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Laparoscopic radical cystectomy with pelvic lymph node dissection and ileal orthotopic neobladder by a total extraperitoneal approach: Our initial technique and short-term outcomes

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Purpose: With the increasing application of laparoscopic or robot-assisted radical cystectomy, a reliable and promising method is needed for reducing postoperative complications. We describe the short-term outcomes of totally extraperitoneal laparoscopic radical cystectomy (TELRC) with extraperitoneal pelvic lymph node dissection (EPLND) and extraperitoneal ileal orthotopic neobladder (EION) techniques.

Materials and Methods: From January 2020 to December 2021, we performed TELRC and EPLND with EION in 72 patients in our center. The accompanying video highlights our novel techniques. The patients' demographic data, intraoperative data, and perioperative complications were collected, and short-term oncological and functional results are reported.

Results: All procedures were technically successful without conversion to open surgery. The patients' mean body mass index was 26.22±5.71. Median age was 57.51±12.34 years. Average hospital stay was 13.78±4.62 days. Median intraoperative blood loss was 112.92±88.56 mL. No blood transfusion was needed during the operations and only one blood transfusion was performed during the perioperative period. Mean operating time was 259.44±49.84 minutes. Average cost was US$9,875.71±1,873.08. Postoperative short-term complications included short-term ileus (n=3), infection (n=13), leakage of urine (n=11), and lymph fistula (n=7). One late complication of unilateral vesicoureteral anastomotic stenosis occurred. The mean follow-up was 13.42±8.77 months, and no patient developed local or systemic recurrence. The short-term follow-up and small cohort of patients limited our evaluation of outcomes.

Conclusions: TELRC with PLND and EION was technically feasible and clinically promising, with a reduced potential harm of postoperative complications. Long-term follow-up and a larger cohort of patients are needed for further study.

Keywords: Cystectomy; Laparoscopes; Urinary bladder neoplasms; Urinary diversions

INTRODUCTION

Radical cystectomy (RC) with pelvic lymph node dissection (PLND) is the gold standard treatment for muscle-invasive bladder cancer (BCa) and refractory non-muscle-invasive BCa. With the development of advanced surgical equipment and techniques, more laparoscopic and robot-assisted RC procedures with PLND are being performed [1,2]. However, postoperative complications after RC still frustrate patients and urologists.

Compared with the outcomes of cutaneous ureterostomy and the Bricker operation, the creation of a urinary diversion by use of an ileal orthotopic neobladder (ION) is more acceptable and results in a higher quality of life when performed in the setting of BCa [3,4]. However, complications after RC with ION continue to plague both patients and urologists during a long postoperative period. Generally, infection, leakage of urine, and ileus are common postoperative complications [5,6], which may result in unpredictable consequences. To date, minimally invasive operations including laparoscopic radical cystectomy [7] and robot-assisted radical cystectomy [8] are mostly performed by the intraperitoneal approach, which offers a satisfying operating space. But the intestines are pulled around by surgeons during the intraperitoneal operation, which contributes to ileus and other gastrointestinal complications. Extraperitoneal laparoscopic prostatectomy is thus becoming a preferred treatment because of its shorter operative time and fewer complications [9]. Thus, building on extraperitoneal laparoscopic prostatectomy, we explored a totally extraperitoneal laparoscopic radical cystectomy (TELRC) approach that would minimize adverse effects on intestinal function and reduce potential harm of postoperative complications. In this study, we report our detailed techniques of TELRC with extraperitoneal pelvic lymph node dissection (EPLND) and extraperitoneal ileal orthotopic neobladder (EION) and the short-term outcomes.

