncological results, adequately powered prospective randomized trials comparing open, laparoscopic and robotic approaches are urgently needed.

Chade DC, Laudone VP, Bochner BH, Parra RO.
J Urol 2010; 183: 862-69.
Oncological outcomes after radical cystectomy for bladder cancer: open versus minimally invasive approaches.
Urology Service, Department of Surgery, Memorial Sloan-Kettering Cancer Center, New York, USA.
PURPOSE: The number of centers performing robotic assisted radical cystectomy has recently increased, spurring greater concerns about oncological outcomes. In this review we summarize the most comprehensive articles published on the oncological outcomes of laparoscopic assisted, robotic assisted and open radical cystectomy.
MATERIALS AND METHODS: A MEDLINE/PubMed literature search was conducted in March 2009 to review English language articles published from 1998 onward. Of 217 selected articles on the 3 techniques 19 studies were selected for this review.
RESULTS: The laparoscopic series reported recurrence-free survival rates in the range of 83% to 85% at 1 to 2 years and 60% to 77% at 2 to 3 years, while the robotic assisted studies reported recurrence-free survival rates of 86% to 91% at 1 to 2 years. Large open surgery studies showed 62% to 68% recurrence-free survival at 5 years and 50% to 60% at 10 years, with overall survival of 59% to 66% at 5 years and 37% to 43% at 10 years. Overall survival in the laparoscopic cohorts was 90% to 100% at 1 to 2 years and 50% to 87% at 2 to 3 years. Publications reporting robotic cases demonstrated a 90% to 96% overall survival in 1 to 2 years of followup.
CONCLUSIONS: Despite the surge of centers adopting minimally invasive approaches for radical cystectomy, the long-term effectiveness of these techniques has not yet been proven. This review of recent and landmark articles on open and minimally invasive procedures emphasizes the need for prospective controlled studies and long-term followup data to determine the proper use of laparoscopic and robotic assisted techniques in bladder cancer surgery.

Pruthi RS, Nix J, McRackan D, Hickerson A, Nielsen ME, Raynor M, Wallen EM.
Eur Urol 2010; 57: 1013-21.
Robotic-assisted laparoscopic intracorporeal urinary diversion.
Division of Urologic Surgery, University of North Carolina at Chapel Hill, Chapel Hill, USA.

BACKGROUND: Recent small case series have now been reported for robotic-assisted laparoscopic radical cystectomy (RALRC). In most of these series, the urinary diversion has been performed in an extracorporeal fashion. There have been few case reports of an intracorporeal diversion and little description of the technique of such a procedure.
OBJECTIVE: In this paper, we report our initial experience with robotic-assisted laparoscopic intracorporeal urinary diversion, describing stepwise the surgical procedure itself and evaluating perioperative and pathologic outcomes of this novel procedure.
DESIGN, SETTING, AND PARTICIPANTS: We studied a single-institution case series of patients undergoing robotic-assisted cystectomy and intracorporeal urinary diversion for clinically localized urothelial carcinoma of the bladder (n=10) or for a noncompliant dysfunctional bladder refractory to more conservative management (n=2). Historical comparisons are also made to a consecutive case series of 20 patients undergoing robotic radical cystectomy and extracorporeal urinary diversion.
SURGICAL PROCEDURE: RALRC and intracorporeal urinary diversion, including ileal conduit (n=9) and orthotopic ileal neobladder (n=3).
MEASUREMENTS: The stepwise operative procedure is described in detail. Outcome measures evaluated in this series included operative variables, hospital recovery, and complication rate. Comparisons were made to a contemporaneous series of 20 patients who underwent a robotic cystectomy with extracorporeal diversion during this time period (from an experience of >100 robotic cystectomy patients since 2005).
RESULTS AND LIMITATIONS: Twelve patients (mean age: 60.9 yr) underwent an intracorporeal diversion. Mean operating-room time of all patients was 5.3h, and mean surgical blood loss was 221ml. Mean time to flatus, bowel movement, and hospital discharge was 2.2 d, 3.2 d, and 4.5 d, respectively. Eleven of the 12 patients were discharged on or before postoperative day 5. There were six postoperative complications in five patients (42%), with one complication being Clavien grade 3 or higher. The major limitations of the study are the small sample size and the nonrandomized nature of the compared treatment groups (intracorporeal vs extracorporeal), which limits the ability to directly compare the techniques at a high level of scientific confidence.
CONCLUSIONS: Our initial experience with robotic-assisted laparoscopic intracorporeal diversion appears to be favorable with acceptable operative and short-term clinical outcomes.

Guru KA, Perlmutter AE, Butt ZM, Piacente P, Wilding GE, Tan W, Kim HL, Mohler JL. JSLS 2009; 13: 509-14.

The learning curve for robot-assisted radical cystectomy.

Department of Urologic Oncology, Roswell Park Cancer Institute, Buffalo, New York, USA.

OBJECTIVE: Robot-assisted radical cystectomy has the potential to cure patients from bladder cancer while offering the benefits of minimally invasive surgery. We sought to evaluate the learning curve for this technically demanding procedure.
MATERIALS AND METHODS: Robot-assisted radical cystectomy was attempted in 100 consecutive patients. An IRB-approved review of our robot-assisted radical cystectomy database was conducted. Total operative (OR) time, cystectomy time, pelvic lymph node dissection (PLND) time, estimated blood loss (EBL), margin positivity, complications, and length of hospital stay were compared among patients divided into 4 cohorts of increasing surgical experience. Scattergrams and continuous curves were plotted to develop a robotic cystectomy learning curve.
RESULTS: Overall OR time decreased from 375 minutes in cohort 1 to 352 minutes in cohort 4, with less than 1% change in OR time after case 16. Time from incision to bladder extirpation decreased from 187 minutes in cohort one to 165 minutes in cohort 4. Time for PLND increased from 44 minutes in cohort 1 to 77 minutes in cohort 4. Lymph node yield

increased from 14 nodes in cohort 1 to 23 nodes in cohort 4. Positive surgical margins decreased from 4 patients in cohort 1 to 0 patient in cohort 4. The complication rate had no change from 9 patients in cohort 1 to 9 patients in cohort 4.
CONCLUSION: Operative results and oncologic outcomes for robot-assisted radical cystectomy constantly improve as the technique evolves.

Pruthi RS, Nielsen ME, Nix J, Smith A, Schultz H, Wallen EM.
J Urol 2010; 183: 510-4.
Robotic radical cystectomy for bladder cancer: surgical and pathological outcomes in 100 consecutive cases.
Division of Urologic Surgery, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA.
PURPOSE: Radical cystectomy remains the most effective treatment for patients with localized, invasive bladder cancer and recurrent noninvasive disease. Recently some surgeons have begun to describe outcomes associated with less invasive surgical approaches to this disease such as laparoscopic or robotic assisted techniques. We report our maturing experience with 100 consecutive cases of robotic assisted laparoscopic radical cystectomy with regard to perioperative results, pathological outcomes and surgical complications.
MATERIALS AND METHODS: A total of 100 consecutive patients (73 male and 27 female) underwent robotic radical cystectomy and urinary diversion at our institution from January 2006 to January 2009 for clinically localized bladder cancer. Outcome measures evaluated included operative variables, hospital recovery, pathological outcomes and complication rate.
RESULTS: Mean age of this cohort was 65.5 years (range 33 to 86). Of the patients 61 underwent ileal conduit diversion, 38 received a neobladder and 1 had no urinary diversion (renal failure). Mean operating room time for all patients was 4.6 hours (median 4.3) and mean surgical blood loss was 271 ml (median 250). On surgical pathology 40% of the cases were pT1 or less disease, 27% were pT2, 13% were pT3/T4 disease and 20% were node positive. Mean number of lymph nodes removed was 19 (range 8 to 40). In no case was there a positive surgical margin. Mean days to flatus were 2.1, bowel movement 2.8 and discharge home 4.9. There were 41 postoperative complications in 36 patients with 8% having a major complication (Clavien grade 3 or higher) and 11% being readmitted within 30 days of surgery. At a mean followup of 21 months 15 patients had disease recurrence and 6 died of disease.
CONCLUSIONS: We report a relatively large and maturing experience with robotic radical cystectomy for the treatment of bladder cancer providing acceptable surgical and pathological outcomes. These results support continued efforts to refine the surgical management of high risk bladder cancer.

Smith A, Kurpad R, Lal A, Nielsen M, Wallen EM, Pruthi RS.
J Urol 2010; 183: 505-9.
Cost analysis of robotic versus open radical cystectomy for bladder cancer.
Division of Urologic Surgery, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA.
PURPOSE: Recently robotic approaches to cystectomy have been reported, and while clinical and oncological efficacy continues to be evaluated, potential financial costs have not been clearly evaluated. In this study we present a financial analysis using current cost structures and clinical outcomes for robotic and open cystectomy for bladder cancer.
MATERIALS AND METHODS: The financial costs of robotic and open radical cystectomy

were categorized into operating room and hospital components, and further divided into fixed and variable costs for each. Fixed operating room costs for open cases involved base cost as well as disposable equipment costs while robotic fixed costs included the amortized machine cost as well as equipment and maintenance. Variable operating room costs were directly related to length of surgery. Variable hospital costs were directly related to transfusion requirement and length of stay. The means of the prior 20 cases of robotic and open cystectomy were used to perform a comparative cost analysis.
RESULTS: Mean fixed operating room costs for robotic cases were $1,634 higher than for open cases. Operating room variable costs were also higher by a difference of $570, directly related to increased operating room time. Hospital costs were nearly identical for the fixed component while variable costs were $564 higher for the open approach secondary to higher transfusion costs and longer mean length of stay. Based on these findings robotic cystectomy is associated with an overall higher financial cost of $1,640 (robotic $16,248 vs open $14,608). Cost calculators were constructed based on these fixed and variable costs for each surgical approach to demonstrate the expected total costs based on varying operating room time and length of stay.
CONCLUSIONS: Robotic assisted laparoscopic radical cystectomy is associated with a higher financial cost (+$1,640) than the open approach in the perioperative setting. However, this analysis is limited by its single institution design and a multicenter followup study is required to provide a more comprehensive analysis.

