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## Laparoscopic Radical Cystectomy with Urinary Diversion in Ramathibodi Hospital

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### Abstract

**Purpose:** The gold standard of care for patients with muscle invasive bladder cancer is radical cystectomy. While open radical cystectomy is now a standard procedure, laparoscopic radical cystectomy is still an alternative procedure. We reported our experience on surgical technique and outcome for laparoscopic radical cystectomy with urinary diversion.

**Methods:** A retrospective review was performed of 23 patients who required radical cystectomy and urinary diversion, which 20 cases for the ileal conduit (group 1), 3 cases for neobladder (group 2) at our institution between 2005-2006. Inclusion criteria was invasive cancer of urinary bladder which invade at least to muscular layer. Exclusion criteria were those had distance metastatic bladder cancer or absolute contraindications for general anesthesia or laparoscopic procedure. We used the five-port transperitoneal approach for radical cystectomy and opened the small incision about 5 cm for retrieving the specimen and the ileal reconstruction (conduit or neobladder) were performed extracorporeal through the same small lower abdominal incision. We have performed the operation by the same team and we reported total operating time (hours), radical cystectomy time (hours), estimated blood loss (cc), hospital stay (days), and complications.

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**Results:** The respective total operating time (hours), radical cystectomy time (hours), estimated blood loss (cc), hospital stay (days) in group 1 and group 2 were 6.3/6.6 hours, 2.5/2.75 hours, 534/250 cc , 17/24.6 days. One patient in group 1 had compartment syndrome of right leg.

**Conclusions:** The laparoscopic radical cystectomy remained challenging procedure for laparoscopic urologist. Even the advantage of blood loss, shorten hospital stay and decreased postoperative pain in laparoscopic procedure, we must regard to the difficult of the procedure and the long-term oncologic followup data will determine.

**Key Words:** Radical cystectomy, Laparoscopy, Ileal conduit and neobladder diversion

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## Introduction

Bladder cancer accounts for approximately 90% of cancers of the urinary tract (renal pelvis, ureters, bladder, urethra). Incidence of bladder cancer increases with age and 2 to 3 times more common in men. Bladder cancer usually originates in the bladder lining and categorized as low stage (superficial) or high stage (muscle invasive).[1]

Open radical cystectomy is the accepted gold standard for the treatment of organ confined muscle invasive bladder cancer.[2] Laparoscopic cystectomy has been described as a feasible procedure and still being evaluated.

Ramathibodi hospital have experience in laparoscopic radical cystectomy for invasive bladder cancer since February 2005.[3] We reported our experience on surgical technique and outcome for laparoscopic radical cystectomy with urinary diversion.

## Materials and Methods

Between February 2005 and March 2007, 23 patients underwent laparoscopic radical cystectomy with extracorporeal-assisted urinary diversion for muscle invasive bladder cancer at Ramathibodi hospital. The operation was performed by two surgeons (Kongchareonsombat W, Kijvika K) and operation type (laparoscopy) was selected by surgeon preference. Exclusion criteria were those had distant metastatic bladder cancer or absolute contraindications for general anesthesia or laparoscopic procedure. The records of all patients were retrospectively reviewed.

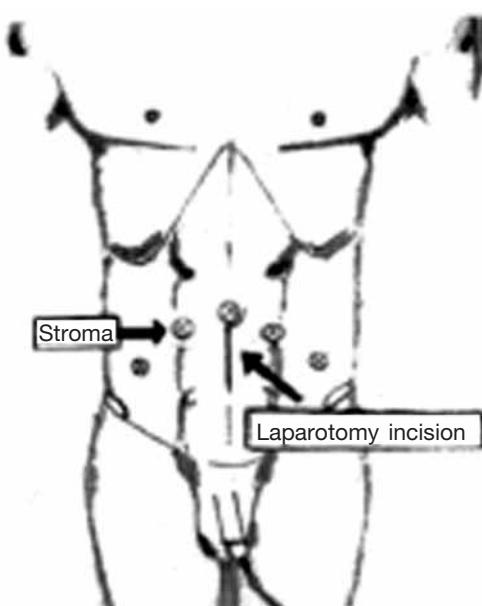
Demographic data included patient age, sex, intraoperative parameters for example operating time, cystectomy time and estimate blood loss, transfusion rate and complications. All of these data were reviewed. Surgical procedures were based on anatomical approach for laparoscopic cystectomy

described by Gill IS et al[4] and bowel anastomosis in all cases used hand-sawn technique included bowel construction for neobladder diversion.

### Technique[3-6]

Each patient underwent preoperative bowel preparation with standard 3-days bowel preparation and received broad-spectrum intravenous antibiotics preoperatively. With the patient under general anesthesia and in a modified lithotomy position, the operating table was placed in the trendelenberg position and a Foley catheter was placed in the bladder. A nasogastric tube was also inserted.