MATERIALS AND METHODS

1. Patient selection

A total of 72 patients underwent TELRC with EPLND and EION from January 2020 through December 2021 in our center. Indications included 1) muscle-invasive BCa T2–4a, N0–Nx, M0; 2) high-risk and refractory non-muscle-invasive BCa; and 3) extensive non-muscle-invasive BCa that could not be controlled by transurethral resection or intravesical therapy. The exclusion criteria were 1) patients who rejected TELRC; 2) patients with distant metastasis or other contraindications for TELRC; and 3) patients with contra-
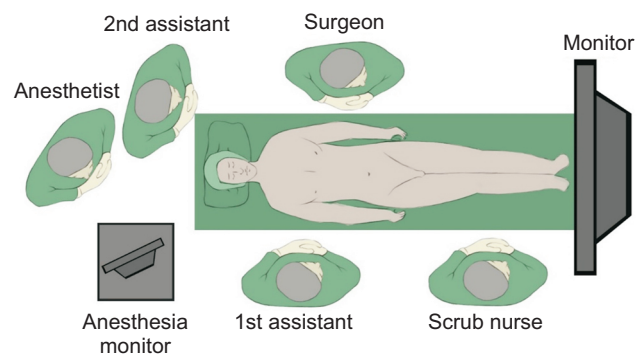

Fig. 1. Operative position.

indications for neobladder surgery, such as a tumor in the urethra, urethral stricture, abnormal abdominal straining, and decompensated renal function. This study was approved (approval no. QDU2020-1018) by the ethics committee of the Affiliated Hospital of Qingdao University, and informed consent was obtained from all patients. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

2. Surgical technique
1) Patient preparation

A standard preoperative evaluation and enhanced recovery after surgery (ERAS) procedure were followed. The surgeon and first assistant stood at different sides of the surgical bed, and the second assistant with the endoscopic camera stood beside the patient's head. A monitor was placed at the patient's foot as shown in Fig. 1.

2) Extraperitoneal space establishment

We performed a novel "two-cut" technique to establish the extraperitoneal space. The accompanying Supplementary Video 1 introduces this technique. In brief, a median incision of the lower abdomen was used to establish the extraperitoneal space, and then a balloon trocar was introduced. A total of 800 mL air was insufflated by use of the balloon trocar with direct vision. Then four other trocars were placed as shown in Fig. 2 under a standard Trendelenburg position.

3) Mobilization of ureter

The accompanying Supplementary Video 2 introduces the step-by-step technique. Expansion of the bilateral fossa iliaca was the first step for creating a sufficient operating space. To mobilize the right ureter, the right spermiduct and spermatic cord (Fig. 3A, ovarian round ligament in a

female) were identified, blocked by use of Hem-o-lok clips (Teleflex Medical, Wayne, PA, USA), and transected by use of an Ultracision harmonic scalpel (Ethicon Inc., Somerville, NJ, USA). The umbilical artery (Fig. 3B) was identified and transected, followed by identification of the ureter, which was close to the peritoneum. Then the right ureter was dissected in the range of the common iliac artery to the ure-

