

Comparison of laparoscopic and open cystectomy for bladder cancer: a single center of 110 cases report

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Purpose: We compared the operative time, complications, blood loss, total cost, and hospital days of laparoscopic cystectomy *vs.* open cystectomy for bladder cancer.

Materials and methods: This retrospective, nonrandomized study was conducted between January 2004 and March 2011 on 110 patients (17 women and 93 men) who underwent radical cystectomy for bladder cancer. A total of 45 cystectomies were performed laparoscopically and 65 by open surgery. Mean patient age was 62.9 ± 10.4 years. The age, gender, American Society of Anesthesiologists score, histopathological results etc. were reviewed in this article.

Results: Intraoperative blood loss was significantly lower in the laparoscopic surgery group (821 ± 776 *vs.* 1112 ± 706 mL, $P=0.044$) while operative time was significantly lower in the open surgery group (376 ± 90 *vs.* 445 ± 119 min, $P=0.001$). The total costs were also significantly lower in the open surgery group $51,726 \pm 13,589$ yuan (about \$8000) *vs.* $63,053 \pm 19,378$ yuan (about \$10,000), $P<0.001$). There was no statistically significant difference in complication rates, postoperative days in hospital between the two groups.

Conclusions: Laparoscopic cystectomy can reduce intraoperative blood loss significantly. Open cystectomy requires less operative time and has a lower cost than laparoscopic cystectomy for bladder cancer. There was no statistically significant difference in postoperative complication rates in the hospital between the two groups.

Keywords: Bladder cancer; cystectomy; laparoscopy surgery; open surgery

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Introduction

Radical cystectomy with lymph node dissection is the gold standard treatment for invasive and superficial high grade bladder tumors which have recurred after conservative treatment (1,2).

Radical cystectomy remains one of the most invasive surgical procedures in urology, with a mortality and complication rate of 1% to 2% and up to 25%, respectively (3,4). Historically, the first cystectomy was performed by Bernhard Bardenheuer (1839-1913) in January, 1887 in

Koln, Germany. In 1949, Marshall and Whitmore gave the first detailed description of radical cystectomy (5). Progressively, the technique was improved and made safer. In the recent two decades, the use of laparoscopy to infiltrate bladder cancer has increased very rapidly. In 1992, Parra *et al.*, published a case report on a laparoscopic cystectomy that was performed on a 27 year-old paraplegic woman with a pre-existing cutaneous diversion whose neurogenic bladder was removed for pyocystis (6). In 1993, Sanchez de Badajoz reported the first laparoscopic

Table 1 Preoperative characteristics.

	Laparoscopy	Open surgery	P value
No. of patients	45	65	
Mean age \pm SD (yr)	59.7 \pm 11.1	64.6 \pm 9.3	0.013
Mean age \pm SD (yr)**	62.5 \pm 10.7	65.3 \pm 9.1	Not sig.
Mean BMI \pm SD(kg/m ²)	21.3 \pm 3.7	22.5 \pm 4.1	Not sig.
Gender:			Not sig.
Male	39 (86.7%)	54 (83.1%)	
Female	6 (13.3%)	11 (16.9%)	
Median ASA score:	II	II	Not sig.
I	10 (22.2%)	9 (13.8%)	
II	28 (62.2%)	47 (72.3%)	
III	7 (15.6%)	9 (13.8%)	

Notes: **exclude neobladder patients.

radical cystectomy for bladder cancer (7). In 2000, Gill published the first two cases of laparoscopic radical cystoprostatectomy with ileal conduit performed completely intracorporeally (8). In 2004, Basillote *et al.* compared 13 laparoscopic cystectomies with 11 open cystectomies and found that there was no significant difference in operative time, blood loss and complications. However, there was a significant reduction in postoperative use of analgesics, time needed to regain fluid and solid intake, and hospital stay in the laparoscopic group (9). In 2007, Hernal *et al.* compared 30 laparoscopic cystectomies with 35 open cystectomies and found cystectomy using laparotomy was associated with a reduced use of analgesics and less blood loss (10). In 2009, Guillotreau *et al.* compared 38 laparoscopic cystectomies with 30 open cystectomies and found laparoscopic cystectomy was associated with a more rapid return to normal bowel function, less blood loss and low morbidity (11).