Ghavamian R, Hakimi AA.
Expert Rev Anticancer Ther 2009; 9: 1783-92.
Lymph node dissection for bladder cancer: the issue of extent and feasibility in the minimally invasive era.
Department of Urology, Montefiore Medical Center, Albert Einstein College of Medicine, 3400 Bainbridge Avenue, Bronx, USA.
Lymph node dissection in bladder cancer is an integral part of radical cystectomy. It allows for accurate staging of the patient and will, therefore, serve to dictate additional treatment and add prognostic information. The issue of what is an adequate lymphadenectomy as to the extent and boundaries of the operation, specifically the cephalad extent, has been the focus of recent debate. Some have suggested that lymph node yield, in terms of number, could serve as a surrogate for the adequacy of the node dissection and, thus, the oncologic efficacy of the operation. It has also been suggested that it is a marker for the experience of the operating surgeon. What is meant by a limited, standard and extended lymph node dissection varies among different publications. Recent evidence suggests that an 'extended' node dissection infers oncologic efficacy. With the advent of minimally invasive and, specifically, robotic-assisted surgery, more cystectomies are approached robotically. As such, there has been recent debate as to whether a robotic-assisted procedure can emulate the open approach, satisfying the accepted boundaries and extent of dissection and ultimately leading to equivalent oncologic outcomes without increasing morbidity. In this review, we focus on the extent of lymphadenectomy in bladder cancer by reviewing the lymphatic drainage and arguments in favor of a more extended dissection. We will then address the minimally invasive techniques, focusing on robotic-assisted surgery, and review the evidence suggesting that this is a promising new technique that results in acceptable nodal yield and potentially equivalent oncologic outcomes with no added morbidity.

Smith AB, Nielsen ME, Wallen EM, Pruthi RS.

Curr Opin Urol 2010; 20: 60-4.
Current status of robot-assisted radical cystectomy.
Division of Urologic Surgery, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA.
PURPOSE OF REVIEW: To assess the current status of robot-assisted radical cystectomy with pelvic lymphadenectomy and urinary diversion for the treatment of bladder cancer.
RECENT FINDINGS: Robot-assisted radical cystectomy is steadily growing with a feasible learning curve in those experienced in robotic prostatectomy. Pelvic lymphadenectomy appears to provide adequate nodal yield in several studies. Urinary diversions are most commonly performed extracorporeally, but several centers are attempting intracorporeal techniques. Short-term perioperative outcomes appear acceptable, but oncologic efficacy remains unknown.
SUMMARY: Robot-assisted radical cystectomy with urinary diversion appears to be growing steadily in academic institutions. Long-term data regarding oncologic efficacy remain lacking but perioperative outcomes appear favorable.

Nix J, Smith A, Kurpad R, Nielsen ME, Wallen EM, Pruthi RS.
Eur Urol 2010; 57: 196-201.
Prospective randomized controlled trial of robotic versus open radical cystectomy for bladder cancer: perioperative and pathologic results.
Division of Urologic Surgery, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA.
BACKGROUND: In recent years, surgeons have begun to report case series of minimally invasive approaches to radical cystectomy, including robotic-assisted techniques demonstrating the surgical feasibility of this procedure with the potential of lower blood loss and more rapid return of bowel function and hospital discharge. Despite these experiences and observations, at this point high levels of clinical evidence with regard to the benefits of robotic cystectomy are absent, and the current experiences represent case series with limited comparisons to historical controls at best.
OBJECTIVE: We report our results on a prospective randomized trial of open versus robotic-assisted laparoscopic radical cystectomy with regard to perioperative outcomes, complications, and short-term narcotic usage.
DESIGN, SETTING, AND PARTICIPANTS: A prospective randomized single-center noninferiority study comparing open versus robotic approaches to cystectomy in patients who are candidates for radical cystectomy for urothelial carcinoma of the bladder. Of the 41 patients who underwent surgery, 21 were randomized to the robotic approach and 20 to the open technique.
INTERVENTION: Radical cystectomy, bilateral pelvic lymphadenectomy, and urinary diversion by either an open approach or by a robotic-assisted laparoscopic technique.
MEASUREMENTS: The primary end point was lymph node (LN) yield with a noninferiority margin of four LNs. Secondary end points included demographic characteristics, perioperative outcomes, pathologic results, and short-term narcotic use.
RESULTS AND LIMITATIONS: On univariate analysis, no significant differences were found between the two groups with regard to age, sex, body mass index, American Society of Anesthesiologists classification, anticoagulation regimen of aspirin, clinical stage, or diversion type. Significant differences were noted in operating room time, estimated blood loss, time to flatus, time to bowel movement, and use of inpatient morphine sulfate equivalents. There was no significant difference in regard to overall complication rate or hospital stay. On surgical pathology, in the robotic group 14 patients had pT2 disease or higher; 3 patients had pT3/T4 disease; and 4 patients had node-positive disease. In the open group, eight patients had pT2 disease or higher; five patients

had pT3/T4 disease; and seven patients had node-positive disease. The mean number of LNs removed was 19 in the robotic group versus18 in the open group. Potential study limitations include the limited clinical and oncologic follow-up and the relatively small and single-institution nature of the study.
CONCLUSIONS: We present the results of a prospective randomized controlled noninferiority study with a primary end point of LN yield, demonstrating the robotic approach to be noninferior to the open approach. The robotic approach also compares favorably with the open approach in several perioperative parameters.

Ismail AF, Dasgupta P, Shabbir M, Khan MS.
Minerva Urol Nefrol 2009; 61: 341-50.
Robotic radical cystectomy for bladder cancer.
Urology Centre, Guy's Hospital, London, UK.
This article will focus on the evolution of robotic-assisted radical cystectomy (RARC) as the treatment for muscle invasive or uncontrolled superficial bladder cancer. Authors describe the current implementation of technology in their patients. The results of published case series and comparative studies on RARC available to date are also reviewed, to identify the surgical, pathological, oncological and quality of life outcomes of RARC.

Yuh BE, Ciccone J, Chandrasekhar R, Butt ZM, Wilding GE, Kim HL, Mohler JL, Guru KA.
JSLS 2009; 13: 398-405.
Impact of previous abdominal surgery on robot-assisted radical cystectomy.
Department of Urology, State University of New York at Buffalo, USA.
OBJECTIVE: We analyzed the effect of previous abdominal surgery (PAS) on consecutive patients who underwent robot-assisted radical cystectomy (RARC).
MATERIALS AND METHODS: From 2005 to 2008, 73 patients at a single institution underwent RARC with bilateral extended pelvic lymph node dissection and urinary diversion. Lysis of adhesions was performed robotically and laparoscopically. Records were reviewed to assess the impact of PAS on operative outcomes and complications up to 3 months after surgery.
RESULTS: Of the 73 patients, 37 (51%) had undergone PAS. Of these 37, 6 (16%) had PAS above the umbilicus, and 31 (84%) had surgery either above and below or strictly below the umbilicus. Patients with PAS were significantly older than those without ($P<0.01$). No statistically significant difference was seen with respect to blood loss, transfusion requirement, operative time, lysis of adhesion time, length of ICU stay, overall hospital stay, or the need for reoperation between patients with PAS and those without PAS. The overall postoperative complication rate was higher in the group with PAS ($P=0.04$). Lymph node yield was higher in patients without PAS ($P<0.01$). Patients with PAS below the umbilicus had a significantly longer hospital stay than patients with surgery strictly above the umbilicus had ($P=0.01$). Whether individuals had previously undergone single or multiple surgeries had no significance.
CONCLUSION: Robot-assisted radical cystectomy in patients with a history of previous surgery may carry a higher risk for postoperative complications. However, previous operations do not appear to affect the likelihood of a safely completed robotic operation. Patients should be counseled about their risk of obstacles after surgery.

Zhu J, Gao JP, Xu AX, Wang W, Dong J, Cui L, Zhang K, Zhang X.
Zhonghua Wai Ke Za Zhi 2009; 47: 1242-4.

Robot-assisted laparoscopic radical cystectomy with extracorporeal urinary diversion.

Department of Urology, General Hospital of People's Liberation Army, Beijing, China.

OBJECTIVE: To present the technique and experience of robotic-assisted laparoscopic radical cystectomy (RARC) by da Vinci surgical system.
METHODS: From December 2007 to September 2008, 4 patients underwent RARC and urinary diversion. The age of patients was 44 to 63 years old. The body mass index was 22.8 to 27.7. All their clinical stages were lower than T2N0M0. The technique for RARC involving ureters dissection, posterior dissection, lateral pedicle control, anterior dissection, dorsal vein complex control, neurovascular bundles sparing, lymphadenectomy, ureter-ileal anastomosis, urethra-neobladder anastomosis to either ileal conduit urinary diversion or neobladder reconstruction performed extracorporeally.
RESULTS: All the operations were accomplished successfully. The urinary diversion of 2 case was ileal conduit and others was ileal orthophoria neobladder. The operation time was 300 to 450 min. The time of radical cystectomy was 150 to 180 min. The estimated blood loss was 100 to 500 ml. The postoperative hospital stay was 9 to 35 d. The bed rest time was 4 to 9 d. There was 1 patients who had incomplete intestinal obstruction at 8th postoperative day cured by conservative therapy. The patients were followed up for 3 to 12 months, all patients survived without tumor recurrence. The patients have satisfied urinary continence and normal renal functions without hydronephrosis after the operation.
CONCLUSIONS: RARC is small incision and safe, the results are definite. It is one of the direction of minimally invasive urologic surgery.