Fig. 2. Port placement. Median incision of the lower abdomen was closed by 7-0 Mersilk sutures followed by 10-cm trocar placement. In our experience, a rectangular distribution of ports was more beneficial to subsequent operations.
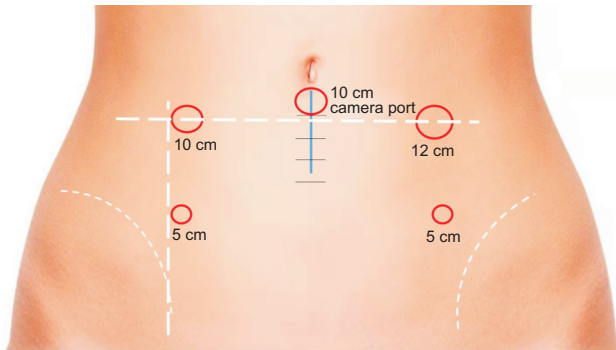
terovesical junction (Fig. 3C). The process was repeated for the left ureter. Incidentally, the perivesical space was dissected by transected perivesical fascia.
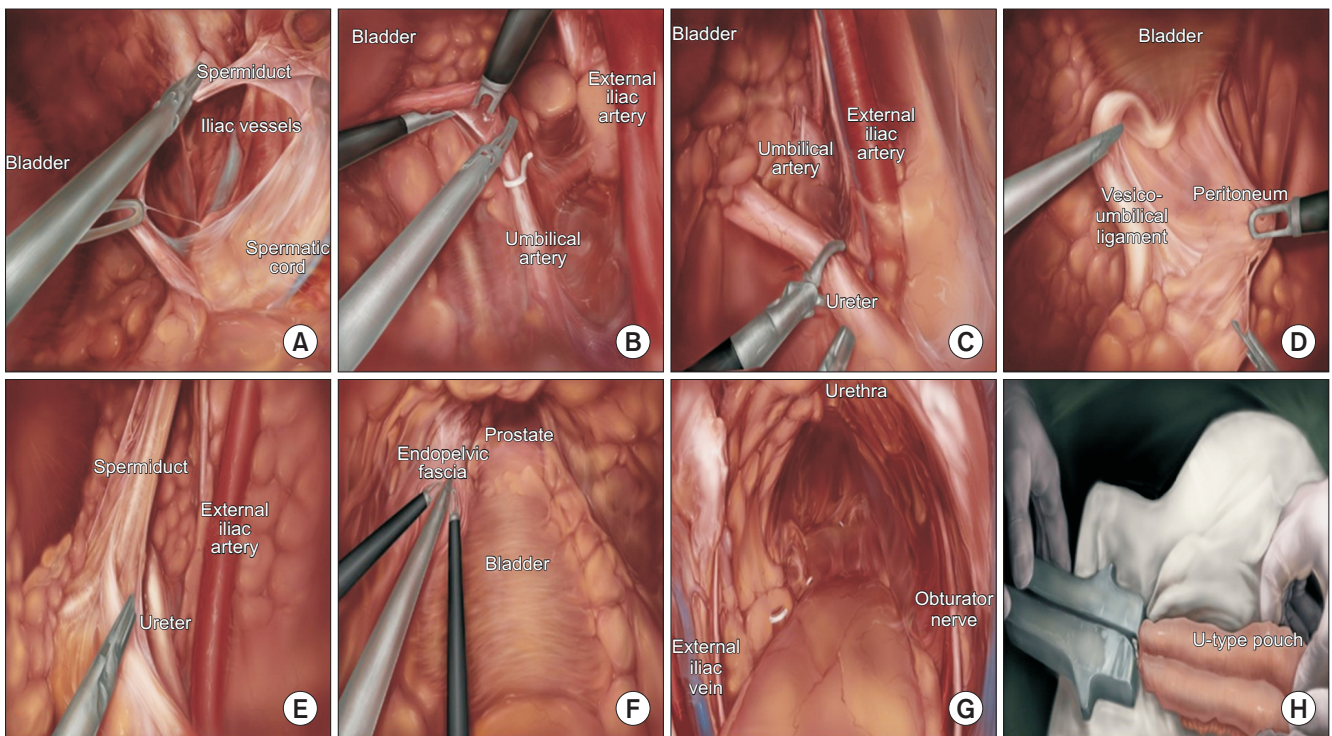
4) Retrovesical dissection

After mobilization of both ureters, the inferior-vesical space was dissected. First, the vesico-umbilical ligament was identified and transected (Fig. 3D). Then retrovesical dissection was performed along with the median umbilical ligament and bilateral spermiducts (Fig. 3E) until seminal vesicle exposure. Next, the prostate was carefully dissected between the prostate posteriorly and Denonvilliers fascia anteriorly. Simultaneously, the endopelvic fascia and lateral prostatic ligament (Fig. 3F) were incised for dissecting the left and right sides of the prostate.