However, the series in these studies were small. In this study, we compare the operative time, rate of complications, blood loss, and hospital days of laparoscopic cystectomy *vs.* open cystectomy for bladder cancer.

Materials and methods

Between January 2004 and March 2011, we performed laparoscopic radical cystectomy in 45 patients with bladder cancer. Patients included 6 women and 39 men with a mean age of 59.7 \pm 11.1 yr. At the same time, we performed open radical cystectomy in 65 patients, which included 11 women and 54 men with a mean age of 64.6 \pm 9.3 yr. Before surgery all patients underwent a chest X-ray, cystoscope, ultrasound

of the urologic system, and CT of the abdomen and pelvis.

Preoperative parameters studied were patient age, body mass index, gender, ASA score. The details are presented in *Table 1*.

Statistical analysis

Quantitative values were compared with Student's t-test. Qualitative values were compared using the chi-square test or Fisher's exact test and P<0.05 was considered statistically significant. Statistical analysis was performed using SPSS software, 2006, ver. 15.0 (SPSS Institute).

Results

Preoperative characteristics are shown in *Table 1*. The groups were comparable in terms of sex, BMI, and ASA score. The mean age is younger in the laparoscopy group than the open surgery group. However, because the neobladder patients are relatively young, when we excluded the neobladder patients, there was no significant difference between the two groups.

Intraoperative data is shown in *Table 2*. Operative time differed significantly between the 2 groups (LS group 445 \pm 119 min, Open surgery group 376 \pm 90 min, P<0.05). The operative time of open surgery group was less. However, total blood loss was significantly less in the LS group. According to the urinary diversions, the two groups are also comparable. Regardless of this, the number of neobladder patients in LS group was higher and neobladder patients were relatively younger than the rest of the patients

Table 2 Intraoperative characteristics.

	Laparoscopy	Open surgery	P value
Mean blood loss \pm SD (mL)	821 \pm 776	1112 \pm 706	0.044
Mean blood loss \pm SD (mL)**	753 \pm 618	1101 \pm 745	0.026
Mean operative time \pm SD (min)	445 \pm 119	376 \pm 90	0.001
Mean operative time \pm SD (min)**	438 \pm 124	366 \pm 89	0.002
Urinary diversions:			Not sig.
Ileal neobladder	12 (26.7%)	8 (12.3%)	
Noncontinent Bricker ileal conduit	24 (53.3%)	45 (69.2%)	
Cutaneous ureterostomy	9 (20%)	12 (18.5%)	

Notes: **exclude neobladder patients.

Table 3 Postoperative complication rates.

Complications	Laparoscopy (%)	Open surgery (%)	P value
Ureterointestinal stenosis	3 (6.7)	2 (3.1)	Not sig.
Intestinal obstruction	12 (26.7)	6 (9.2)	0.015
Urinary tract infection	4 (8.9)	5 (7.7)	Not sig.
Rectal injury	1 (2.2)	2 (3.1)	Not sig.
Chest infection	1 (2.2)	2 (3.1)	Not sig.
Urinary fistulae	2 (4.4)	0 (0)	Not sig.
Wound infection	1 (2.2)	3 (4.6)	Not sig.
Wound dehiscence	0 (0)	2 (3.1)	Not sig.
Bleeding	0 (0)	1 (1.5)	Not sig.
Total	24 (53.3)	23 (35.4)	0.047
Total**	12 (36.4)	19 (33.3)	Not sig.

Notes: **exclude neobladder patients.

in the group. Therefore, we also did a comparison of the two groups, excluding neobladder patients.

Postoperative complication rates are shown in *Table 3*. Except intestinal obstructions [LS group 12 (26.7%), Open surgery group 6 (9.2%), $P=0.015$], there was no significant difference between the two groups in postoperative complication rates.

Postoperative days in hospital and total costs are shown in *Table 4*. Mean cost differed significantly between the 2 groups [LS group 63,053 \pm 19,378 yuan (about \$10,000), Open surgery group 51,726 \pm 13,589 yuan (about \$8200), $P<0.05$]. However, there was no significant difference between the two groups in postoperative days in hospital.

