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Analysis of the perioperative and five-year oncological outcome of two hundred cases of open radical cystectomy: A single center experience

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Abstract

OBJECTIVES: We prospectively evaluated our perioperative and five-year oncological results of 200 cases of open radical cystectomy with urinary diversion, for formulating contemporary benchmarks, for future comparison of minimally invasive techniques. This is one of the largest prospective series reported from India of open radical cystectomy. **MATERIALS AND METHODS:** Between 2004 and 2009, patients undergoing open radical cystectomy with urinary diversion, at our institution, were prospectively enrolled in the study. Data were recorded and analyzed statistically. **RESULTS:** Two hundred patients were enrolled in the study. The mean age was 65.1 years. The patients undergoing ileal conduit and orthotopic neobladder were 159 (79.5%) and 41 (20.5%), respectively. The mean operating time was 275 minutes. The mean operating time for ileal conduit and orthotopic neobladder were 262 minutes and 288 minutes, respectively. The mean estimated blood loss was 690 ml. Blood transfusion was required in 37 (18.5%) patients. The mean hospital stay was 6.1 days. Major and minor complications were recorded in 16 (8%) and 31 (15.5%) patients, respectively. Perioperative mortality was recorded in only two (1.5%) patients. The pathologically organ-confined and non-organ-confined cases were 135 (67.5%) and 65 (32.5%), respectively. Thirty-three (16.5%) patients had pathologically confirmed lymph nodes. Median follow-up was 60.1 months. Local recurrence and distant metastases were recorded in 16 (8%) and nine (4.5%) patients, respectively. A five-year disease-free survival, cancer-specific survival, and overall survival were 75.5, 71.5, and 63.5%, respectively. **CONCLUSIONS:** Open radical cystectomy has an acceptable perioperative morbidity and mortality, along with a favorable five-year oncological efficacy. Minimally invasive techniques need a long-term prospective comparison with this approach, before being accepted as a standard treatment for urinary bladder malignancy.

Key words: Carcinoma, radical cystectomy, urinary bladder

Introduction

Bladder malignancy accounts for the fourth most common cancer after prostate, lung, and colorectal cancers in males. Its incidence is nearly three times more common in males than females. The standard treatment option for muscle invasive bladder cancers and high-grade, non-muscle invasive bladder cancers,

refractory to intravesical immunotherapy, has been open radical cystectomy in males and anterior exenteration in females, coupled with en bloc pelvic lymphadenectomy.^[1-3] Traditionally, radical cystectomy has been associated with significant morbidity and mortality. However, due to improvements in surgical techniques, anesthesia techniques, and perioperative intensive care and monitoring, the mortality and morbidity of open radical cystectomy have been reduced to 1 – 3% and 25 – 35%, respectively, in the recently published series.^[1-6] Laparoscopic surgery for kidney and prostate cancers has produced excellent perioperative and long-term oncological outcomes, thus encouraging its application in bladder cancers also. Although, few groups have demonstrated short- and intermediate-term oncological efficacy of laparoscopic radical

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cystectomy (LRC) comparable to the open approach, the long-term oncological outcomes are still under scrutiny.^[7-10] Moreover, the requirement of surgical expertise, longer operative time, and potentially limited pelvic lymphadenectomy, also limit its application. Recently, robotic radical cystectomy has also been introduced providing all the advantages of minimally invasive surgery, with a less steep learning curve. However, the cost, availability, and lack of long-term oncological outcome, has limited the application of this approach.^[11-14] Therefore, we have prospectively evaluated our perioperative and five-year oncological results of 200 cases of open radical cystectomy with urinary diversion, for formulating contemporary benchmarks for future comparison of minimally invasive techniques. This is one of the largest prospective series reported from India, on open radical cystectomy with urinary diversion.

