Surgical Techniques in UROLOGY

Laparoscopic Radical Cystectomy With Extracorporeal Neobladder: Our Initial Experience

Peng Hong[1], Guang-Pu Ding[1], Han Hao[1], Kun-Lin Yang, Li-Yan Zhuang, Lin Cai, Zhong-Yuan Zhang, Shu-Bo Fan, Lei Zhang, Qi Tang, Xue-Song Li, and Li-Qun Zhou

OBJECTIVE To illustrate our technique to construct the Institute of Urology Peking University (IUPU) orthotopic ileal bladder and present our initial experience.

METHODS From August 2017 to April 2018, 12 patients with bladder cancer underwent radical cystectomy (RC), pelvic lymph node dissection and extracorporeal construction of an IUPU neobladder (IUPUB) by an experienced surgeon. We present the demographic, clinicopathologic, perioperative, and follow-up data. We also describe our step-by-step surgical technique for the IUPUB in this article.

RESULTS Laparoscopic RC with an extracorporeal IUPUB was successfully accomplished in 11 patients, and 1 patient was converted to open RC with an IUPUB. The median total operative time and median time spent suturing the pouch were 248 minutes and 23 minutes, respectively. The median estimated blood loss was 150 mL. The median time to recovery of bowel function (tolerance of a liquid diet) was $3^1/_2$ days. The urinary catheter was removed on post-operative day 21 in 10 patients. The ureteral stents and stoma catheter were removed on day 7 after cystography. At a median followup of $7^1/_2$ months, 2 patients had early complications (<30 days), and no major complications (grade $\geq$ 3) occurred. The follow-up outcomes were satisfactory. The limitations included the small sample size and short-term outcomes.

CONCLUSION Our technique of constructing the IUPUB is feasible and safe. The operative time and early complication rates are acceptable. UROLOGY 124: 286–291, 2019. © 2018 Elsevier Inc.

Radical cystectomy (RC) with lymph node dissection (LND) and urinary diversion is the gold-standard treatment for muscle-invasive bladder cancer.[1,2] The therapy goals are to achieve ideal cancer outcomes, good renal function, and good quality of life after the operation. There are many types of urinary diversions, including urinary conduits, continent cutaneous diversions, and orthotopic neobladder. In the past, the ileal conduit was considered the gold standard for urinary diversion. In 1979, Camey and Le Duc presented their technique of constructing a neobladder with a small bowel.[3] Due to the demand for a perfect body image and good quality of life, the orthotopic ileal neobladder gradually became popular.

Neobladder construction is a challenging and complicated procedure regardless of the approach. The perfect neobladder should have sufficient capacity for storage, low pressure to avoid reflux, sufficient compliance to achieve urinary continence, and complete evacuation.[4,5] In 1989, Studer et al successfully constructed a spherical reservoir as a neobladder with 4 cross-folded detubularized ileal segments.[4] Since the 1980s, many different types of neobladder models have been reported,[6] and surgeons continue to explore techniques to construct a neobladder. The most popular neobladders are the Studer pouch and Hautmann pouch.[7] Some surgeons have reported minor modifications to these pouches,[8] and some modified pouches have a shorter operative time.[9] To simplify the surgical procedures of constructing a pouch and to use less ileum, we designed the Institute of Urology Peking University (IUPU) neobladder (IUPUB).

In this article, we present a step-by-step description of our technique for constructing the IUPUB. This type of pouch is easy to construct and shares features of the Studer bladder and Hautmann bladder. We also present the perioperative data and follow-up data of this technique and our initial experience.

[1] *These authors contributed equally to this paper.*

Financial Disclosure: None.

Funding: No funding.

From the Department of Urology, Peking University First Hospital, Institute of Urology, Peking University, National Urological Cancer Center, Beijing, China; and the Department of Urology, Tufts Medical Center, Boston, America

Address correspondence to: Li Xue-Song, M.D., Ph.D., Department of Urology, Peking University First Hospital, Institute of Urology, Peking University, National Urological Cancer Centre, No. 8 Xishiku St, Xicheng District, Beijing 100034, China. E-mail: pineneedle@sina.com

Submitted: June 2, 2018, accepted (with revisions): November 5, 2018

https://doi.org/10.1016/j.urology.2018.11.017
0090-4295

PATIENTS AND METHODS

Study Population

Between August 2017 and April 2018, 12 patients (7 male and 5 female) with bladder cancer underwent RC with IUPUB by an experienced surgeon. For females, RC included removal of the uterus. The exclusion criteria for IUPUB were distant metastasis, urethral tumor or stricture, poor renal function, severe hepatic dysfunction, active inflammatory bowel disease, and positive margin of the urethra.