Palou Redorta J, Gaya Sopena JM, Gausa Gascón L, Sánchez-Martín F, Rosales Bordes A, Rodríguez Faba O, Villavicencio Mavrich H.

Actas Urol Esp 2009; 33: 759-66.

Robotic radical cystoprostatectomy: oncological and functional analysis.

Unidad de Urología Oncológica, Servicio de Urología, Fundació Puigvert, Universidad Autónoma de Barcelona, Barcelona, España.

INTRODUCTION: The da Vinci robotic laparoscopic surgery, has been shown in radical prostatectomy, optimal functional and oncological results with a lower learning curve, greater comfort and vision for the surgeon, and proper preservation of the neurovascular bundles. This has led to begin the experience with robotic radical cystectomy (RRC).
OBJECTIVES: Review our initial experience in CRR, evaluating surgical and functional results obtained, and also immediate and short-term complications.
MATERIAL AND METHODS: Between December 2007 and January 2009 we performed nine robotic radical cystoprostatectomy and in seven patients robotic lymphadenectomy (LDN). Five patients had a muscle-invasive disease and 4 non-muscle invasive bladder cancer. The median age was 57 years (range 34-81). Urinary diversion was performed extracorporeally in all cases, 3 cases an ileal conduit and 6 an Studer neobladder in 3 of these 6 cases, the urethra-neobladder anastomosis was performed intracorporeally.
RESULTS: The average time of surgery was 300 minutes (range 280-420) in the ileal conduit and 360 (range 330-540) in the Studer. No cases required conversion or blood transfusion. The median number of nodes removed by LDN robotics was 10 (range 6-18). The pathology revealed 3 pT0. 2 CIS, 3 pT3, 1 pT4b (positive margins). With a median follow up of 7 months there have been no peritoneal implant and only one ureteral stenosis. Oral diet was initiated in 5 cases at 48 hours. Of the 6 patients with preserved sexual function preoperatively and followup of more than 3 months, 2 had full erection at 1 month, 2 at 3 and 6 months, and the remaining 2 presented with a full erection with 5 PD inhibitors at 3 and 9 months. All patients with neobladder presented correct daytime

continence. The average hospital stay was 8.5 days (range 7-19).
CONCLUSIONS: The radical robotic cystectomy with extracorporeal reconstruction of the urinary diversion offers good early functional and surgical outcomes. The careful preservation of the neurovascular bundles in radical pelvic surgery provides excellent results in urinary and sexual function.

Kauffman EC, Ng CK, Lee MM, Otto BJ, Portnoff A, Wang GJ, Scherr DS.
BJU Int 2010; 105: 520-7.
Critical analysis of complications after robotic-assisted radical cystectomy with identification of preoperative and operative risk factors.
Department of Urology, Weill Cornell Medical Center, New York, NY, USA.
OBJECTIVE: To better characterize short- and long-term complications in patients after robotic-assisted radical cystectomy (RRC) using standardized complications-reporting systems, and to identify preoperative and operative risk factors predicting their occurrence.
PATIENTS AND METHODS: Data were collected for 79 consecutive patients with bladder cancer undergoing RRC with extracorporeal urinary diversion by one surgeon at our institution. Complications occurring < or =90 days after RRC were graded according to two standardized reporting methods (Memorial Sloan Kettering Cancer Center and Modified Clavien), and additionally stratified by organ system. Nineteen preoperative and operative variables were tested by univariate analysis for association with the occurrence of one or more postoperative complications. Variables with a significant ($P < 0.05$) or near-significant ($P < 0.20$) association on univariate analysis were included in multivariate analysis to identify independent risk factors.
RESULTS: Patients were of relatively poor health, with 58% having an American Society of Anesthesiology class or Charlson Index score of > or =3. Advanced bladder disease was frequent (41% had pT3/pT4). After RRC, one or more complications occurred within 90 days of surgery for 39/79 (49%) patients. The vast majority of complications were low grade (79%), and mostly infectious (41%) or gastrointestinal (27%). Sixteen high-grade complications occurred in 13/79 (16%) patients. Urinary obstruction, abscess, enteric fistula, gastrointestinal bleeding and thromboembolism constituted most of the high-grade complications, nearly half (seven of 16) of which occurred 31-90 days after RRC. On multivariate analysis, only preoperative renal insufficiency and intraoperative intravenous (i.v.) fluids of >5000 mL were significantly associated with postoperative complications of any grade, with respective odds ratios (ORs) of 4.2 and 4.1. For high-grade complications, significant independent risk factors included an age of > or = 65 years, operative blood loss of > or =500 mL and intraoperative i.v. fluids of >5000 mL, with respective ORs of 12.7, 9.7 and 42.1.
CONCLUSION: Even among relatively sick patients with frequent advanced disease, the vast majority of complications after RRC are low grade. High-grade complications are infrequent and similar in nature to high-grade events after open RC, and a notable proportion may occur at >30 days after RRC underscoring the importance of longer reporting intervals. The surgeon's ability to limit blood loss and i.v. fluids during RRC may provide effective risk reduction, particularly for high-grade events.

Atallah MM, Othman MM.
Middle East J Anesthesiol 2009; 20: 257-63.
Robotic laparoscopic radical cystectomy inhalational versus total intravenous anesthesia: a pilot study.
Urology and Nephrology Center, University of Mansoura, Mansoura, Egypt.

BACKGROUND: Robotic assistance may refine laparoscopic radical cystectomy. Steep Trendelenburg tilt (TT) and pneumoperitoneum (PP) are challenging anesthesia maneuvers. In view of those maneuvers, would inhalational anesthesia or total intravenous anesthesia (TIVA) be the more appropriate anesthetic management for this kind of surgery? This issue is under consideration in this clinical trial.
METHODS: 15 patients scheduled for robotic laparoscopic radical cystectomy (RLRC) were randomly allocated into two groups to be anesthetized by either isoflurane anesthesia (ISO n = 8) or ketamine-midazolam-fentanyl total intravenous anesthesia (TIVA n = 7). The hemo-respiratory dynamics, oxygenation and biochemical variables were monitored taking into consideration the system organ function as primary outcomes, and operative conditions and recovery profile as secondary outcomes.
RESULTS: The PP and TT increased the mean arterial and airway pressures and decreased lung compliance, and were associated with respiratory acidemia, while changes in heart rate remained within normal range. The duration of PP was shorter in TIVA patients but mean arterial pressure was higher than ISO group. ISO was associated with increased plasma concentrations ofprothrombin, fibrinogen and aspartate aminotransferase.
CONCLUSIONS: Though the number of patients is small in this study (n = 15), it nevertheless brings to light the advantages of TIVA during the robotic laparoscopic radical cystectomy (RLRC), by shortening the duration of PP without an increase in prothrombin and fibrinogen concentrations. A lager number of clinical trial are needed to further clarify this issue.

Ng CK, Kauffman EC, Lee MM, Otto BJ, Portnoff A, Ehrlich JR, Schwartz MJ, Wang GJ, Scherr DS.
Eur Urol 2010; 57: 274-81.
A comparison of postoperative complications in open versus robotic cystectomy.
Weill Cornell Medical College, Department of Urology, New York, NY, USA.
BACKGROUND: Robotic cystectomy is an emerging alternative for treatment of invasive bladder cancer (BCa). However, reduction in postoperative morbidity relative to the open approach has not been demonstrated.
OBJECTIVE: To compare complication rates in patients undergoing robotic versus open radical cystectomy (RC).
DESIGN, SETTING, AND PARTICIPANTS: A prospective cohort study of 187 consecutive patients undergoing RC at our institution-104 open RC, 83 robotic RC.
INTERVENTION: Open or robotic RC with urinary diversion.
MEASUREMENTS: Demographic, perioperative, and complication data were recorded prospectively. Thirty-day and 90-d complication rates were assessed using the modified Clavien complication scale. Data were evaluated using chi(2) and multivariate logistic regression analyses.
RESULTS AND LIMITATIONS: At 30 d, the open group demonstrated a higher overall complication rate (59% vs 41%; p=0.04) as well as more major complications (30% vs 10%; p=0.007). At 90 d, the overall complication rate was greater in the open group, but this was not statistically significant (62% vs 48%; p=0.07). However, there was a significantly higher major complication rate in the open cohort (31% vs 17%; p=0.03). When subjected to logistic regression analysis, robotic cystectomy was an independent predictor of fewer overall and major complications at 30 and 90 d. High American Society of Anesthesiologists (ASA) score (3-4) and longer surgical time were independent predictors of major complications. Though this is one of the largest published RC series, the sample size is relatively small. Moreover, despite the two patient cohorts being similarly matched, the study was not performed in a randomized fashion.

CONCLUSIONS: Patients undergoing robotic cystectomy experienced fewer postoperative complications than those undergoing open cystectomy. Robotic cystectomy is an independent predictor of fewer overall and major complications. Until long-term oncologic results are available, robotic cystectomy should still be considered investigational.