Materials and Methods

Between 2004 and 2009, all patients undergoing open radical cystectomy (ORC) and urinary diversion for urinary bladder malignancy were included in this study. The indications for ORC included muscle invasive bladder cancer detected by transurethral resection or high grade stage Ta, T1 or carcinoma *in situ*, refractory to repeat transurethral resection and intravesical immunotherapy / chemotherapy. The patients with metastatic disease were excluded. All patients underwent a preoperative metastatic workup including blood tests, chest X-Ray, contrast-enhanced computed tomography of the abdomen and pelvis, and a bone scan, wherever indicated. The indications and contraindications for orthotopic ileal neobladder (using the Studer's technique) and ileal conduit reconstruction in this study, conformed to the criteria set by the guidelines of the European Association of Urology, on bladder cancer. The surgery was performed with en bloc excision of the bladder, prostate, and seminal vesicles in males and en block excision of uterus, ovaries, and anterior vagina in females. Bilateral standard pelvic lymph node dissection was performed in all cases with the following limits: cranial-bifurcation of the common iliac artery; caudally – lymph node of cloquet, and laterally, the genitofemoral nerve, including the obturator lymph nodes. The lymph node packets were sent separately for histopathological examination. The surgical margins were considered positive on demonstration of a tumor at the inked margins of the specimen. The patients' demographic profiles, perioperative outcomes, histopathological results, and follow-ups were entered into a computerized database prospectively. All entries were made by a skilled computer data operator posted in the office of the Department of Urology, regularly,

after coordination between the Departments of Urology, Pathology, and Medical Oncology. The patients were followed up regularly on Saturday in the cancer clinic in the Department of Urology. Any death occurring within 30 days of operation or before discharge was considered as perioperative mortality.

Postoperatively, the patients were followed up every three months for the first two years, every six months for the next three years, and then annually. During each visit, detailed history, physical examination, routine blood tests, chest X-Ray, and urine cytology were performed. An abdominopelvic, contrast-enhanced, computed tomography was performed biannually. Upper tract monitoring was done yearly with either intravenous urography or a loopogram, depending on patient's serum creatinine level.

The results were analyzed statistically. Kaplan-Meier analysis with log rank comparison was performed to estimate the five-year, disease-free survival, five-year cancer-specific survival, and five-year overall survival.

Results

Two hundred patients were enrolled in this study. Table 1 represents the demographic profile of the patients. One hundred and thirty-five patients were males. Mean age was 65.1 years. Mean American Society of Anesthesiologists scores (ASA) and Body Mass Index (BMI) scores were 2.6 and 26.8, respectively; 18.5% of the patients had a history of previous abdominal surgery; 14.5% of the patients were clinically non-muscle-invasive, whereas, 85.5% were clinically muscle-invasive. Neo-adjuvant chemotherapy (Gemcitabine and cisplatin) was given to 19 (9.5%) patients, who had clinically locally advanced disease. Twenty-seven (13.5%) patients received neoadjuvant radiotherapy for clinically locally advanced disease. A majority of these patients had received neoadjuvant therapy in some other institutions, and were then referred to our institution. The history of Intravesical BCG and mitomycin therapy was recorded in 23 (11.5%) and six (3%) patients, respectively.

Table 1 also summarizes the perioperative outcomes. Ileal conduits were constructed in 159 (79.5%) patients, whereas, Ileal orthotopic neobladder (Studer's) was constructed in 41 (20.5%) patients. Overall, the mean operating time was 275 minutes (ileal conduit: 262 minutes; Ileal orthotopic neobladder: 288 minutes). The mean estimated blood loss was 690 ml, with 37 (18.5%) patients requiring perioperative blood transfusions. Mean hospital stay was 6.1 days.