All the patients had undergone transurethral resection of bladder tumor and 7 patients had received intravesical chemotherapy before RC. The patients were evaluated preoperatively with ultrasonography, chest radiography, and computed tomography. The data of patients were collected retrospectively, including demographics data, clinicopathology, operative data, and follow-up data.

Preoperative Preparation

The patients underwent full bowel preparation for 2 days before the operation. During the 2 days, the patients had a liquid diet. The day before the operation, the patients took an oral cathartic and underwent intravenous fluid replacement. A nasogastric tube was inserted immediately before the procedure.

Surgical Technique

Patient Positioning and Trocar Configuration. After induction of general anesthesia, all the patients were placed in the Trendelenburg position, which helped the intestines move the cephalad and make more room for the operation. A Veress needle was inserted 2 cm above the umbilicus. The pneumoperitoneum pressure was maintained at 14 mm Hg. A 12 mm trocar was placed 1 cm above the umbilicus for the camera. The remaining 4 trocars were placed under direct vision as operative trocars. The second and third trocars were symmetrically placed 5 cm lateral to the midline below the umbilicus at the caudal level on both sides. The fourth and fifth trocars were placed 4 cm superior and medial to the anterior superior iliac spine on both sides. Thus, the 5 trocars were distributed in an arch shape. The RC with pelvic LND was performed laparoscopically, and the neobladder was constructed through a laparotomy incision around the umbilicus.

RC and Pelvic Lymph Node Dissection. Laparoscopic RC (LRC) and pelvic LND were performed using the standard laparoscopic technique.[10] After LRC, a 5 cm midline incision was made to remove specimens. All the specimens were sent for pathological examination.

Construction of the Neobladder. Through the 5 cm midline incision, the ileum was extracted from the peritoneal cavity. To construct neobladder, we often chose the most sloped ileal segment at approximately 25 cm proximal to the ileocecal valve. A calibrated drain tube was used to measure the length of the ileal segment for constructing neobladder. By cutting the ileum and its adjacent mesentery, a 54-cm ileal segment for neobladder was isolated. We used the ileum to construct the neobladder (39 cm for