Histopathological details are shown in *Table 5*. Comparing the two groups with Fisher's exact test, no significant differences were found in pTNM stage, histology and occasional prostate cancer rates.

Discussion

The laparoscopic technique has been shown to provide significant benefits in various urological procedures (11). The laparoscopic cystectomy is one of the most complex surgical procedures in urology. In recent years, laparoscopic cystectomy has progressed very rapidly. However, there are limited studies comparing laparoscopic cystectomy with open cystectomy, and most series in these studies were small (4,9-12). The results in these studies indicate that blood loss and postoperative complication rates appear to be less after laparoscopic cystectomy compared to open surgery. But the results are not consistent.

In this study we compared the operative time, rate of complications, blood loss, and hospital days of laparoscopic cystectomy *vs.* open cystectomy for bladder cancer. Our study indicates that Laparoscopic cystectomy can reduce

Table 4 Postoperative days and total cost.

	Laparoscopy	Open surgery	P value
Mean cost ± SD (yuan)	63,053±19,378	51,726±13,589	0.001
Mean cost ± SD (yuan)**	60,633±19,349	49,827±12,290	0.002
Postoperative days ± SD	18.8±12.5	15.3±10.0	Not sig.
Postoperative days ± SD**	16.7±12.5	13.7±9.0	Not sig.

Notes: **exclude neobladder patients.

Table 5 Final histopathology.

	Laparoscopy	Open surgery	P Value
No. PT stage			Not sig.
PT0	1	0	
PTa	0	0	
PTis	1	1	
PT1	13	17	
PT2a	7	13	
PT2b	5	10	
PT3a	5	4	
PT3b	1	8	
PT4a	11	11	
PT4b	1	1	
No. PN classification:			Not sig.
N0	40	56	
N1	3	5	
N2	2	4	
N3	0	0	
No. histology:			Not sig.
Urothelial Ca.	43 (95.6%)	60 (92.3%)	
Squamous cell Ca.	1 (2.2%)	4 (6.2%)	
Adenoca.	0 (0%)	1 (1.5%)	
Sarcomatous Ca.	1 (2.2%)	0 (0%)	
No. prostate Ca.	6 (13.3%)	12 (18.5%)	Not sig.

intraoperative blood loss significantly. Similarly, Hernal *et al.* determined that performing cystectomy via laparotomy was associated with less blood loss (10). The operative time of laparoscopic cystectomy is longer than the open surgery (LS group 445±119 min, Open surgery group 376±90 min). But Basillote *et al.* compared 13 laparoscopic cystectomies with 11 open cystectomies and found no significant difference in operative time (9). However, it is certainly likely that with further experience, our operative time will decrease further. Laparoscopic cystectomy initially appeared to have higher complication rates than open

surgery due to the inclusion of neobladder patients, who are typically associated with higher intestinal obstruction rates. No significant differences are found between the two groups when these patients are excluded. In addition, wound infection and wound dehiscence are lower in the LS group than in the open group (2.2% vs. 7.7%), although there is no statistically significant difference. Therefore, laparoscopic cystectomy is at least not associated with higher complication rates than open surgery and may even be improved with further experience.

About the hospital day, our data is much different from

other studies. In our study, the mean hospital day is about 15 days. But in the study of Ashok K. Hemal *et al.*, the mean hospital day is about 10 days (10). The most possible reason is that in China, the bed-fee (the cost of a patient stay in hospital for one day) is much cheaper (less than 50 yuan, about 8 \$/d) than in the U.S. or Euro, so the patients in China are expected to want to stay in the hospital for a longer period of time.

As for the final histopathology, we found that there was no significant difference in pTNM stage, histology and occasional prostate cancer rates. It indicates the two groups are comparable, especially important for further oncologic outcome research.

Conclusions

According to our study, we conclude that: Laparoscopic cystectomy can reduce intraoperative blood loss significantly. Open cystectomy requires less operative time and has a lower cost than laparoscopic cystectomy for bladder cancer. There is no statistically significant difference in postoperative complication rates in the hospital between the two groups.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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