A transumbilical skin incision was done with opened technique and pneumoperitoneum was created at a pressure of 15 mmHg. Five ports were placed transperitoneal, including 10 mm umbilical camera port, 10 mm port in each pararectus area 3 cm below the umbilicus, and a 5 mm port in each lower abdominal quadrant (fig. 1). After completing bilateral pelvic lymphadenectomies, each ureter was



**Fig 1.** Five ports placement in fan-shaped fashion[3]

dissected and then transected close to its insertion into the bladder. The peritoneum in the pouch of Douglas was then incised after which the vas deferens and seminal vesicles were identified and mobilized. Each vas deferens was then occluded using clips and divided. Posterior dissection between the prostate and rectum was continued. Denonvilliers' fascia was then identified and incised to reach pre-rectal plane. The lateral and posterior vascular pedicles of the bladder were controlled bilaterally with Ligasure®. No attempt was made to preserve the neurovascular bundles.

To enter the prevesical and retropubic space, the bladder was distended with 200 cc fluid, and an inverted V-shaped peritoneotomy was created, starting lateral to the right medial umbilical ligament, proceeding up towards the umbilicus where the urachus was incised, and extending lateral to the left medial umbilical ligament. In this manner, the urachus was divided high near the umbilicus. The anterior surface of the bladder was mobilized with the entire prevesical fat being maintained with the deflated bladder specimen. The endopelvic fascia was incised bilaterally and the puboprostatic ligaments were divided. The dorsal vein complex secured with a 1-0 vicryl. With careful attention placed on preserving the external sphincter, the proximal urethra was then identified and divided.

With the bladder and prostate completely freed laparoscopically, a low midline 5 cm infraumbilicus incision was then performed. The specimen was delivered through this incision and an ileal neobladder (Studer) or ileal conduit was constructed according to established principles.[7] Next, 6 Fr ureteral catheter were placed up both ureters and the open end exited through the anterior abdominal wall. In case of neobladder construction, the anastomosis of urethra and neobladder was performed laparoscopically.

The Studer pouch was drained via suprapubic and urethral catheters.

## Results

A total of 23 male patients in this series underwent laparoscopic radical cystectomy for invasive bladder cancer. Mean patients age was 62.9 years (46-71). The number of patients in clinical stage T1, T2, T3 and T4 were 1 (4.3%), 18 (78.3%), 3 (13%) and 1 (4.3%) respectively. Permanent pathological reported show 100% surgical margin negative for cancer. Lymph node positive was found in 2 patients (8.6 %). TCC was the most common histopathological type found in 22 patient (95.6%). Of 23 patients with laparoscopic radical cystectomy, 20 (87%) performed diversion with ileal conduit technique and ileal neobladder (Studer technique) in 3 patients (13%). (table 1)

Table 2 shows operative data of laparoscopic radical cystectomy. Mean operative times is about 6 hrs and 33 mins, cystectomy times is 2 hrs 50 mins, blood loss approximately 547 ml. Only 4 patients require blood transfusion, of these were operated in first 5 cases of this series and average transfusion require were 3.25 unit/patient (1-6 Unit).

Of 23 patients with laparoscopic radical cystectomy, no perioperative complications eg. adjacent organ injury, uncontrol bleeding or conversion to open technique. Two patients has postoperative complication, first case with wound infection and compartment syndrome of right leg but save with wound dressing, secondary suture and conservative treatment in orderly. Another patient who we had to extent the duration of removing ureteric catheter due to the delaying reabsorbant of the stayed suture (table 3). Average length of hospital stay (LOH) was 17.8 days.

There was no mortality in the present series and all cases discharge without any catheter.

**Table 1** Patient characteristics

	Neobladder	Conduit
Patients	3	20
Mean age (yrs)	54.3	64.25
Clinical stage (pts)		
T1	-	1
T2	1	17
T3	2	1
T4	-	1
Lymph node positive (pts)	1	1
Histologic type		
Transitional cell carcinoma	3	19
Urachal adenocarcinoma	0	1

**Table 2** Intraoperative and postoperative parameters

Operative data	Overall	Neobladder	Conduit
Operative time (hrs)	6.56	6.94	6.50
Cystectomy time (hrs)	2.82	2.45	2.50
EBL (ml)	547	250	592.5
Transfusion (pts)	4	-	4
Average transfusion (units)	1-6	-	3.25
Hospital stay (days)	17.8	24.6	16.85

**Table 3** Complications

Complications	No (pts)
Surgical site infection (SSI)	1
Leg compartment syndrome	1
Retained ureteric catheter	1
No immediate complication	21