Lee DJ, Rothberg MB, McKiernan JM, Benson MC, Badani KK.
Can J Urol 2009; 16: 4664-9.
Robot-assisted radical cystoprostatectomy in complex surgical patients: single institution report.
Department of Urology, Columbia University Medical Center, New York, NY 10032, USA.
OBJECTIVE: To evaluate the safety and feasibility of robotic-assisted radical cystoprostatectomy (RRCP) in a salvage setting for patients with a history of radiation and chemotherapy treatment, complex pelvic anatomy, and significant comorbidities.
MATERIALS AND METHODS: Over a 5 month period, six patients who met these criteria underwent RRCP for urothelial carcinoma. Two of the patients had major cardiovascular disease and were previously denied an open procedure subsequently underwent chemotherapy with external beam radiation protocol. One patient had brachytherapy for prior prostate cancer, and three additional patients had neoadjuvant chemotherapy with large diverticula, measuring up to 12 cm in size. Data was collected on patient demographics, comorbidities, intraoperative parameters, and postoperative outcomes.
RESULTS: The mean age was 70.4 years (range 53-84 years) with an average BMI of 25.8 (23.33-28.37). All patients were male. All six RRCPs were completed without intraoperative complications or open conversion. The estimated blood loss was 296 cc (150 cc-500 cc). Four patients had pathologic pT3a disease, one patient had pT4a, and one patient had pT1 urethral squamous cell carcinoma. Four of the patients had positive nodes. All six patients had negative surgical margins. The patients were discharged within a mean of 12 days (range 7-28 days).
CONCLUSIONS: Robot-assisted radical cystoprostatectomy is a minimally invasive option in men with complex surgical anatomy and multiple comorbidities. Short term follow up indicates good clinical and pathologic outcome and physiologic benefit of minimally invasive surgery. However a larger cohort with long term follow up is needed to assess the oncologic efficacy of RRCP.

Dasgupta P, Rimington P, Murphy D, Challacombe B, Hemal A, Elhage O, Khan MS.
Int J Clin Pract 2008; 62: 1709-14.
Robotic assisted radical cystectomy: short to medium-term oncologic and functional outcomes.
Guy's and St Thomas' NHS Foundation Trust, GKT School of Medicine, Guy's Hospital, London, UK.
PURPOSE: To report short- and medium-term oncological and functional outcomes of the first robotic-assisted laparoscopic radical cystectomy (RARC) series from the UK.
MATERIALS AND METHODS: Thirty patients underwent RARC between 2004 and 2007 at our unit. We report oncological and functional outcomes of this procedure in 20 patients (17 ileal conduit and three Studer Pouches), who have completed at least 6 months of follow up.
RESULTS: There were 17 men and three women, median age 66 years (range 38-77 years). Median operating time was 330 min (range 295-510 min), and median blood loss 150 ml (range 100-1150 ml). There were two major complications (10%); a port site bleed and a rectal injury. The median follow up of this cohort is 23 months (range 7-44 months). One patient died of distant metastases at 8 months, and another developed a right ureteric

tumour at 7 months. None of the patients had local pelvic or port site recurrence. The overall and disease-free survival are 95% and 90% respectively. Functional complications included a neovesico-urethral stricture at 3 months, a left upper ureteric stricture at 6 months and an incisional hernia at 12 months.
CONCLUSION: Robotic-assisted laparoscopic radical cystectomy is an emerging minimally invasive procedure which at short- to medium-term follow up, in our experience, is oncologically and functionally equivalent to open radical cystectomy.

Hemal AK.
Curr Urol Rep 2009; 10: 45-54.
Robotic and laparoscopic radical cystectomy in the management of bladder cancer.
Department of Urology, Director, Robotics and Minimally Invasive Surgery, Baptist Medical Center, Wake Forest University School of Medicine, Winston-Salem, NC 27157, USA.
To review the current status of robot-assisted and laparoscopic radical cystectomy (RARC and LRC) in the management of bladder cancer, published English literature was searched using the National Library of Medicine database. The experience with RARC is rapidly growing, and this minimally invasive option and has relatively better results than LRC. Both techniques allow an appropriate lymph node dissection in the hands of experienced and skilled surgeons at high-volume centers. The early and intermediate oncological outcomes of RARC and LRC compare favorably with open radical cystectomy (ORC). Extracorporeal urinary diversions are performed via a mini-incision in most cases and have better outcome than pure intracorporeal urinary diversions. RARC has taken over LRC at most of the centers where robot is available. The future of RARC with extracorporeal urinary diversion looks optimistic and has potential to supplant ORC, but with greater cost.

Pruthi RS, Smith A, Wallen EM.
J Endourol 2008; 22: 2469-74.
Evaluating the learning curve for robot-assisted laparoscopic radical cystectomy.
Division of Urologic Surgery, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27599, USA.
PURPOSE: We seek to describe the learning curve of robot-assisted laparoscopic radical cystectomy by evaluating some of the surgical, oncologic, and clinical outcomes in our initial experience with 50 consecutive patients undergoing this novel procedure.
PATIENTS AND METHODS: Fifty consecutive patients (representing our initial experience with robot-assisted cystectomy) underwent radical cystectomy and urinary diversion from January 2006 to December 2007. Several different metrics were used to evaluate the learning curve of this procedure, including estimated blood loss (EBL), operative (OR) time, pathologic outcomes, and complication rate. We evaluated patients as a continuous variable, divided into five distinct time periods (quintiles), and stratified by first half and second half of robotic experience.
RESULTS: EBL was not significantly lower until the third quintile (patients 21-30), after which further significant reductions were not observed. Mean OR time declined between each quintile for the first 30 patients (1-10 v 11-20 v 21-30). No significant declines occurred after the third quintile (21-30). When evaluated as a continuous variable, the statistical cut point at which no further significant reductions were observed was after patient 20 for OR time. No differences were observed with regard to time to flatus, bowel movement, or hospital discharge. Furthermore, complications were not different between the initial 25 patients and the most recent patients. There has been no case of a positive

margin, and there was only one inadvertent bladder entry. Lymph node yield has also not significantly changed over time.
CONCLUSIONS: This report helps to define the learning curve associated with robot-assisted laparoscopic radical cystectomy for bladder cancer. Despite the higher OR times and blood loss that is observed early in the learning curve, no such compromises are observed with regard to these oncologic parameters even early in the experience.

Pruthi RS, Stefaniak H, Hubbard JS, Wallen EM.
J Laparoendosc Adv Surg Tech A 2009; 19: 23-7.
Robotic anterior pelvic exenteration for bladder cancer in the female: outcomes and comparisons to their male counterparts.
Division of Urologic Surgery, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA.
BACKGROUND: Recent small case series have now been reported for robotic-assisted laparoscopic radical cystectomy. The majority of these series have reported techniques and outcomes in a predominantly male patient population. The application of such novel techniques to female cystectomy and anterior exenterative procedures has not been well documented and described. In this paper, we report our initial experience with robotic anterior pelvic exenteration in the female with bladder cancer evaluating perioperative and pathologic outcomes of this novel procedure and comparing the outcomes to those observed in their male counterparts.
METHODS: Fifty patients underwent a robotic radical cystectomy and extracorporeal diversion for clinically localized bladder cancer: 40 male patients (robotic radical cystoprostatetctomy) and 10 women (robotic anterior pelvic exenteration). Outcome measures evaluated in this series included operative variables, hospital recovery, pathologic outcomes, and complication rate.
RESULTS: Mean age of female patients was 68.4 years and of male patients was 62.8. Mean operating room time was 4.6 hours, and mean surgical blood loss was 215 mL. On surgical pathology, 5 patients were <=pT2, 3 patients pT3, and 2 patients N+. In no case was there a positive surgical margin, though in 1 case there was inadvertent entry into the bladder. Mean number of lymph nodes removed was 19 (range, 12-34). Mean time to flatus was 1.9 days, time to bowel movement 2.4 days, and time to discharge 4.9 days. These outcomes were comparable to the male patients, particularly the 20 male patients undergoing robotic radical cystoprostatectomy during the same time period.
CONCLUSIONS: In our experience, the robotic anterior exenteration has been readily adapted to the surgical treatment of bladder cancer with similar outcomes to those observed in male patients undergoing a robotic radical cystoprostatectomy. The approach appears to achieve the clinical and oncologic goals of radical cystectomy in both the female and male patient.

Barros R, Frota R, Stein RJ, Turna B, Gill IS, Desai MM.
Int Braz J Urol 2008; 34: 413-21
Simultaneous laparoscopic nephroureterectomy and cystectomy: a preliminary report.
Section of Laparoscopic and Robotic Surgery, Glickman Urological Institute, Cleveland Clinic Foundation, Cleveland, Ohio 44195, USA.
PURPOSE: Patients with muscle-invasive bladder cancer and concomitant upper urinary tract tumors may be candidates for simultaneous cystectomy and nephroureterectomy. Other clinical conditions such as dialysis-dependent end-stage renal disease and non-functioning kidney are also indications for simultaneous removal of the bladder and kidney.

In the present study, we report our laparoscopic experience with simultaneous laparoscopic radical cystectomy (LRC) and nephroureterectomy.
MATERIALS AND METHODS: Between August 2000 and June 2007, 8 patients underwent simultaneous laparoscopic radical nephroureterectomy (LNU) (unilateral-6, bilateral-2) and radical cystectomy at our institution. Demographic data, pathologic features, surgical technique and outcomes were retrospectively analyzed.
RESULTS: The laparoscopic approach was technically successful in all 8 cases (7 males and 1 female) without the need for open conversion. Median total operative time, including LNU, LRC, pelvic lymphadenectomy and urinary diversion, was 9 hours (range 8-12). Median estimated blood loss and hospital stay were 755 mL (range 300-2000) and 7.5 days (range 4-90), respectively. There were no intraoperative complications but only 1 major and 2 minor postoperative complications. The overall and cancer specific survival rates were 37.5% and 87.5% respectively at a median follow-up of 9 months (range 1-45).
CONCLUSIONS: Laparoscopic nephroureterectomy with concomitant cystectomy is technically feasible. Greater number of patients with a longer follow-up is required to confirm our results.