Table 1: Patients demographic profile and perioperative data

Time period	2004 - 2009
Total no of patients	200
Male / female	135 / 65
Mean age (in years)	65.1 (range:32 - 74)
Mean ASA score	2.6
Mean BMI (Kg / m ²)	26.8
Previous abdominal surgery (%)	37 (18.5)
Previous abdominal radiation (%)	25 (12.5)
Clinical stage - non-muscle-invasive < T2(%)	29 (14.5)
Clinical stage - muscle-invasive: T2-4(%)	171 (85.5)
Neoadjuvant chemotherapy-MVAC(%)	19 (9.5%)
Intravesical therapy (%)	
BCG	23 (11.5)
Chemotherapy (mitomycin)	6 (3)
Neoadjuvant radiotherapy (%)	27 (13.5)
Ileal conduit (%)	159 (79.5)
Orthotopic neobladder (%)	41 (20.5)
Mean (OT) operating time in minutes (range)	275 (225 - 330)
Mean OT for ileal conduit in minutes (range)	262 (225 - 310)
Mean OT for orthotopic neobladder in minutes (range)	288 (270 - 330)
Mean estimated blood loss in ml (range)	690 (400 - 2000)
Blood transfusion (%)	37 (18.5)
Mean hospital stay in days (range)	6.1 (5 - 16)

BMI: Body mass index, ASA: American society of Anaesthesia, MVAC: Methorexate, Vinblastine, Doxorubicin, Cisplatin

Table 2 summarizes complications encountered in these series. Major complications were seen in 16 (8%) patients. Four patients had significant intraoperative bleeding, due to inadvertent damage to the accessory pudental vessels. One patient had a rectal serosal tear, a case of locally advanced malignancy abutting the rectum, with a history of prior pelvic radiotherapy. This was diagnosed intraoperatively and managed with interrupted stitches and a rectal tube. Two patients had bowel anastomosis leaks diagnosed on the fourth and fifth postoperative day. They underwent exploratory laparotomy with ileostomy formation, which was subsequently closed after three months. Two patients were diagnosed with subacute intestinal obstruction on postoperative days five and six, respectively, and they were managed conservatively. Two (1%) patients died in the perioperative period (one due to myocardial infarction, and the other due to severe chest infection, with a prior history of cardiopulmonary disease). Thirty-one (15.5%) patients had minor complications. Paralytic ileus was seen in 15 patients, and managed conservatively. One patient had a urine leak from

Table 2: Complications and histopathological results

Major (%)	16 (8)
Bleeding	4 (2)
Chest infection	3 (1.5)
Wound dehiscence	3 (1.5)
Rectal injury	1
Myocardial infarction	1
Cerebrovascular infarction	0
Bowel leak	2
Bowel obstruction	2
Minor (%)	31 (15.5)
Paralytic Ileus	15 (7.5)
Pyelonephritis	3 (1.5)
Deep vein thrombosis	3 (1.5)
Wound infection	4 (2)
Pneumonia	2
Urine leak	1
Lymphocele	1
Incisional hernia	2
pTo (%)	5 (2.5)
pTa (%)	3 (1.5)
pT1 (%)	11 (5.5)
pT2 (%)	116 (58)
pT3 (%)	54 (27)
pT4 (%)	11 (5.5)
Organ confined (≤ pT2)	135 (67.5)
Non - organ confined (> pT2)	65 (32.5)
pNo (%)	167 (83.5)
pN1-2 (%)	33 (16.5)
Low grade (%)	59 (29.5)
High grade (%)	241 (71.5)
Positive surgical margins (%)	3 (1.5)
Mean number of lymph nodes removed (range)	17 (7 - 26)
Histology (%)	
Transitional cell carcinoma	190 (95)
Squamous cell carcinoma	7 (3.5)
Adenocarcinoma	3 (1.5)

the ureteroileal anastomosis, diagnosed on the fourth postoperative day, which was managed conservatively.

The histopathological results are also summarized in Table 2. Transitional cell carcinoma was found in 190 (95%) patients. Pathologically organ-confined malignancy (≤ pT2) was found in 135 (67.5%) patients. Non-organ confined malignancy (> pT2) was found in 65 (32.5%) patients. The mean number of lymph nodes identified on the specimen was 17 (range: 7 - 26). Thirty-three (16.5%) patients had histologically confirmed positive lymph nodes. All these patients with positive lymph nodes received adjuvant chemotherapy (Gemcitabine and cisplatin). High and low grades were found in 29.5 and 71.5% of the patients, respectively.

Three (1.5%) patients had positive distal surgical margins. All these had locally advanced malignancy and underwent urethrectomy later on.