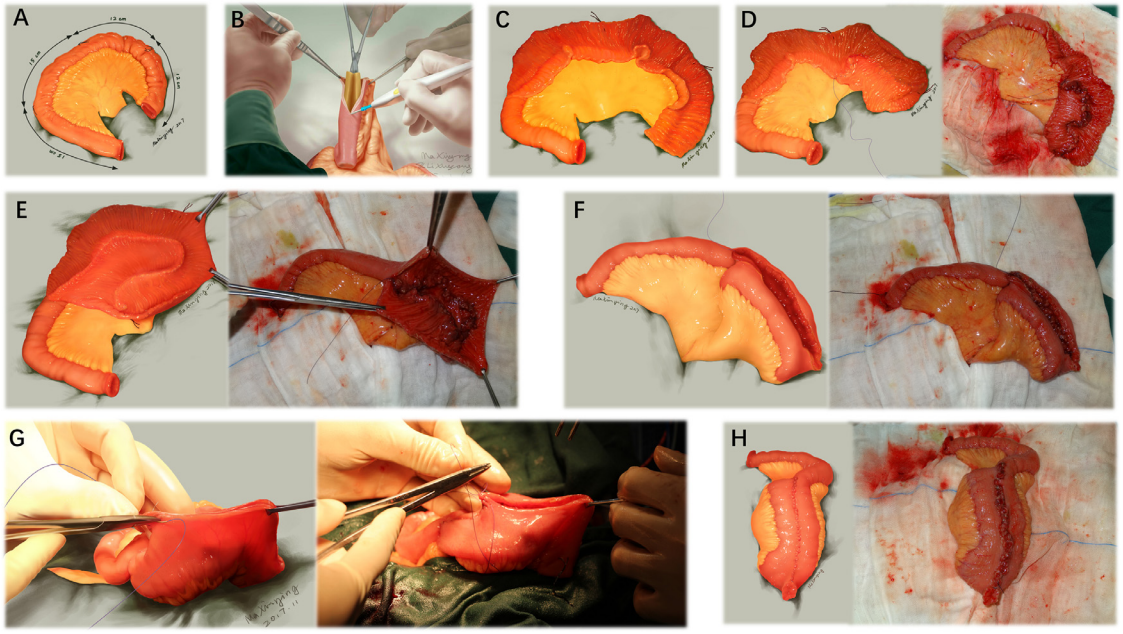

Figure 1. Neobladder construction. (**A**) Ileal segment to construct the neobladder. (**B**) and (**C**) Detubularization with the incision near the mesenteric edge at 1/3 of the way from the distal ileal segment. (**D**) First fold of the distal ileal segment with the two 12 cm segments sutured together. (**E**) and (**F**) Second fold and forming the posterior wall of the neobladder. (**G**) Closing the anterior wall of the neobladder and leaving an opening to anastomose with the urethra. (**H**) Completing the construction of the IUPUB. (Color version available online.)

the pouch and 15 cm for the afferent limb) (Fig. 1A) (Supplementary Fig. 1A). A modified side-to-side ileoileal anastomosis was performed at the antimesenteric edge of the proximal and distal ileal segment by using a linear stapler (Supplementary Fig. 2A,B). The open ends of the ileal segments were closed using a tissue stapler load (Supplementary Fig. 2C,D). The anastomotic edges were strengthened in interrupted Lembert sutures (Supplementary Fig. 2E-G). Then, the mesentery margin was closed.

The ileal segment was cleaned and rinsed with diluted iodine solution. Using sutures, the ileal segment was marked at 12 cm (indicating the first folding point), 24 cm (indicating the second folding point) and 39 cm (indicating the beginning of the afferent limb). The distal 39 cm of the ileum was used for the pouch, and the proximal 15 cm of the ileum was used for the afferent limb. The 39 cm ileal segment was detubularized along the antimesenteric border (Supplementary Fig. 1B,C). We used an intestinal clamp with rubber tube wrapping the clamp jaws to facilitate detubularization (Fig. 1B,C). The distal 12 cm ileal segment was folded, and the neighboring edges of the two 12 cm ileal segments were joined by continuously suturing twice with 3-0 absorbable sutures (Fig. 1D) (Supplementary Fig. 1D). Then, the other edge of the distal 12 cm ileal segment was folded to appose the adjacent edge of the 15 cm detubularized ileal segment (Supplementary Fig. 1E). The neighboring edges were also joined by suturing twice with 3-0 absorbable sutures (Fig. 1E). Thus, parallel edges, consisting of the free edge of the proximal 12 cm ileal segment and the free edge of the 15 cm detublarized ileal segment, were generated (Fig. 1F) (Supplementary Fig. 1F). The parallel edges were sutured with 3-0 absorbable sutures, and a small opening was left in the end far away from the afferent limb to anastomose with the urethra (Fig. 1G,H) (Supplementary Fig. 1G,H). Then, we checked the water tightness of the pouch.

Uretero-Ileal Anastomosis. One 7 F, single-J stent was inserted in each of the 2 ureters. The 2 ureters were split 2.5 cm lengthwise at the distal end and lined up. Then, the 2 ureters were anastomosed into one 2.5-cm-long combined ureter in the distal end. End-to-end anastomosis between the combined ureters and afferent limb was performed with 4-0 absorbable Vicryl in a running fashion. Bladder cystostomy from a punctured incision was performed. Two single-J stents were secured to a stoma catheter with nonabsorbable sutures to facilitate its removal approximately 4 weeks postoperatively. The suture could be loosely tied. Then, the neobladder was put into the peritoneal cavity.