Butt ZM, Perlmutter AE, Piacente PM, Wilding G, Tan W, Kim HL, Mohler JL, Guru KA.
JSLS 2008; 12: 241-5.
Impact of body mass index on robot-assisted radical cystectomy.
Department of Urologic Oncology, Roswell Park Cancer Institute, Buffalo, New York, USA.
BACKGROUND AND OBJECTIVES: Obesity is a major comorbidity in the Western world and influences outcomes of patient care. A minimally invasive approach towards radical cystectomy has been increasing in popularity. We sought to determine the influence of body mass index (BMI) on robot-assisted radical cystectomy.
METHODS: Fifty-one consecutive patients underwent robot-assisted radical cystectomy for bladder cancer from October 2005 to April 2007 and were categorized into 3 groups based on their weight: normal (BMI <25), overweight (BMI=25 to 29) and obese (BMI= 30 to 39.9). Effect of BMI on intraoperative, pathologic, and postoperative outcomes was assessed by retrospective review of the robot-assisted radical cystectomy database.
RESULTS: Mean BMI was 28.0, and 71% of the patients were overweight or obese. BMI did not correlate with age, sex, or American Society of Anesthesiologists (ASA) score. Overweight and obese patients had similar operative times and estimated blood loss compared with patients with normal BMI. Overweight and obese patients with bulky disease (pT3-4) had significantly higher rates of positive surgical margins (P=0.05). Complication rates were similar.
CONCLUSION: Robotic-assisted radical cystectomy can be considered for patients of all body mass indices. Wider excision should be performed in patients with higher BMI.

Khan MS, Shah SS, Hemel A, Rimington P, Dasgupta P.
Int J Med Robot 2008; 4: 197-201.
Robotic-assisted radical cystectomy.
Department of Urology, King's College School of Medicine, Guy's & Thomas' NHS Foundation Trust, London, UK.
OBJECTIVE: To evaluate the emerging role of robotic-assisted radical cystectomy (RARC) in the management of bladder cancer.
METHODS: Review of the published literature on robotic-assisted radical cystectomy, including data from our cystectomy series of 30 patients.
RESULTS: Nearly 150 procedures have been performed worldwide. The benefits of robotic-assisted operations are similar to those of laparoscopically-performed procedures.

RARC appears to be technically safe, oncologically and functionally equivalent to open (ORC) and laparoscopic radical cystectomy (LRC). However, RARC offers superior ergonomics and better vision. These benefits come at extra initial capital expenditure and subsequent higher maintenance costs.
CONCLUSION: With the rapid spread of robotics, it is likely that RARC will become the standard of care in units with access to the technology.

Pruthi RS, Stefaniak H, Hubbard JS, Wallen EM.
J Endourol 2008; 22: 2397-402
Robot-assisted laparoscopic anterior pelvic exenteration for bladder cancer in the female patient.
Division of Urologic Surgery, The University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA.
INTRODUCTION: Recent small case series have now been reported for robotic-assisted laparoscopic radical cystectomy. Herein, we describe our approach and initial experience with robotic-assisted laparoscopic anterior pelvic exenteration in the female patient with bladder cancer.
METHODS: We describe the technique of robotic-assisted laparoscopic anterior pelvic exenteration. The classic da Vinci or the da Vinci S robotic platform is utilized for the procedure. In our experience, 12 women underwent robotic-assisted laparoscopic anterior pelvic exenteration and extracorporeal urinary diversion for clinically localized bladder cancer.
RESULTS: Mean age was 67.9 years (range 61-79 years). Nine patients underwent ileal conduit diversion and three patients underwent an orthotopic neobladder. In all cases, the urinary diversion was performed extracorporeally. Mean operating room time was 4.6 h; mean surgical blood loss was 221 mL. On surgical pathology, seven patients were =pT2, three patients were pT3, and two patients were N+. In no case was there positive surgical margins, and in one case there was inadvertent entry into the bladder. Mean number of lymph nodes removed was 19 (range 12-34). Mean time to flatus was 1.9 days and to bowel movement 2.4 days, and time to discharge 4.8 days. Six patients were discharged on postoperative day 4, four patients on postoperative day 5, one on postoperative day 6, and one on postoperative day 8. There were two postoperative complications (17%) in two patients.
CONCLUSIONS: Our initial experience with robotic-assisted laparoscopic anterior pelvic exenteration appears to be favorable with acceptable operative, pathologic, and short-term clinical outcomes. Certainly, larger experiences are required to adequately evaluate and validate this procedure as an appropriate surgical and oncologic option.

Pruthi RS, Wallen EM.
Urology 2008; 72: 617-20
Is robotic radical cystectomy an appropriate treatment for bladder cancer? Short-term oncologic and clinical follow-up in 50 consecutive patients.
Division of Urologic Surgery, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA.
OBJECTIVES: Recent case series have now been reported for robotic cystectomy. Despite the novelty of these approaches, few reports have been published on the oncologic and clinical outcomes, even in the short term. We report the oncologic and short-term clinical outcomes of 50 patients who underwent robotic-assisted radical cystectomy.
METHODS: A total of 50 patients underwent robotic-assisted laparoscopic radical

cystectomy and extracorporeal urinary diversion for bladder cancer. The outcome measures included the pathologic outcomes, complication rate, timing of adjuvant chemotherapy, disease recurrence, and overall and disease-specific survival.
RESULTS: Robotic cystectomy was performed in 40 men and 10 women at a mean age of 63.6 years. Of the 50 patients, 66% had Stage pT2 or less, 14% had pT3 disease, and 20% Stage N+ disease. No patient had positive surgical margins. The mean number of lymph nodes removed was 19 (range 8-37). The mean clinical follow-up was 13.2 months. Seven patients had evidence of recurrent disease. Three patients died of advanced urothelial carcinoma, and two died of other causes. Longer term complications included stomal hernia in 2 and partial ureteral obstruction in 1. Eleven patients underwent adjuvant chemotherapy for Stage pT3 disease and N+ disease at a mean of 7.2 weeks postoperatively.
CONCLUSIONS: The clinical and oncologic follow-up of patients undergoing robotic radical cystectomy appears to be favorable in the short term. As our follow-up increases, we should expect to continue to truly define the long-term clinical appropriateness and oncologic success of this procedure.

Woods M, Thomas R, Davis R, Andrews PE, Ferrigni RG, Cheng J, Castle EP.
J Endourol 2008; 22: 1297-302.
Robot-assisted extended pelvic lymphadenectomy.
Department of Urology, Tulane University Medical Center, New Orleans, Louisiana, USA.
PURPOSE: To evaluate perioperative and pathologic outcomes of patients undergoing robot-assisted extended pelvic lymphadenectomy for bladder cancer.
MATERIALS AND METHODS: A retrospective chart review was performed for all 27 patients who underwent robotassisted radical cystectomy (RARC) and extended pelvic lymphadenectomy at Tulane University and Mayo Clinic Arizona between March 2005 and April 2007. Baseline demographic, perioperative, and pathologic data were evaluated. The bifurcation of the aorta was the proximal border of dissection in all patients.
RESULTS: There was a total of 27 patients, and all procedures were completed laparoscopically; all urinary diversions were constructed extracorporeally in RARC patients. The mean total operative time was 400 minutes, and mean blood loss was 277 mL. All patients had transitional-cell carcinoma in the bladder cancer group. The mean total lymph node count for the RARC group was 12.3 (range 7-20). There were no intraoperative complications, and 9 (33%) patients experienced postoperative complications.
CONCLUSIONS: An extended pelvic lymphadenectomy can be reliably and safely performed robotically during RARC in the management of bladder cancer. The robotic system aids in performing a meticulous dissection and in adhering to sound oncologic principles.

Yuh B, Padalino J, Butt ZM, Tan W, Wilding GE, Kim HL, Mohler JL, Guru KA.
BJU Int 2008; 102: 840-3.
Impact of tumour volume on surgical and pathological outcomes after robot-assisted radical cystectomy.
Department of Urology, State University of New York at Buffalo, Buffalo, New York, USA.
OBJECTIVE: To report on the influence that bladder tumour volume has on operative and pathological outcomes after robotic-assisted radical cystectomy (RARC, a minimally invasive alternative to open cystectomy for treating bladder cancer), as with the lack of tactile feedback in RARC tumour volume might compromise the outcome.
PATIENTS AND METHODS: Between 2005 and 2007, 54 consecutive patients had RARC

at one institution. CT urograms were obtained in all patients for staging purposes and to evaluate hydronephrosis. Patients were separated into two groups based on pathological tumour dimensions. Once selected into two-dimensional (2D, flat) or 3D (bulky) tumour groups the patients were compared for operative and pathological variables.
RESULTS: The mean age of all patients was 67 years; 19 had tumours classified as 2D and 35 as 3D. There were no statistical differences in age, sex, body mass index, American Society of Anesthesiologists score, previous surgery, mean hospital stay, or estimated blood loss between the groups. The difference in operative duration for bladder removal was almost statistically significant (P = 0.077). Intraoperative transfusion was more common in the 3D group (P = 0.044); 43% of patients in the 3D group had hydronephrosis, vs only 16% in the 2D group. 3D tumours were more likely to be higher stage (P = 0.051). All positive margins in the patient were in the 3D group (P = 0.04); no patients with < or =T2 disease had a positive surgical margin.
CONCLUSIONS: Bulky tumours removed with RARC might be associated with an increased rate of intraoperative transfusion, higher stage disease, and higher rate of margin positivity. In patients with large-volume tumours on preoperative assessment, wider dissection of perivesical tissue might decrease the margin-positive rates.