The follow-up results are summarized in Table 3. The overall median follow-up was 60.1 months, comparable in both organ-confined and non-organ-confined patients ($p = 0.32$). Local recurrence was recorded in 16 (8%) patients. Distant metastases were recorded in nine (4.5%) patients — liver: five, lungs: two, bones: one, brain: one. Five-year overall survival, disease-free survival, and cancer-specific survival were 63.5, 75.5, and 71.5%, respectively. These results were further analyzed between organ-confined ($\leq pT2$) / Non-organ-confined ($\geq pT2$) and pNo / pN1-2. Five-year overall survival, disease-free survival, and cancer-specific survival were significantly lower in the non-organ-confined group as compared to the organ-confined group ($p = 0.01, 0.02, \text{ and } 0.01$, respectively). Similarly, five-year overall survival, disease-free survival, and cancer-specific survival were significantly lower in the pN1-2 group as compared to the pNo group ($p = 0.01, 0.01, \text{ and } 0.01$, respectively). Most deaths occurring within the first three years after radical cystectomy were attributed to bladder cancer. However, after three years of follow-up, most deaths in this elderly group of patients were related primarily to other comorbid diseases; unrelated to bladder cancer (e.g., myocardial infarction, cerebrovascular stroke). Kaplan Meier curves for disease-free survival in organ-confined groups ($\leq pT2$) / Non-organ confined ($\geq pT2$) and pNo / pN1-2 are shown in Figures 1a and 1b, respectively.

Discussion

Urinary bladder malignancy is the second most common genitourinary malignancy, with transitional-

cell carcinoma (TCC), comprising nearly 90% of all primary bladder tumors. Although the majority of patients presented with superficial bladder tumors, 20 to

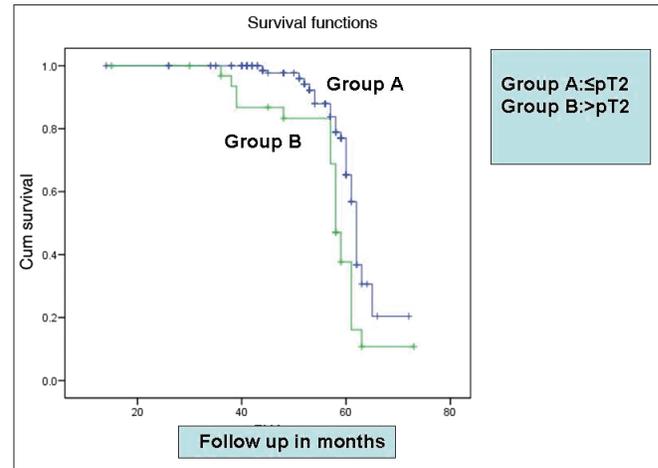


Figure 1a: Kaplan-Meier survival curve for recurrence-free survival, for organ-confined ($\leq pT2$) / non-organ-confined ($\geq pT2$)