## Discussion

Radical cystectomy is widely considered the gold standard treatment for muscle invasive, non-metastasis bladder cancer.[2] The laparoscopic technique has been shown to provide significant benefits in various urological procedures. It has been showed

that the laparoscopic technique offer less postoperative pain, quicker recovery and improved cosmesis compared to the corresponding open approach. Laparoscopic cystectomy was first described by Para et al in 1992, when they performed simple cystectomy for benign pyocytis in a retained bladder after urinary diversion in a 27 years-old woman with post-traumatic paraplegia.[8] The first laparoscopic cystectomy for muscle invasive bladder cancer was reported in 1995 by Sanchez de Badajoz et al[9] The chronological milestones of laparoscopic cystectomy and urinary diversion in the literature listed in the table 4.[4,5,8,9,12-20]

**Table 4** Laparoscopic cystectomy and urinary diversion chronologic milestones

Reference	Completely Intracorporeal	Procedure (No. pts.)
<b>Experimental:</b>		
Valdivia Uria et al[13]	No	Laparoscopic uretersigmoidostomy assisted by instrument pass through anus
Anderson et al[14]	No	Laparoscopic Mainz pouch II, colonic detubularization and ureteroenteric anastomoses performed extracorporeally
Fergany et al[15]	Yes	Laparoscopic cystectomy and ileal conduit
Kaouk et al[12]	Yes	Laparoscopic cystectomy and ileal orthotopic neobladder with Studer limb
<b>Clinical:</b>		
Parra et al[8]	-	Laparoscopic simple cystectomy for retained bladder with pyocystis (1), no urinary diversion performed since pt. had preexisting ileal conduit
Kozminski and Partamian[16]	No	Laparoscopic assisted ileal conduit (2), ileal loop exclusion (1) ureteroileal anastomoses (2) performed extracorporeally
Puppo et al[17]	No	Laparoscopic assisted transvaginal radical cystectomy with ileal conduit performed through mini-laparotomy incision (5)
Sanchez de Badajoz et al[9]	No	Laparoscopic radical cystectomy, ureteroileal anastomosis performed extracorporeally (1)
Denewer et al[18]	No	Laparoscopic assisted radical cystectomy with sigmoid pouch urinary diversion through mini-laparotomy incision (10)
Gill et al[4]	Yes	Laparoscopic radical cystectomy with ileal conduit (2)
Potter et al[19]	Yes	Laparoscopic ileal conduit (no cystectomy) (1)
Turk et al[20]	Yes	Laparoscopic radical cystectomy with Mainz pouch II (5)
Gill et al[5]	Yes	Laparoscopic radical cystectomy with orthotopic ileal Neobladder with Studer limb (2), laparoscopic Indiana pouch (1)

The mean operating time in cystectomy with ileal conduit group was 6.56 hours and 6.94 hours when looking in case of neobladder, not more than 8.3 hours reported by Abdel-Hakim et al (2002)10 and similar to the initial case report of Carvalhal and Gill 2002 (7.3 hrs).[11] The operating time in neobladder group not much longer than in ileal conduit group may be due to performed neobladder group in last 5 cases of this series.

The overall estimate blood loss (EBL) was 547 ml compare to 414 ml in study of Helmal AK 2007 but still less than 825 ml in open surgery group.[21] Only 4 patients require transfusion, all of these patients performed operation in the first five cases of this study. They were no intraoperative complication or open conversion. No bowel complication was detected and no mortality in this series. One patient had compartment syndrome of right leg, clinical show

paresthesia and swelling of lower leg but clinical improve with conservative treatment (bed rest and NSAIDs). Lower limb compartment syndrome is caused by abnormal increase in intracompartment pressure from prolonged elevation of he lower limbs during surgical procedure in lithotomy position. Simms MS et al reports risk factor of compartment syndrome included perioperative blood loss, peripheral vascular disease and obesity.[22] Despite no monitor postoperative pain score and analgesic requirement but data from previous study show pain score significantly less, resulting in less analgesic requirement in the laparoscopic group than in the open surgery group, same with length of hospital stay.[21] Overall hospital stay was 16.85 days in conduit group and prolong up to 24.6 days in neobladder group due to retained ureteric catheter.

Permanent pathological report show T1 stage in one patient, this may be due to complete resection of tumor before proceed to performed radical surgery. Two patients in this series show positive lymph node that's required further adjuvant treatment.

## Conclusions

The laparoscopic radical cystectomy and extracorporeal construction of ileal conduit or ileal neobladder is a feasible and reproducible procedure that results in less operative blood loss, decreased postoperative pain, quicker recovery and shorter hospital stay. Future studies in larger numbers of patients and longer followup are needed to assess longterm oncological and functional outcomes.

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