5) Transection of dorsal vein complex and urethra

The puboprostatic ligament and dorsal vein complex (DVC) (pubovesical ligament in female) were transected by use of the Ultracision harmonic scalpel and electrocoagulation was performed simultaneously by laparoscopic bipolar

Fig. 3. Step-by-step totally extraperitoneal laparoscopic radical cystectomy. (A) Transection of spermiduct. Spermiduct and spermatic cord were transected separately. (B) Transection of umbilical artery. (C) Identification and dissection of ureter. Ureter was close to the peritoneum and the dissection range was from the common iliac artery to the ureterovesical junction. (D) Identification of vesico-umbilical ligament. Vesico-umbilical ligament was transected and the peritoneum was separated from the bladder posteriorly. (E) Dissection along with spermiduct. (F) Bilateral seminal vesicle was dissected followed by incision of prostatic pedicles and remaining attachments. (G) Pelvic structure after extraperitoneal pelvic lymph node dissection. (H) Extracorporal manufacture of ileal neobladder. A liner cutter was put into ileum at the bottom of the pouch. Usually, two clips were enough for neobladder.

coagulation (with suturing of the DVC if needed). The urethra was transected using scissors after being clamped with a large Hem-o-lok clip. The urethra was preserved for as long as possible. Next, the prostatic pedicles and remaining attachments of the prostate were dissected.

6) Transection of ureters

The ureters were clipped and marked by use of Hem-o-lok clips and then transected using scissors. The incisal edges of the ureters were detected by intraoperative frozen section diagnosis. Care was taken to ensure a negative margin. The whole specimen was separated and then entrapped *en bloc* in an EndoBag specimen retrieval bag (Medtronic, Homeportmedical, Suzhou, Jiangsu, China). If the surgeon was experienced, transection of the ureters was followed by mobilizing the ureter.

7) Lymphadenectomy

Lymphadenectomy was performed according to a stand PLND procedure (Fig. 3G). Each side of the lymph specimen was put *en bloc* into an EndoBag specimen retrieval bag separately.

8) Extra-peritonealization of orthotopic neobladder

The peritoneum was incised and the ileocecal junction identified. Next, the appendix was resected because of the risk for appendicitis. Then the distal ileum was labeled by use of a 4-0 absorbable suture. Next, the bladder and two lymph specimens were removed through the median incision of the lower abdomen and the labeled ileum was pulled out. A 45-cm proper ileum was cut off. After sufficient disinfection, a "U-type" pouch was extracorporeally made by side-to-side anastomosis using line cutters (Ethicon Inc.; Fig. 3H), and the continuity of the left ileum was restored by side-to-side anastomosis using line cutters. Then the ureters were dragged out and anastomosis was performed between the ureter and the apex of the pouch. A small enterotomy was made for later urethral–neobladder anastomosis at the bottom of the pouch. Two ureteric single-J stents (Kaite, Jinan, Shandong, China) were placed and penetrated the anterior pouch wall (Fig. 4). Next, the ileum and pouch were put into the abdomen through the median incision. The median incision was closed and the extraperitoneal space rebuilt. Next, the ileum was replaced intraperitoneally and the peritoneum was closed (Fig. 4). Anastomosis of the pouch and urethra was done by using a 3-0 V-Loc wound closure device (Covidien Inc., Minneapolis, MN, USA). Simultaneously, a three-cava catheter was placed. A suprapubic incision was made for pulling out the ureteric stents (Fig. 4). Two 8-mm extraperitoneal drains were placed in the pelvis through bilateral 5-mm ports and an 8-mm intraperitoneal drain was placed through the left 10-mm port.

3. Follow-up

Postoperative follow-up was conducted every 3 months in the first year after surgical intervention. Ultrasonography was performed at every follow-up visit. Abdominal/pelvic computed tomography imaging was performed at the 6-month follow-up. Complications were noted during the follow-up visits, which consisted of imaging, physical examination, and biochemical examination.

RESULTS

Patient demographic data are presented in Table 1. There were 65 males and 7 females with a median age of 57.51±12.34 years and a median body mass index of 26.22±5.71. The patients' mean American Society of Anesthesiologists score was 2.57±1.41. A total of 21 patients had hypertension, 11 had diabetes, and 12 had cardiovascular disease. Preoperative clinical stages are listed in Table 1.