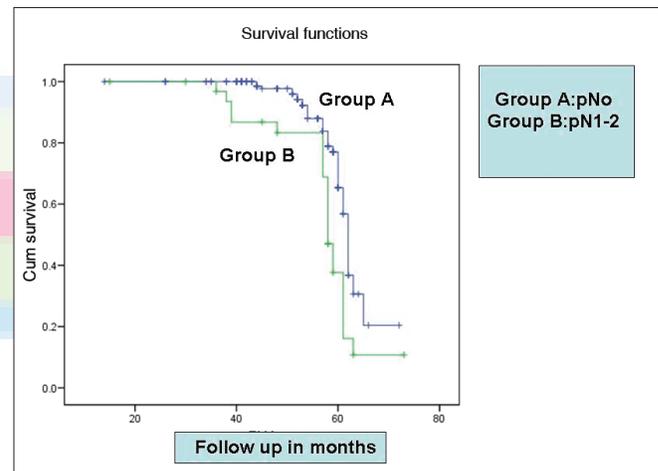


Figure 1b: Kaplan-Meier curve for recurrence-free survival for pNo / pN1-2

Table 3: Follow-up results

	N	Median follow-up in months (range)	Local recurrence (%)	Distant metastases (%)	Five-year disease free survival (%)	Five-year cancer specific survival (%)	Five-year overall survival (%)
Total	200	60.1 (14 - 72)	16 (8)	9 (4.5)	75.5 (151)	71.5 (143)	63.5 (126)
Organ confined ($\leq pT2$)	135	61.2 (13 - 69)	4	3	73.3 (99)	71.1 (96)	67.4 (91)
Non-organ confined ($> pT2$)	65	62.1 (11 - 70)	12	6	56.9 (37)	52.3 (34)	50.7 (33)
P value		0.32 (NS)			0.02 (S)	0.01 (S)	(0.01 (S)
pNo	167	63.5 (16 - 71)	3	2	78.4 (131)	76 (127)	68.8 (115)
pN1-2	33	62.7 (14 - 69)	13	7	27.2 (9)	24.2 (8)	21.2 (7)
P value		0.44 (NS)			0.01 (S)	0.01 (S)	0.01 (S)

40% either presented with or developed muscle-invasive disease.^[1-3] Muscle-invasive TCC of the bladder is generally a lethal disease, requiring aggressive therapy, with fewer than 15% of the TCC patients surviving for two years if untreated. The optimal goals of treatment for any invasive bladder cancer should include: (1) Acceptable morbidity and mortality, (2) long-term oncological efficacy, (3) prevention of pelvic recurrence or development of metastatic bladder cancer, and (4) an excellent quality of life.^[4-6]

Open radical cystectomy has been a gold standard treatment for muscle-invasive and high-risk superficial tumors, resistant to intravesical therapy.^[1-6,15,16] However, this is a formidable procedure, and has been associated with significant morbidity and mortality. LRC has been recently used by urologists to minimize the morbidity and mortality of this formidable procedure. Although some series have reported its feasibility and safety in these patients, long-term oncological efficacy has still to be established. Very few prospective comparisons between ORC and LRC are available in literature, demonstrating the oncological efficacy.^[7-10,17] In most of the series, extracorporeal urinary diversion has been used. Some of these studies have shown lesser blood loss and postoperative pain, and earlier recovery of bowel function, although with increased operative time in the LRC group. However, these observations have not been corroborated by others. Haber *et al.* has reported a five-year oncological outcome of LRC: The five-year actuarial overall, cancer-specific, and recurrence-free survival was 63, 92, and 92%, respectively.^[10] However, this study included only 37 patients with only few patients actually completing the five-year follow-up. Similarly, Hemal *et al.*, reported a three-year oncological outcome of LRC for localized bladder cancer, as compared to open radical cystectomy. However, the study was non-randomized including only 30 patients in the LRC group and 35 in the open group. A three-year recurrence-free survival was reported as 76% in the LRC group as compared to 80% in the open group, with no mention of the overall- and disease-free survival.^[9] Similarly, robotic radical cystectomy has been used recently as a minimally invasive option for bladder cancer, with advantages of 3-D vision, no hand tremors, and a lesser learning curve in comparison to LRC. Very few published series comparing robotic radical cystectomy (RRC) and ORC are available.^[11-14] Wang *et al.* reported that RRC has given operative and perioperative benefits compared to the open approach, without compromising on the pathological measures of early oncological efficacy, such as, lymph node yield and margin status. However, the study included only 54 patients with no reporting of a long-term oncological outcome.^[14]