Murphy DG, Challacombe BJ, Elhage O, O'Brien TS, Rimington P, Khan MS, Dasgupta P.
Eur Urol 2008; 54: 570-80.

Robotic-assisted laparoscopic radical cystectomy with extracorporeal urinary diversion: initial experience.

Department of Urology, Guy's & St Thomas' NHS Foundation Trust, London, UK.

BACKGROUND: The use of robotic technology for laparoscopic prostatectomy is now well established. The same cannot yet be said of robotic-assisted laparoscopic radical cystectomy (RARC), which is performed in just a few centres worldwide.
OBJECTIVE: We present our technique and experience of this procedure using the da Vinci surgical system.
DESIGN, SETTING, AND PARTICIPANTS: From 2004 to 2007, 23 patients underwent RARC and urinary diversion at our institution.
SURGICAL PROCEDURE: We report the development of our technique for RARC, which involves posterior dissection, lateral pedicle control, anterior dissection, and lymphadenectomy prior to either ileal conduit urinary diversion or Studer pouch reconstruction performed extracorporeally.
MEASUREMENTS: Demographic and perioperative data were recorded prospectively. Oncologic and functional outcomes were assessed at 3- to 6-mo intervals.
RESULTS AND LIMITATIONS: To date, 23 patients have undergone this procedure at our institution. Of those, 19 had ileal loop urinary diversion and 4 were suitable for Studer pouch reconstruction. Mean total operative time plus or minus (+/-) standard deviation (SD) was 397+/-83.8min. Mean blood loss +/-SD was 278+/-229ml with one patient requiring a blood transfusion. Surgical margins were clear in all patients with a median +/-SD of 16+/-8.9 lymph nodes retrieved. The complication rate was 26%. At a mean follow-up +/-SD of 17+/-13 (range 4-40) mo, one patient had died of metastatic disease and one other is alive with metastases. The remaining 21 patients are alive without recurrence.
CONCLUSIONS: RARC remains a procedure in evolution in the small number of centres carrying out this type of surgery. Our initial experience confirms that it is feasible with acceptable morbidity and good short-term oncologic results.

Haber GP, Crouzet S, Gill IS.
Eur Urol 2008; 54: 54-62.

Laparoscopic and robotic assisted radical cystectomy for bladder cancer: a critical analysis.

Department of Laparoscopic and Robotic Surgery, Glickman Urological and Kidney Institute, The Cleveland Clinic Foundation, Cleveland, Ohio, USA.

CONTEXT AND OBJECTIVES: Interest in laparoscopic assisted radical cystectomy (LRC) and robotic assisted radical cystectomy (RRC) is increasing at select centers worldwide. In this update we present the recent worldwide experience and critically evaluate the role of minimally invasive radical surgery for patients with bladder cancer.

EVIDENCE ACQUISITION: English-language literature between 1992 and 2007 was reviewed using the National Library of Medicine database and the following key words: laparoscopic, laparoscopic-assisted, robotic, robotic-assisted, and radical cystectomy. Over 102 papers were identified, 48 of which were selected for this review on the basis of their contribution to advancing the field with regard to three criteria: (1) evolution of concepts, (2) development and refinement of techniques, and (3) intermediate- and long-term clinical outcomes. These were evaluated with respect to current techniques and perioperative, functional, and oncological outcomes. Our initial experience is also reported.

EVIDENCE SYNTHESIS: Minimally invasive techniques can adequately achieve the extirpative aspects of LRC and extended template lymphadenectomy. At most institutions the reconstructive urinary diversion is now typically being performed extracorporeally through a minilaparotomy. Perioperative data indicate that minimally invasive techniques are associated with reduced blood loss, slightly increased operating time, and shorter hospital stay without any significant difference in postoperative complications compared with open surgery. Intermediate-term oncological outcomes appear to be comparable with the open approach. Worldwide experience continues to increase; >700 surgeries have already been performed.

CONCLUSION: LRC or RRC with extracorporeally constructed urinary diversion is a safe and effective operation for appropriate patients with bladder cancer. Perioperative and functional outcomes are comparable with open surgery. More focus on extended lymphadenectomy is necessary to routinely achieve higher node yields. Surrogate and intermediate oncological outcomes are encouraging, and long-term assessment is ongoing.

Guru KA, Wilding GE, Piacente P, Thompson J, Deng W, Kim HL, Mohler J, O'Leary K. Can J Urol 2007; 14: 3753-6.

Robot-assisted radical cystectomy versus open radical cystectomy: assessment of postoperative pain.

Department of Urologic Oncology, Roswell Park Cancer Institute, Buffalo, New York, USA.

INTRODUCTION: To date, no study has compared postoperative pain and requirement for pain medications in open versus robot-assisted radical cystectomy. Patient reported pain and opiate use were reviewed retrospectively using prospectively collected data from postoperative day one to day of discharge.

MATERIALS AND METHODS: Twenty consecutive robot-assisted radical cystectomy patients were compared to the prior 20 patients who underwent open radical cystectomy. Data was collected prospectively to determine opiate requirements and pain scores in each group. Daily opiate use was converted to morphine sulfate equivalents (MSE) to facilitate comparison. A Likert pain perception scale was used to assess perceived pain. Statistical models were used to test for differences in opiate usage and pain perception between groups of patients who underwent open versus robot-assisted surgery.

RESULTS: Seven patients were excluded from the study (three from the open group, and four from the robotic group): five due to preoperative opiate usage, one due to missing pain data, and one whose procedure was aborted due to unresectable

disease. All patients were similar with respect to age, body mass index and pathological parameters. Average MSE usage differed significantly between the two groups on all postoperative days ($p < 0.007$) whereas average pain scores were similar in the two groups.
CONCLUSION: Patients who underwent robot-assisted radical cystectomy achieved similar pain control but required less opiates than those who underwent open radical cystectomy.

Wang GJ, Barocas DA, Raman JD, Scherr DS.
BJU Int 2008; 101: 89-93.
Robotic vs open radical cystectomy: prospective comparison of perioperative outcomes and pathological measures of early oncological efficacy.
Department of Urology, New York-Presbyterian Hospital, Weill Medical College of Cornell University, New York, USA.
OBJECTIVE: To prospectively compare perioperative and pathological outcomes in a consecutive series of patients undergoing radical cystectomy (RC) and urinary diversion by the open or the robotic approach.
PATIENTS AND METHODS: From February 2006 to April 2007, 54 consecutive patients underwent RC by one surgeon at our institution. Twenty-one were open, while 33 utilized the da Vinci robotic system (Intuitive Surgical, Sunnyvale, CA, USA). Data was collected prospectively, including patient demographics, operative and postoperative variables, and pathological outcomes.
RESULTS: The robotic cohort had decreased blood loss (400 vs 750 mL, P = 0.002) and transfusion requirement (2.0 vs 0.5 units, P = 0.007), but increased operative duration (390 vs 300 min, P = 0.03). The time to resumption of a regular diet (4 vs 5 days, P = 0.002) and the hospital stay (5 vs 8 days, P = 0.007) were decreased in the robotic group. Overall the complication rates were similar (24% open, 21% robotic, P = 0.3). The open cohort had more patients with extravesical disease (57 vs 28%, P = 0.03) and nodal metastasis (34 vs 19%, P = 0.04). There were three patients in the open group and two in the robotic with positive margins (P = 0.2). The median number of lymph nodes removed was similar in the open and robotic cohorts (20 vs 17, P = 0.6).
CONCLUSION: Robotic-assisted RC appears to offer some operative and perioperative benefits compared with the open approach without compromising pathological measures of early oncological efficacy, such as lymph node yield and margin status. Larger, randomized studies with long-term follow-up are required to confirm these findings and establish oncological equivalence.

Pruthi RS, Wallen EM.
J Urol 2007; 178: 814-8.
Robotic assisted laparoscopic radical cystoprostatectomy: operative and pathological outcomes.
Division of Urologic Surgery, University of North Carolina at Chapel Hill, North Carolina, USA.
PURPOSE: Recent small case series have now been reported for robotic assisted laparoscopic radical cystoprostatectomy. We report our initial experience with robotic assisted laparoscopic radical cystoprostatectomy, evaluating the perioperative and pathological outcomes of this novel procedure.
MATERIALS AND METHODS: A total of 20 men underwent robotic assisted laparoscopic radical cystoprostatectomy and extracorporeal urinary diversion for clinically localized bladder cancer. Outcome measures evaluated in this series were operative variables,

hospital recovery, pathological outcomes and complication rate. Comparisons were made to 24 gender matched men who underwent an open procedure during the same period. RESULTS: Mean patient age was 62.3 years (range 54 to 76). Ten patients underwent ileal conduit diversion and 10 received an orthotopic neobladder. In all cases urinary diversion was performed extracorporeally. Mean operative time for robotic cases was 6.1 hours, including 5.2 hours in the most recent 10 cases. This was longer than in patients undergoing an open procedure (3.8 hours). Mean surgical blood loss was 313 ml, which was significantly less than in those undergoing open cystectomy (588 ml). On surgical pathology 14 cases were pT2 or less, 4 were pT3 and 2 were N+. In no case was there inadvertent entry into the bladder or positive surgical margins. A mean of 19 lymph nodes was removed. Mean time to flatus was 2.1 days and mean time to bowel movement was 2.8 days, which was significantly shorter than in men undergoing an open procedure. Of the patients 16, 3 and 1 were discharged home on postoperative days 4, 5 and 8, respectively. There were a total of 6 postoperative complications (30%) in 5 patients. CONCLUSIONS: Our initial experience with robotic assisted laparoscopic radical cystoprostatectomy appears to be favorable with acceptable operative, pathological and short-term clinical outcomes. As our experience increases, we expect to continue to refine our surgical technique and decrease operative time.