Perioperative data are shown in Table 2. Mean operative time was 259.44±49.84 minutes. Blood loss during the operation was 112.92±88.56 mL. Hemoglobin was 107.35±12.27 g/L and albumin was 26.34±2.88 g/L, which were tested on the day following the operation. The mean number of lymph nodes dissected was 15.11±6.19. There were no positive lymph nodes. Two patients had positive margins. Blood transfusion was performed for only one patient. Oral feeding was started after a mean of 3.21±1.53 days and the average hospital stay
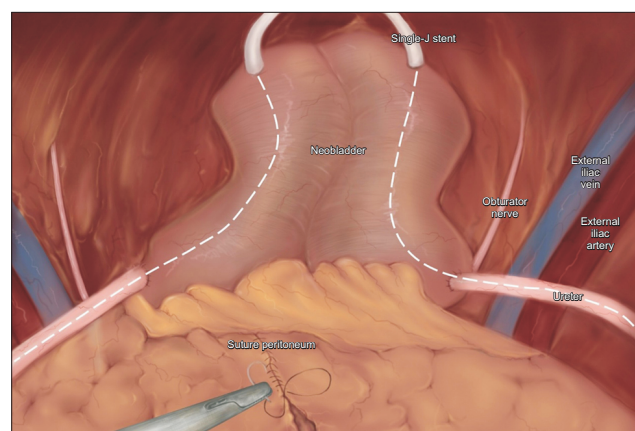
Fig. 4. Extraperitonealization of orthotopic neobladder. Peritoneum was sutured for extraperitonealization of orthotopic neobladder with proper tightness. Bilateral single-J stents were pulled out through the suprapubic incision.

Table 1. Demographic characteristics of the patients (n=72)

Characteristic	No. of patient
Sex	
Male	65 (90.28)
Female	7 (9.72)
Age (y)	57.51±12.34
Body mass index (kg/m^2)	26.22±5.71
ASA class	2.57±1.41
Hypertension	21 (29.17)
Diabetes	11 (15.28)
Cardiovascular disease	12 (16.67)
Clinical stage	
cTis	3 (4.17)
cT1	12 (16.67)
cT2	54 (75.00)
cT3	3 (4.17)
cT4	0 (0.00)

Values are presented as number (%) or mean±standard deviation.
ASA, American Society of Anesthesiologists.

Table 2. Perioperative data

Variable	Data
Operative time (min)	259.44±49.84
Estimated blood loss (mL)	112.92±88.56
Hemoglobin (g/L)	107.35±12.27
Albumin (g/L)	26.34±2.88
Lymph nodes retrieved	15.11±6.19
Positive lymph nodes	0
No. of positive margins	2
No. of blood transfusions	1
Time to oral intake (d)	3.21±1.53
Hospital stay (d)	13.78±4.62
Cost (US dollar)	9,875.71±1,873.08
Follow-up (mo)	13.42±8.77

Values are presented as mean±standard deviation.

Table 3. Pathologic data (n=72)

Variable	No. of patient
Tis	3 (4.17)
Ta-T1	7 (9.72)
T2	56 (77.78)
T3	4 (5.56)
T4	2 (2.78)
Prostate cancer	2 (2.78)
pN+	0 (0.00)

Values are presented as number (%).

Table 4. Complications and survival (n=72)

Variable	No. of patient
Complication	35 (48.61)
Infection	13 (18.06)
Ileus	3 (4.17)
Ureteral leak	11 (15.28)
Ureteral stricture	1 (1.39)
Intestinal fistula	0 (0.00)
Lymphatic fistula	7 (9.72)
Clavien–Dindo class	
1	23 (31.94)
2	10 (13.89)
3	2 (2.78)
4–5	0 (0.00)
Recurrence-free survival	72 (100.00)
Overall survival	72 (100.00)

Values are presented as number (%).

Table 5. Functional outcomes

Continence	3 mo	6 mo	12 mo
Daytime	47 (65.28)	65 (90.28)	69 (95.83)
Nighttime	17 (23.61)	43 (59.72)	52 (72.22)

Values are presented as number (%).

was 13.78±4.62 days. The total cost was US$9,875.71±1,873.08. Mean follow-up time was 13.42±8.77 months.