We have reported a prospective series of 200 patients of open radical cystectomy from a single institution. This is one of the largest prospective series on ORC reported from India. The demographic profiles of our patients were similar to the reported series on ORC.^[1-6,16] Clinically muscle invasive malignancy accounted for 85.5% of the cases for ORC. Our overall mean operating time for ileal conduits and orthotopic ileal neobladder were comparable to the reported series on ORC. Similarly, the mean estimated blood loss and blood transfusion requirements were also well within acceptable limits.^[1-6,16] The mean hospital stay was only 6.1 days (less than a week). Major complications and minor complications were 8 and 15.5%, respectively, which were comparable to the standard published series from high volume centers performing ORC. Perioperative mortality was only 1.5%, lesser than the reported perioperative mortality of 2 – 3%.^[1-6,16,18,19] Histopathological results showed TCC to be the predominant histology. The mean number of lymph nodes removed was 17, with only three (1.5%) patients showing distal positive surgical margins, thus confirming the meticulous surgical dissection of the procedure. Local recurrences in the pelvis and distant metastases were recorded in only 16 (8%) and nine (4.5%) patients, which was comparable to the reported series on ORC.^[1,4,5,15,16] At the median follow-up of 53.1 months, the five-year overall survival, disease-free survival, and cancer-specific survival were 63.5, 75.5, and 71.5%, respectively, which was similar to the reported large series on ORC.^[1,4,5,15,16] On further sub-analyzing, we found that the five-year overall survival, disease-free survival, and cancer-specific survival were significantly lesser in the organ-confined and the lymph node negative group. This highlights the prognostic significance of these variables.

A similar retrospective study conducted by Gupta *et al.*,^[20] in 2008, analyzed the clinical course, pathological features, and the long-term clinical outcome of 432 patients of transitional cell carcinoma, undergoing radical cystectomy from 1992 to 2006. Ileal conduit was the predominant urinary diversion (85.1%) made, similar to our study (79.5%). Median follow-up was 62 months, comparable to our study (60.1 months). Peri-operative mortality was lower in our study as compared to this study (1.5% vs. 6.9%, respectively). However, the perioperative complication rates were similar (23.5%: in our study vs. 25.7% in the study by Gupta *et al.*). In the histopathological results, pathologically localized bladder cancer (pT1 + 2) was higher in our study (67.5% vs. 43%, respectively). Similarly, pathologically locally advanced bladder cancer (pT3 + 4) was lower in our study (32.5% vs. 57%, respectively). pN+ cases were lower in our study (16.5% vs. 25%, respectively).

Likewise, high-grade cases were lower in our study (71.5% vs. 89.6%, respectively). This explains the difference in oncological outcomes in two studies. Five-year recurrence-free survival was higher in our study (75.5% vs. 66%, respectively). However, five-year overall survival was comparable in both studies (63.5% in our study vs. 62% in the study by Gupta *et al.*). Similarly local recurrence was similar in both studies (8% in the Gupta *et al.* study vs. 9.3% in our study). However, distant recurrence was higher in their study (24.3% in the Gupta *et al.* study vs. 4.5% in our study).

Thus, due to strict attention to perioperative details, meticulous surgery, and a team-oriented surgical and postoperative approach, we have performed ORC with acceptable morbidity, decreased mortality, and a favorable five-year oncological outcome, similar to large reported series from a high-volume center.^[1,4,5,15,16] These outcomes can be considered as benchmarks, by which minimally invasive procedures like LRC and RRC can be compared. Prospective randomized series involving a larger number of patients comparing ORC versus LRC / RRC are required to establish long-term oncological efficacy of these procedures, before accepting them as a standard treatment for bladder cancers.

Conclusion

Radical cystectomy performed using an open approach has acceptable perioperative morbidity and mortality, along with a favorable five-year oncological efficacy. Minimally invasive techniques need a long-term prospective comparison with this approach, before being accepted as a standard treatment for urinary bladder malignancy.

References

1. Huang GJ, Stein JP. Open radical cystectomy with lymphadenectomy remains the treatment of choice for invasive bladder cancer. *Curr Opin Urol* 2007;17:369-75.
2. Lowrance WT, Rumohr JA, Chang SS, Clark PE, Smith JA Jr, Cookson MS. Contemporary open radical cystectomy: Analysis of perioperative outcomes. *J Urol* 2008;179:1313-8.
3. Konety BR, Joslyn SA, O'Donnell MA. Extent of pelvic lymphadenectomy and its impact on outcome in patients diagnosed with bladder cancer: Analysis of data from the Surveillance, Epidemiology and End Results Program data base. *J Urol* 2003;169:946-50.