Neobladder-Urethral Anastomosis. After re-establishment of the pneumoperitoneum, end-to-end anastomosis between the small opening of the neobladder and the urethra was performed using 2-0 Q sutures (Polydioxanone, America, and Quill Knotless Tissue Closure Device) by suturing in a running fashion (Supplementary Fig. 3). A 3-way catheter was inserted. The neobladder was tested with irrigation to ensure that the closure was watertight. Then, a pelvic drain tube was placed through the left lateral port site, and the surgical incisions were closed.

Postoperative Care

Neobladder irrigation was started on day 1 postoperatively (100-150 mL saline every 2 hours). The nasogastric tube was removed after passing flatus. Then, starting with clear liquids, the patient gradually returned to a regular diet. When the volume of drainage was <100 mL/day and creatinine analysis of fluid from the pelvic drain excluded urine, the pelvic drain was extracted. Cystography of the neobladder was performed approximately 3 weeks postoperatively (Supplementary Fig. 4). If no leakage was observed, the catheter was extracted. After 1 week of urination training, bladder cystostomy from a punctured incision was removed. Then, the patients were instructed to urinate every 2 hours during the day (every 3 hours at night), gradually increasing the interval to increase the capacity of the neobladder. During this period of time, the patients were advised not to void as soon as they felt incontinent. Patients were advised to drink 2-3 L of water per day in case of hypovolemia and metabolic acidosis. Patients were also taught to empty the neobladder by clean intermittent catheterization.

Follow-Up

Patients were followed-up through WeChat and outpatient services. Routine blood, routine urine, blood gas, and blood biochemical tests and urinary ultrasonography were performed monthly within the first 3 months postoperatively. Then, these tests were performed every 3 months. Uroflowmetry testing was performed at 6 months after surgery. The presence of urinary continence and the quality of life were also followed-up. Complete continence was defined as the use of 0 or 1 pads during the daytime or nighttime. The quality of life of the patients was evaluated by using the National Comprehensive Cancer Network-Functional Assessment of Cancer Therapy-Functional Bladder Symptom Index 18 questionnaire.[11]

RESULTS

The patients' demographic and clinicopathologic data are shown in Table 1. The median age was $49\frac{1}{2}$ years. The median body mass index was 24.05 kg/m^2. Ten patients presented hematuria before the operation. Two patients had neoadjuvant chemotherapy for bladder cancer. The preoperative mean creatinine level was 75.7 μmol/L, while the postoperative mean creatinine level was 79.6 μmol/L. Pathology reports indicated that all patients had transitional cell carcinoma and that 2 men had incidental prostate adenocarcinoma.

Perioperative data are presented in Table 2. LRC with extracorporeal IUPUB was successfully accomplished in 11 patients. One patient, who had undergone open partial cystectomy 2 months prior, underwent Open RC (ORC) with IUPUB. Among all the LRC procedures, there was

Table 1. Demographic and clinicopathologic characteristics of patients

Variable	Value
Patients, *n*	12
Age (year), median	49.5
Sex (male/female), *n*	7/5
BMI (kg/m^2), median	24.05
Hematuria, *n*	10
ASA score, median	2
Previous chemotherapy, *n*	2
Previous intravesical therapy, *n*	7
Previous abdominal surgery, *n*	2
Previous TURBT, *n*	12
Smoking history, *n*	3
Comorbidity, *n*	
DM	2
HT	3
Preoperative creatinine (umol/L), mean	75.7
Postoperative creatinine (umol/L), mean	79.6
Pathology type, *n*	
Transitional cell carcinoma	12
Incidental prostate adenocarcinoma, *n*	2
Pathologic stage, *n*	
T1	2
T2	7
T3	3
Pathologic grade, *n*	
G1	1
G2	1
G3	10

ASA, American society of anesthesiologists; BMI, body mass index; DM, diabetes mellitus; HT, hypertension; TURBT, transurethral resection of bladder tumor.

no conversion to open surgery. The median operative time and median time spent suturing the pouch were 248 minutes and 23 minutes, respectively. The median estimated blood loss was 150 mL. The median time until the patients tolerated a liquid diet and a regular diet were $3^1/_2$ days and 8 days, respectively. Two patients had early complications (<30 days), and their time to catheter removal was prolonged. One patient had an intestinal obstruction, and the other suffered from surgical incision infection. According to the Clavien classification system, no major complications (grade ≥ 3) occurred.[12] The median postoperative hospital stay was 9 days.