After the operation, parenteral nutrition was generally administered for the first 3 days. A small amount of water was allowed by oral intake at 24 hours after surgery, which could improve intestinal function. Somatostatin was used once after the operation if there was no ileus. Antibiotic prophylaxis was administered for 5 days after surgery. The neobladder was irrigated through a catheter every day for 1 month (until the catheter was removed). Single-J stents were removed at 30 days after the operation. Note that the single-J stents and the catheter must not be drawn out at the same time. A 7- to 14-day interval was suitable.

Postoperative pathologic results are presented in Table

3. Three patients were Tis and 9.72% of the patients (7 of 72) were Ta-T1. A total of 56 patients were T2, 4 patients were T3, and 2 patients were T4. Two patients had coexisting prostate cancer.

Complications were classified according to the Clavien–Dindo classification system [10]. In this study, all 72 patients were alive and completed follow-up. In total, 35 patients (48.61%) were observed to have complications. Most complications disappeared by 30 days postoperatively. Infection was the major complication (Table 4). Functional outcomes within the first year are shown in Table 5. Most patients (95.83%) reported satisfactory daytime continence 1 year after the operation (continence was defined as the use of ≤1 urinal pad or diaper within 24 hours after catheter removal).

DISCUSSION

RC has been the gold standard for muscle-invasive BCa (T2-T4a, N0-NX, M0); refractory, high-risk noninvasive BCa; and extensive papillary lesions, either as open surgery or as a minimally invasive operation. The long-term survival rates associated with laparoscopic surgery and open surgery are similar [11]. Compared with open surgery, laparoscopic surgery has better outcomes in terms of overall postoperative complications, blood transfusion, opioid analgesic dosage, intraoperative blood loss, and postoperative hospital stay, except for operative time [12]. With improved laparoscopic techniques and advanced operative experience, however, better operative results and fewer complications are sought for both urologists and patients. Thus, we explored a technique for laparoscopic RC by a totally extraperitoneal approach.

EION is better accepted for RC patients who require urinary diversion and results in a better quality of life [13]. However, the postoperative complications related to urinary diversion remain bothersome for a long time. Laparoscopic surgery seems to be a better choice that reduces early complications, but late complications remain [6]. Ileus was generally reported in previous studies as a common postoperative complication after ION [14-16]. Some researchers believe that extraperitonealization of the ileal neobladder can reduce the incidence of postoperative intestinal complications [17]. They showed that an extraperitoneal ileal bladder protects peritoneal integrity and function, reduces adhesion between abdominal organs and postoperative pain, and contributes to postoperative intestinal function recovery and decreased hospital stay.

Some dozen years ago the extraperitoneal approach was performed in open RC. In 1999, Kulkarni et al. [18] first reported RC with retrograde excision of the prostate and bladder, which was performed by a totally extraperitoneal RC technique through a small subumbilical incision. Later, Jentzmik et al. [17] concluded that extraperitoneal RC greatly reduces ileus, but increases lymphatic fistula compared with intraperitoneal RC. In this study, we performed a TELRC and placed two drains in the pelvic cavity in the case of lymphatic fistula. Still, 7 of 72 patients experienced lymphatic fistula. One possible reason was that during EPLND we used the harmonic scalpel without the Hem-o-lok clips, which resulted in some lymphatics reopening after the operation. But there were few lymphatic fistulas when we replaced the drains with negative-pressure drains. In another study [11], researchers collected data on open RC and intraperitoneal laparoscopic RC and found similar outcomes in terms of perioperative blood transfusion rate, postopera-

tive exhaust time, postoperative fluid intake time, and other postoperative complication rates. However, according to our short-term outcomes, we believe that the extraperitoneal approach reduced the patients' hospital stay, decreased overall complications, down-regulated ileus, and stimulated the recovery of intestinal function without increasing the operation time.