Turna B, Aron M, Haber GP, Gill IS, Kaouk JH.
Arch Esp Urol 2007; 60: 439-48.
Robotic radical cystectomy.
Section of Laparoscopic and Robotic Surgery, Glickman Urological Institute, Cleveland Clinic Foundation, Cleveland, USA.
OBJECTIVES: The last decade has seen tremendous growth of surgical robotics. Popularized for radical prostatectomy, robotic techniques are now increasingly being applied to radical cystectomy. Herein, we review the development and current status of robotic radical cystectomy (RRC) in contemporary urological practice.
METHODS: Between 1995 and 2007 published literature was reviewed using the National Library of Medicine database and the following key words: robotic, robot-assisted, laparoscopic and cystectomy Since the first report in 2003, nine published original reports were identified. These were evaluated with regards to the technique, advantages and disadvantages, perioperative and oncological outcomes. Our initial experience, as yet unpublished, is also described.
RESULTS: At this writing, all published papers on RRC are based on small number of patients with short-term follow-up. Nevertheless, they have demonstrated the technical feasibility of RRC with encouraging perioperative outcomes. Compared to open radical cystectomy (ORC), RRC appears to be associated with decreased blood loss, hospital stay and analgesic requirement. These advantages are also found with laparoscopic radical cystectomy (LRC) and are a function of the minimally invasive approach. The operating time is longer, markedly so when the bowel work is performed intracorporeally. CONCLUSIONS: RRC is in evolution. Technical feasibility has been demonstrated. Initial perioperative outcomes are encouraging. Oncological outcomes are awaited to identify the role of RRC in the management of bladder cancer. Multi-center prospective randomized trials comparing ORC with RRC and LRC are necessary.

Keim JL, Theodorescu D.
ScientificWorldJournal 2006; 6: 2560-5.
Robot-assisted radical cystectomy in the management of bladder cancer.
Paul Mellon Prostate Cancer Institute and Department of Urology, University of Virginia

Health Sciences Center, Charlottesville, USA.
The application of robotic technology to laparoscopic surgery has the potential to revolutionize the entire field of urology. The use of robotic-assisted radical cystectomy has been demonstrated in the literature only within the past 3 years, as much of the reconstruction and urinary diversion techniques associated with radical cystectomy are considered more technically challenging than other procedures. Here we review the available literature pertaining to this procedure, which consists of a limited number of case reports, case series, and pilot or feasibility studies. While theses results seem to point towards less blood loss, lower transfusion rates, and shorter hospital stays compared to open radical cystectomy, definitive conclusions and recommendations cannot yet be made because of a lack of larger and/or prospective studies or randomized trials.

Kaul SA, Menon M.
Minerva Urol Nefrol 2007; 59: 149-57.
Da Vinci assisted cystoprostatectomy and urinary diversion: a paradigm shift in surgical management of bladder cancer.
Vattikuti Urology Institute, Henry Ford Health System, Detroit, USA.
Radical cystoprostatectomy remains the gold standard treatment for muscle invasive bladder cancer. Use of minimally invasive approaches have gained prominence aided by surgical adjuncts such as harmonic scalpel and laparoscopic bowel staplers, however laparoscopic radical cystoprostatectomy remains extremely technically challenging even for experienced laparoscopic surgeons. Following the successful application of the da Vinci robotic surgical system for radical prostatectomy, attention has now turned to the use of robot assistance for laparoscopic cystoprostatectomy. Several centers have explored the feasibility of robotic cystoprostatectomy although long-term data is lacking. Controversy exists on the oncologic efficacy and safety, need for intracorporeal diversion and standardization of technique. This article details the history, technique, results and current status of robotic cystoprostatectomy and urinary diversion.

Pruthi RS, Wallen EM.
Eur Urol 2008; 53: 310-22.
Robotic-assisted laparoscopic radical cystoprostatectomy.
Division of Urologic Surgery, University of North Carolina at Chapel Hill, Chapel Hill, USA.
OBJECTIVES: Recent small case series have been reported for robotic-assisted laparoscopic radical cystoprostatectomy. The present literature includes 34 patients who have undergone robotic-assisted cystectomy procedures. We report our initial experience with robotic-assisted laparoscopic radical cystoprostatectomy, describing stepwise the surgical procedure and evaluating perioperative and pathologic outcomes of this novel procedure.
METHODS: Twenty men underwent robotic-assisted laparoscopic radical cystoprostatectomy and extracorporeal urinary diversion for clinically localized bladder cancer. The stepwise operative procedure is described in detail. Outcome measures evaluated included operative variables, hospital recovery, pathologic outcomes, and complication rate. Comparisons were made to these gender-matched 24 men who underwent an open procedure during this same period.
RESULTS: Mean age was 62.3 yr (range: 54-76 yr). Ten patients underwent ileal conduit diversion and 10 patients underwent an orthotopic neobladder. In all cases the urinary diversion was performed extracorporeally. Mean operating room time of all patients was 6.1h (most recent 10 cases, 5.2h). Mean surgical blood loss was 313 ml. On surgical pathology, 14 patients were < or =pT2, 4 patients pT3, and 2 patients N+. In no case was

there inadvertent entry into the bladder or positive surgical margins. Mean number of lymph nodes removed was 19 (range:6-29). Mean time to flatus was 2.1 d and bowel movement 2.8 d. Sixteen patients were discharged on postoperative day (POD) 4, three patients on POD 5, and one on POD 8. There were six postoperative complications (30%) in five patients.
CONCLUSIONS: Our initial experience with robotic-assisted laparoscopic radical cystoprostatectomy appears to be favorable with acceptable operative, pathologic, and short-term clinical outcomes. As our experience increases, we should expect to continue to refine our surgical technique and reduce operating room times. Larger experiences are required to adequately evaluate and validate this procedure as an appropriate surgical and oncologic option for the bladder cancer patient.

Galich A, Sterrett S, Nazemi T, Pohlman G, Smith L, Balaji KC.
JSLS 2006; 10: 145-50.
Comparative analysis of early perioperative outcomes following radical cystectomy by either the robotic or open method.
Division of Urological Surgery, Department of Surgery, University of Nebraska Medical Center, Omaha, Nebraska, USA.
OBJECTIVE: We analyzed early perioperative outcomes following radical cystectomy by the robotic method compared with the conventional open method.
METHODS: All relevant clinical information was entered in a Microsoft Access Database and queried. $P < 0.05$ were considered statistically significant.
RESULTS: The study cohort comprised 37 consecutive patients undergoing radical cystectomy; 24 (64.9%) cases were performed by the conventional open method and 13 (29.7%) by the robotic method. Body mass index, age, sex, blood transfusion rate, and median decrease in hemoglobin were comparable between the 2 groups. The robotic method resulted in significantly lower median estimated blood loss, shorter hospital stay, and longer operating time compared with the open group ($P < 0.05$). Four (16.7%) perioperative complications occurred in the open group compared with 2 (15.4%) in the robotic group ($P = 1.0$). The incidence of organ-confined (< or =T2N0Mx) disease was 9 (37.5%) and 7 (53.8%) in the open and robotic groups, respectively ($P = 0.49$).
CONCLUSIONS: Radical cystectomy by the robotic method produces early perioperative results comparable to those of the open method. Although intraoperative estimated blood loss and hospital stay were significantly lower in the robotic group, operative time was longer which likely reflects our early operative experience with radical cystectomy by the robotic method.

Rhee JJ, Lebeau S, Smolkin M, Theodorescu D.
BJU Int 2006; 98: 1059-63.
Radical cystectomy with ileal conduit diversion: early prospective evaluation of the impact of robotic assistance.
Department of Urology, University of Virginia, Charlottesville, USA.
OBJECTIVE: To compare the performance of radical cystectomy with ileal conduit diversion by standard methods with that using the assistance of the daVinci robotic system (Intuitive Surgical, Sunnyvale, CA, USA).
PATIENTS AND METHODS: From November 2003 to August 2005, we performed 30 radical cystectomies with ileal conduit urinary diversions on patients with bladder cancer. Seven patients (one woman) had a cystectomy with the daVinci system and 23 (nine women) had a standard cystectomy. Data were collected prospectively, including estimated blood loss (EBL), transfusion requirement, operative duration, hospital stay and

body mass index (BMI), and compared.
RESULTS: The mean EBL and transfusion requirements for standard and daVinci-assisted cases was 1109 and 479 mL (P = 0.002) and 2.7 and 1.6 units (P =0.14), respectively. Four of seven patients received a transfusion in the robotic group, and 20 of 23 in the standard group (P = 0.084). The mean operative duration was 638 and 507 min (P = 0.005) for the daVinci and standard group, respectively, with respective mean hospital stays of 11 and 13 days (P = 0.52). There was no difference in patient BMI between the groups (P = 0.22).
CONCLUSION: The daVinci-assisted cystectomy appears to offer some advantages over standard cystectomy. Larger randomized studies are needed to confirm these findings.

Overstreet DL, Sims TW.
Urol Nurs 2006; 26: 117-22.
Care of the patient undergoing radical cystectomy with a robotic approach.
The University of Virginia, Charlottesville, USA.
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.

Miller NL, Theodorescu D.
World J Urol 2006; 24: 180-7.
Status of robotic cystectomy in 2005.
Department of Urology, Methodist Hospital Institute for Kidney Stone Disease and Indiana University School of Medicine, Indianapolis, USA.
Minimally invasive approaches have been shown to offer considerable benefits to patients in the treatment of urologic malignancies. While open radical cystectomy remains the gold standard for the treatment of muscle invasive bladder cancer, the continued refinement of laparoscopic techniques and the success of robotic assistance in radical prostatectomy have led to great interest in minimally invasive approaches to radical cystectomy. We review the current experience with laparoscopic and robotic radical cystectomy and its role in the treatment of muscle invasive bladder cancer.