At a median follow-up time of $7^1/_2$ months, patients rarely suffered from severe complications. One patient suffered from mucous retention and was treated by irrigation and catheterization. Two patients had metabolic acidosis and were treated conservatively. All the patients were able to void urine. The capacity of the neobladder was 150 mL postoperatively. The median capacity of the neobladder increased to 302 mL and 478 mL at 3 months and 6 months after surgery, respectively. In addition, the median volume of residual urine after voiding was 13.5 mL and 20 mL at 3 months and 6 months after surgery, respectively. Regarding urinary continence, 83.3% of patients achieved complete daytime continence, and 75% of patients achieved complete nocturnal continence when using an alarm clock at 3 months after surgery. At 6 months after surgery, 100% of patients achieved complete daytime continence, and 87.5% of patients achieved complete nocturnal continence. The median peak flow rate was 18.7 mL/s at 6 months postoperatively. The mean quality of life score was 36.1, which was satisfactory.

Table 2. Perioperative data of patients

Variable	Value
Overall operative time (min), median	248
Time of suturing pouch (min), median	23
Estimated blood loss (mL), median	150
Time to flatus (d), median	3
Time to liquid diet (d), median	3.5
Time to regular diet (d), median	8
Time to pelvic drain removal (d), median	6
Hospital stay after operation (d), median	9
Postoperative complications (<30 d), *n* (%)	2 (16.7%)
Follow-up time (mon), median	7.5

COMMENT

The orthotopic ileal neobladder could offer distinct advantages over an ileal conduit. With advancements in surgical techniques and anesthesiology, ileal neobladder reconstruction can be accomplished with low mortality, admissible morbidity, improved quality of life, and improved sexual function.[4,13] Many types of orthotopic neobladder have been reported,[8,9] but there is no consensus on the best type. Many surgeons have improved upon configurations of the neobladder based on their preference.[9,14]

The perfect technique for the construction of an ileal neobladder should be safe and reproducible, and the ileal neobladder must have adequate volume and excellent voiding function. Perioperative and long-term complication rates should be low and the patient should be able to achieve complete daytime continence. The IUPUB was made from the ileum. Compared with the colon and cecum, the ileum has less contractibility and better compliance.[15] Thus, a neobladder made of ileum exhibits lower pressure and better continence rates. The IUPUB is a modified Studer neobladder. Compared with Studer neobladder construction, IUPUB construction utilizes a simpler procedure to create a pouch with less ileum. In addition, uretero-ileal anastomosis and neobladder-urethral anastomosis are different. Differences between the IUPUB and Studer neobladder are summarized in Supplementary Table 1. The IUPUB included a spherical pouch and an afferent limb. The pouch was constructed of detubularized ileum. Hinman's principles show that detubularization of the ileum could abolish the pressure waves caused by peristalsis and lead to the gain of maximal volume and minimal surface area from a certain length of ileum.[16] Moreover, a low-pressure and high-capacity pouch might be good for the upper urinary tract, and an ideal surface-to-volume ratio could reduce the metabolic complications.[17] As the ileum exhibits one-way peristalsis, the afferent limb could prevent reflux and

protect the upper urinary tract, which was confirmed by Studer et al.[18] Compared with the serosa-line ileal antireflux technique reported by Stein and Skinner, which was used in the T-pouch neobladder, the antireflux technique used in the IUPUB is simpler and easier to perform.[19]