At the beginning of TELRC, surgeons may confront many difficulties, even urologists who are experienced in intraperitoneal laparoscopic RC. The extraperitoneal anatomical structure is strikingly different from the intraperitoneal approach. Certainly, if one knew the extraperitoneal anatomical structure well, TELRC would be fast and reliable. Normally, we completed a TELRC with EPLND and EION within 4 hours. During TELRC, the peritoneum should be carefully dissected, especially during retrovesical dissection and expansion of the bilateral fossa iliaca. A peritoneal break would reduce the operating space and complicate subsequent processes. In the clinic, it was unavoidable that the tumor invaded the peritoneum, which meant we could not preserve the intact peritoneum. Accordingly, before TELRC, a full preoperative assessment is very important, especially of tumors in the roof wall of the bladder. Minor defects of peritoneum can be sutured, but for irretrievable defects, the surgeon should be prepared to convert to intraperitoneal surgery, even though the process is difficult.

Postoperative complications in our study were mainly infection and lymphatic fistula. Inadequate bowel preparation might be a cause of infection. Generally, the preparation time for RC with ileal neobladder should be at least 3 days [19]. However, in our center, preoperative preparation for TELRC with EION was 2 days or less. Benefiting from ERAS and extraperitoneal management, oral food intake was shortened to 3.21±1.53 days. Compared with the intraperitoneal approach, leakage of urine and lymphatic fistula was limited in the extraperitoneal space, which reduced the incidence of peritonitis, which usually disappeared after drainage for 2 weeks. In our 72 cases, only one patient experienced unilateral vesicoureteral anastomotic stenosis. We failed to place a double-J stent through either an anterograde or retrograde approach so we performed cysto-urethral anastomosis in this patient by the intraperitoneal laparoscopic approach. Benefiting from TELRC, the anatomical structure was clear and nonadhesive in the intraperitoneal approach, which contributed to the second operation. Capacity of the U-style neobladder was sufficient and daytime continence was 95.83% at 1 year after surgery with regular bladder training.

This study did have some limitations. First, short-term

follow-up does not completely reflect the long-term shortcomings of TELRC. So, we will continue follow-up visits for a long time. Second, in this explorative study, we had no control group, even a retrospective control group, in which we just introduced our surgery procedures of TELRC. So, in the next study we will collect data between TELRC and intraperitoneal laparoscopic RC for comparison with retrospectively collected data.

CONCLUSIONS

We have described the procedures of TELRC step by step and have reported in detail a novel technique for establishing the extraperitoneal space. TELRC with EPLND and EION proved to be technically feasible and promising with shorter recovery times of intestinal function and fewer complications. Long-term follow-up and a large cohort of patients are needed.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

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AUTHORS' CONTRIBUTIONS

Research conception and design: Nianzeng Xing. Data acquisition: Yulian Zhang, Yuanming Sui, Xueyu Li, and Han Yang. Statistical analysis: Xueyu Li and Zongliang Zhang. Data analysis and interpretation: Guanqun Zhu and Zhenlin Wang. Drafting of the manuscript: Guanqun Zhu and Nianzeng Xing. Critical revision of the manuscript: Xinbao Yin and Kai Zhao. Obtaining funding: Zongliang Zhang. Administrative, technical, or material support: Chen Li and Kai Zhao. Supervision: Ke Wang. Approval of the final manuscript: all authors.

SUPPLEMENTARY MATERIALS

Accompanying videos can be found in the 'Urology in Motion' section of the journal homepage (www.icurology.org). The supplementary video clips can also be accessed by scanning a QR code, and will be available on YouTube: Supplementray Video 1, https://youtu.be/6nVgX5BlH1U; Supplementray Video 2, https://youtu.be/FxTTGLrsE94.

REFERENCES

1. Gill IS, Kaouk JH, Meraney AM, Desai MM, Ulchaker JC, Klein EA, et al. Laparoscopic radical cystectomy and continent orthotopic ileal neobladder performed completely intracorporeally: the initial experience. J Urol 2002;168:13-8.

2. Haber GP, Crouzet S, Gill IS. Laparoscopic and robotic assisted radical cystectomy for bladder cancer: a critical analysis. Eur Urol 2008;54:54-62.

3. Lee RK, Abol-Enein H, Artibani W, Bochner B, Dalbagni G, Daneshmand S, et al. Urinary diversion after radical cystectomy for bladder cancer: options, patient selection, and outcomes. BJU Int 2014;113:11-23.