Shah NL, Hemal AK, Menon M.
Curr Urol Rep 2005; 6: 122-5.
Robot-assisted radical cystectomy and urinary diversion.
Vattikuti Urology Institute, Henry Ford Health Systems, Detroit, USA.
Radical cystectomy remains the standard for muscle-invasive, organ-confined urothelial carcinoma of the bladder. With the emergence of minimally invasive approaches for the treatment of urologic cancers, technologic advances using laparoscopy have led to the development of robotic assistance to increase the feasibility of performing this formidable operation. In this article, we describe the procedure of robotic-assisted laparoscopic radical cystectomy with urinary diversion and review the pertinent literature.

Hemal AK, Abol-Enein H, Tewari A, Shrivastava A, Shoma AM, Ghoneim MA, Menon M.
Urol Clin North Am 2004; 31: 719-29

Robotic radical cystectomy and urinary diversion in the management of bladder cancer.

Vattikuti Urology Institute, Henry Ford Hospital, Detroit, USA.

The authors have explored the versatility of the da Vinci robot for pelvic surgery to develop the technique of robotic radical cystectomy in conjunction with the Urology and Nephrology Center in Mansoura, Egypt, a world leader in conventional (open) cystectomy. This approach, which is designed to minimize the time required for surgery, is a sandwich technique in which the cystectomy and the neobladder-urethral anastomosis are performed with robotic assistance and the urinary diversion is performed extracorporeally. This article reviews the published literature and details the authors' current technique of robotic radical cystectomy and urinary diversion.

Menon M, Hemal AK, Tewari A, Shrivastava A, Shoma AM, Abol-Ein H, Ghoneim MA.
J Am Coll Surg 2004; 198: 386-93.

Robot-assisted radical cystectomy and urinary diversion in female patients: technique with preservation of the uterus and vagina.

Vattikuti Urology Institute, Detroit, USA.

BACKGROUND: After performing more than 500 robotic radical prostatectomy and robotic radical cystoprostatectomy in men, we attempted to develop the technique of robot-assisted radical cystectomy in women. This article describes two techniques of robot-assisted radical cystectomy for women, conventional and with preservation of the uterus and vagina. To the best of our knowledge, this is the first case series of robot-assisted radical cystectomy and urinary diversion in women.

STUDY DESIGN: Robot-assisted radical cystectomy was undertaken in three female patients with transitional cell carcinoma of the urinary bladder. The operation was performed with the conventional anterior approach in one patient and with a new technique in two patients, which allows preservation of urethra, uterus, vagina, and both ovaries. As planned, the radical cystectomy was done robotically, using the da Vinci Surgical System (Intuitive Surgical). The bladder was entrapped in an Endocatch bag and removed through a small subumbilical incision. Urinary reconstruction was performed extracorporeally after exteriorizing the bowel through the incision used for retrieving the specimen. In two patients, the reconstructed pouch was placed in the pelvis and the abdominal incision was closed. Urethroneovesical anastomosis was done robotically, using a technique described previously for men.

RESULTS: The average operating time for the robotic radical cystectomy was 160 minutes and the mean operating times for ileal conduit and orthotopic neobladder were 130 minutes and 180 minutes, respectively. The mean blood loss was less than 100 mL. The mean number of lymph nodes removed was 12 (range 3 to 21). Surgical margins were free of tumor in all three patients.

CONCLUSIONS: This approach incorporates advantages of minimally invasive and open surgery. Performing the radical cystectomy with the robot allows precise and rapid removal of the bladder with minimal blood loss. Extracorporeal reconstruction of the urinary tract reduces operative time at this stage of evolution of laparoscopic and robotic instrumentation. In the future, with the development of technology, instrumentation, and with additional refinement of our technique, the entire procedure may be done completely intracorporeally with equal efficiency.

Balaji KC, Yohannes P, McBride CL, Oleynikov D, Hemstreet GP 3rd.
Urology 2004; 63: 51-5.
Feasibility of robot-assisted totally intracorporeal laparoscopic ileal conduit urinary diversion: initial results of a single institutional pilot study.
Division of Urologic, Department of Surgery, University of Nebraska Medical Center, Omaha, Nebraska, USA.
OBJECTIVES: To explore the use of the da Vinci Surgical Robotic System (DSRS) to assist in the completion of totally intracorporeal laparoscopic ileal conduit urinary diversion (TLIC).
METHODS: Two patients with radiation cystitis underwent TLIC procedures and another patient with bladder cancer underwent TLIC along with laparoscopic radical cystoprostatectomy at our institution. The ileal conduit urinary diversion was done totally intracorporeally using conventional laparoscopic techniques, and the DSRS was used to assist in the Bricker-type ureteroileal anastomosis.
RESULTS: The 3 patients in the study included 2 men and 1 woman (mean age 73 years, range 64 to 84). The TLIC was completed intracorporeally in all 3 patients without the need for open conversion. The operative time, estimated blood loss, intraoperative decrease in hemoglobin, and time to hospital discharge for the 2 patients undergoing TLIC and the patient undergoing TLIC along with radical cystoprostatectomy was 628, 616, and 828 minutes, 50, 200, and 500 mL, 1.7, 2.8, and 5.3 g, and 5, 7, and 10 days, respectively. The median follow-up was 4.5 months (range 3.5 to 5.5). Postoperative satisfactory drainage of both kidneys was confirmed in all 3 patients at 8 weeks or later by intravenous urography or renal nuclear imaging. The serum creatinine remained stable in all 3 patients after surgery at hospital discharge. The only complication noted was postoperative ileus in the patient undergoing radical cystoprostatectomy that resolved with conservative management.
CONCLUSIONS: TLIC is technically feasible and safe and can be done intracorporeally without complications. The DSRS can be successfully used to assist in the completion of TLIC. However, that each case lasted for more than 600 minutes highlights the need for further refinement in the technique. The practical application of TLIC requires improved long-term outcomes compared with open surgery, as well as a reduction in the operative time to justify the costs of robotic surgery.

Beecken WD, Wolfram M, Engl T, Bentas W, Probst M, Blaheta R, Oertl A, Jonas D, Binder J.
Eur Urol 2003; 44: 337-9.
Robotic-assisted laparoscopic radical cystectomy and intra-abdominal formation of an orthotopic ileal neobladder.
Department of Urology and Pediatric Urology, J.W. Goethe University, Theodor-Stern-Kai 7, 60590, Frankfurt am Main, Germany.
PURPOSE: To describe our technique of robotic-assisted laparoscopic radical cystectomy and intra-abdominal formation of an orthotopic neobladder (Hautmann) for treatment of transitional cell carcinoma of the bladder.
METHODS: We describe our surgical technique in the worldwide first attempt to perform a robotic-assisted laparoscopic radical cystectomy and completely intra-abdominal formation of an orthotopic neobladder. The DaVinci System (Intuitive Surgical, Mountain View, CA, USA) was utilized to perform the procedure.
RESULTS: Utilizing the DaVinci System the operation could be performed without any complications. Operating time was 8.5 hours, blood loss was 200 ml. The oncologic as well as the functional result of the reservoir were excellent.
DISCUSSION: We here demonstrated that sophisticated laparoscopic procedures like the

intra-abdominal formation of an orthotopic neobladder are accomplishable with robotic assistance.

Menon M, Hemal AK, Tewari A, Shrivastava A, Shoma AM, El-Tabey NA, Shaaban A, Abol-Enein H, Ghoneim MA.
BJU Int 2003; 92: 232-6.
Nerve-sparing robot-assisted radical cystoprostatectomy and urinary diversion.
Vattikuti Urology Institute, Henry Ford Hospital, Detroit, USA.
OBJECTIVE: To develop a technique of nerve-sparing robot-assisted radical cystoprostatectomy (RRCP) for patients with bladder cancer.
PATIENTS AND METHODS: Robotic assistance should enhance the ability to preserve the neurovascular bundles during laparoscopic radical cystectomy. Thus we undertook RRCP and urinary diversion using a three-step technique. First, using a six-port approach and the da Vinci Surgical System (Intuitive Surgical, Sunnyvale, CA, USA), one surgeon carried out a complete pelvic lymphadenectomy and cystoprostatectomy using a technique developed specifically for robotic surgery. The neurovascular bundles were easily identified and dissected away, the specimen entrapped in a bag and removed through a 5-6 cm suprapubic incision. Second, a different surgical team exteriorized the bowel through this incision and created a neobladder extracorporeally. Third, the neobladder was internalized, the incision closed and the primary surgeon completed the urethro-neovesical anastomosis with robotic assistance.
RESULTS: RRCP was carried out in 14 men and three women by the primary surgeon (M.M.). The form of urinary reconstruction was ileal conduit in three, a W-pouch with a serosal-lined tunnel in 10, a double-chimney or a T-pouch with a serosal-lined tunnel in two each. The mean operative duration for robotic radical cystectomy, ileal conduit and orthotopic neobladder were 140, 120 and 168 min, respectively. The mean blood loss was < 150 mL. The number of lymph nodes removed was 4-27, with one patient having N1 disease. The margins of resection were free of tumour in all patients.
CONCLUSIONS: We developed a technique for nerve-sparing RRCP using the da Vinci system which allows precise and rapid removal of the bladder with minimal blood loss. The bowel segment can be exteriorized and the most complex form of orthotopic bladder can be created through the incision used to deliver the cystectomy specimen. Performing this part of the operation extracorporeally reduced the operative duration.