4. Stein JP, Lieskovsky G, Cote R, Groshen S, Feng AC, Boyd S, *et al.*. Radical cystectomy in the treatment of invasive bladder cancer: Long-term results in 1054 patients. *J Clin Oncol* 2001;19:666-75.
5. Dalbagni G, Genega E, Hashibe M, Zhang ZF, Russo P, Herr H, *et al.*. Cystectomy for bladder cancer: A contemporary series. *J Urol* 2001;165:1111-6.
6. Madersbacher S, Hochreiter W, Burkhard F, Thalmann GN, Danuser H, Markwalder R, *et al.*. Radical cystectomy for bladder cancer today – a homogeneous series without neoadjuvant therapy. *J Clin Oncol* 2003;21:690-6.
7. Ha US, Kim SI, Kim SJ, Cho HJ, Hong SH, Lee JY, *et al.*. Laparoscopic versus open radical cystectomy for the management of bladder cancer: Mid-term oncological outcome. *Int J Urol* 2010;17:55-61.
8. Irwin BH, Gill IS, Haber GP, Campbell SC. Laparoscopic radical cystectomy: Current status, outcomes, and patient selection. *Curr Treat Options Oncol* 2009;10:243-55.
9. Hemal AK, Kolla SB. Comparison of laparoscopic and open radical cystoprostatectomy for localized bladder cancer with 3-year oncological followup: A single surgeon experience. *J Urol* 2007;178:2340-3.
10. Haber GP, Gill IS. Laparoscopic radical cystectomy for cancer: Oncological outcomes at up to 5 years. *BJU Int* 2007;100:137-42.
11. Martin AD, Nunez RN, Pacelli A, Woods ME, Davis R, Thomas R, *et al.*. Robot-assisted radical cystectomy: Intermediate survival results at a mean follow-up of 25 months. *BJU Int* 2010;105:1706-9.
12. Nix J, Smith A, Kurpad R, Nielsen ME, Wallen EM, Pruthi RS. Prospective Randomized Controlled Trial of Robotic versus Open Radical Cystectomy for Bladder Cancer: Perioperative and Pathologic Results. *Eur Urol* 2010;57:196-201.
13. Dasgupta P, Rimington P, Murphy D, Challacombe B, Hemal A, Elhage O, *et al.*. Robotic assisted radical cystectomy: Short to medium-term oncologic and functional outcomes. *Int J Clin Pract* 2008;62:1709-14.
14. Wang GJ, Barocas DA, Raman JD, Scherr DS. Robotic vs open radical cystectomy: Prospective comparison of perioperative outcomes and pathological measures of early oncological efficacy. *BJU Int* 2008;101:89-93.
15. Quek ML, Stein JP, Clark PE, Daneshmand S, Miranda G, Cai J, *et al.*. Microscopic and gross extravesical extension in pathological staging of bladder cancer. *J Urol* 2004;171:640-5.
16. Hautmann RE. The oncologic results of laparoscopic radical cystectomy are not (yet) equivalent to open cystectomy. *Curr Opin Urol* 2009;19:522-6.
17. Porpiglia F, Renard J, Billia M, Scoffone C, Cracco C, Terrone C, *et al.*. Open versus laparoscopy-assisted radical cystectomy: Results of a prospective study. *J Endourol* 2007;21:325-9.
18. Hollenbeck BK, Miller DC, Taub D, Dunn RL, Khuri SF, Henderson WG, *et al.*. Identifying risk factors for potentially avoidable complications following radical cystectomy. *J Urol* 2005;174:1231-7.
19. Chang SS, Cookson MS, Baumgartner RG, Wells N, Smith JA Jr. Analysis of early complications after radical cystectomy: Results of a collaborative care pathway. *J Urol* 2002;167:2012-6.
20. Gupta NP, Kolla SB, Seth A, Dogra PN, Hemal AK, Kumar R, *et al.*. Radical cystectomy for bladder cancer: A single center experience. *Indian J Urol* 2008;24:54-9.

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