4. Muto G, Collura D, Simone G, Muto GL, Rosso R, Giacobbe A, et al. Stapled orthotopic ileal neobladder after radical cystectomy for bladder cancer: functional results and complications over a 20-year period. Eur J Surg Oncol 2016;42:412-8.

5. Mischinger J, Abdelhafez MF, Rausch S, Todenhöfer T, Neumann E, Aufderklamm S, et al. Perioperative morbidity, bowel function and oncologic outcome after radical cystectomy and ileal orthotopic neobladder reconstruction: Studer-pouch versus I-pouch. Eur J Surg Oncol 2018;44:178-84.

6. Sathianathen NJ, Kalapara A, Frydenberg M, Lawrentschuk N, Weight CJ, Parekh D, et al. Robotic assisted radical cystectomy vs open radical cystectomy: systematic review and meta-analysis. J Urol 2019;201:715-20.

7. Xu P, Chen B, Xu A, Yuan D, Zhang Y, Liu C. Initial experience with intracorporeal laparoscopic radical cystectomy and detaenial sigmoid neobladder reconstruction. Eur Urol 2021;79:545-51.

8. Wijburg CJ, Michels CTJ, Hannink G, Grutters JPC, Rovers MM, Alfred Witjes J; RACE Study Group. Robot-assisted radical cystectomy versus open radical cystectomy in bladder cancer patients: a multicentre comparative effectiveness study. Eur Urol 2021;79:609-18.

9. Kaouk J, Aminsharifi A, Wilson CA, Sawczyn G, Garisto J, Francavilla S, et al. Extraperitoneal versus transperitoneal single port robotic radical prostatectomy: a comparative analysis

of perioperative outcomes. J Urol 2020;203:1135-40.

10. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg 2004;240:205-13.

11. Bochner BH, Dalbagni G, Sjoberg DD, Silberstein J, Keren Paz GE, Donat SM, et al. Comparing open radical cystectomy and robot-assisted laparoscopic radical cystectomy: a randomized clinical trial. Eur Urol 2015;67:1042-50.

12. Chade DC, Laudone VP, Bochner BH, Parra RO. Oncological outcomes after radical cystectomy for bladder cancer: open versus minimally invasive approaches. J Urol 2010;183:862-9.

13. Skinner EC, Fairey AS, Groshen S, Daneshmand S, Cai J, Miranda G, et al. Randomized trial of studer pouch versus T-pouch orthotopic ileal neobladder in patients with bladder cancer. J Urol 2015;194:433-9.

14. Hussein AA, Hashmi Z, Dibaj S, Altartir T, Fiorica T, Wing J, et al. Reoperations following robot-assisted radical cystectomy: a decade of experience. J Urol 2016;195:1368-76.

15. Large MC, Kiriluk KJ, DeCastro GJ, Patel AR, Prasad S, Jayram G, et al. The impact of mechanical bowel preparation on postoperative complications for patients undergoing cystectomy and urinary diversion. J Urol 2012;188:1801-5.

16. Maffezzini M, Gerbi G, Campodonico F, Parodi D. Multimodal perioperative plan for radical cystectomy and intestinal urinary diversion. I. Effect on recovery of intestinal function and occurrence of complications. Urology 2007;69:1107-11.

17. Jentzmik F, Schostak M, Stephan C, Baumunk D, Lingnau A, Weikert S, et al. Extraperitoneal radical cystectomy with extraperitonealization of the ileal neobladder: a comparison to the transperitoneal technique. World J Urol 2010;28:457-63.

18. Kulkarni JN, Gulla RI, Tongaonkar HB, Kashyapi BD, Rajyaguru KB. Radical cystoprostatectomy: an extraperitoneal retrograde approach. J Urol 1999;161:545-8.

19. Cerantola Y, Valerio M, Persson B, Jichlinski P, Ljungqvist O, Hubner M, et al. Guidelines for perioperative care after radical cystectomy for bladder cancer: Enhanced Recovery After Surgery (ERAS(Ⓡ)) society recommendations. Clin Nutr 2013;32:879-87.