Traditionally, ORC and urinary diversion are the gold-standard treatments for invasive bladder cancer.[20] With the advancement of minimally invasive techniques, LRC is being performed by a growing number of surgeons. Compared with ORC, LRC has benefits including a shorter incision, less pain, and shorter recovery time.[21] In 2002, Gill et al first reported their experience with LRC and the intracorporeal orthotopic ileal neobladder for 2 bladder cancer patients.[22] However, the intracorporeal construction of an orthotopic ileal neobladder is more technically demanding and has a steep learning curve.[23] This procedure is also correlated with considerably higher incidences of urine leakage and intestinal complications.[23] Additionally, constructing the neobladder extracorporeally might prevent fecal contamination of the peritoneal cavity during detubularization of the ileum. Thus, most urologists construct the neobladder extracorporeally. Today, although robot-assisted RC and intracorporeal neobladder construction is being performed by an increasing number of hospitals,[23,24] high-cost and long-operative time are still major obstacles, especially in China.[1] Because of the high medical cost of robotic systems and the technical challenge of intracorporeal construction, most surgeons adopt a hybrid approach, such as LRC with extracorporeal construction of the neobladder. This hybrid approach has its own advantages. First, LRC enables a clearer operative view of the pelvic cavity than ORC, which reduces the incidence of pelvic floor structure injury.[25] Second, the duration of bowel exposure is decreased with LRC compared with pure ORC, so the recovery time may be shorter. Third, extracorporeal construction is easier to learn than intracorporeal construction and can shorten the operative time, which may affect both perioperative morbidity and treatment cost.[26] The operative time for IUPUB is comparable to that for other types of neobladder.[27] Overall, LRC with IUPUB is an acceptable procedure, and the operative time will decrease with experience.

Based on our initial experience, we present some technical considerations with regard to our ileal neobladder construction technique. First, with our construction technique, only 54 cm of ileum is required, which is an acceptable length. Because of the absorption function of ileum, an orthotopic neobladder with excessive ileum resection may lead to complications such as metabolic acidosis and deficiency in vitamin B12. Long-term deficiency in vitamin B12 can lead to hematologic and neurologic sequelae. Patients in whom more than 60 cm of ileum is excised or whose terminal ileum and ileocecal valve are excised are more likely to suffer from vitamin B12 deficiency.[28] Hautmann et al reported that using a longer ileum may lead to excessive distension and more post-voiding residuals with subsequent ureteric reflux and metabolic disorders.[29] However, the long mesentery of the ileum could reduce the tension of anastomosis between the ileum and urethra. Hence, an appropriate length of ileum is important for constructing a neobladder. Second, the IUPUB technique is easy to perform and time saving. IUPUB requires only folding the ileum twice, and by adjusting the trend of the ileal segment, only 2 pairs of parallel edges need to be sutured. Thus, the suturing time decreases slightly with the IUPUB technique. With its simpler sutures, IUPUB may also be suitable for intracorporeal construction. Third, with the afferent isoperistaltic ileal segment preventing reflux, we do not need to perform another antireflux procedure, which may increase the difficulty of operation and prolong the operative time. Fourth, the ureteroileal anastomosis is a key step. With our ureteroileal anastomosis technique, the width of the anastomotic stomas increases, so the incidence of anastomotic stenosis will decline. A similar outcome was reported by Kouba et al [30]. Fifth, our incision was only 5 cm long. This feature might allow faster recovery and leave a relatively shorter scar than that with ORC. Last, when suturing the pouch, we used a two-surgeon suturing approach. The two surgeons sutured the pouch from different directions, reducing the pouch suturing time.

The main limitations of this study are the small sample size and retrospective nature. The study also lacks long-term outcomes. In short, further studies with a longer follow-up time and larger patient cohorts are needed to estimate the long-term outcomes of this technique. Therefore, the current article aimed to present the procedures of constructing the IUPUB.

CONCLUSION

We present herein our stepwise technique for construction of the IUPUB, which is safe and repeatable. The IUPUB technique is also simple and easy to learn.

Acknowledgments. The authors are grateful for Madam Xinying Ma, who is an outstanding medical illustrator, and to all the colleagues who helped in the preparation of this article.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.urology.2018.11.017.

Supplementary Figure 1 Diagram of neobladder construction. (A) Choice of ileal segment. (B), (C), (D), (E), (F), and (G) Process of folding the ileal segment. (H) The IUPUB.

Supplementary Figure 2 Modified stapled side-to-side ileoileal anastomosis. (A) and (B) Side-to-side anastomosis at the anti-mesenteric edge performed by a linear stapler through the vertical incision. (C) and (D) Closing open ends of ileal segments with a linear stapler load. (E),

(F) and (G) Strengthening the anastomotic edges via interrupted Lembert sutures.

Supplementary Figure 3 Neobladder-urethral anastomosis under a laparoscope.

Supplementary Figure 4 Cystogram at 3 weeks postoperatively. No leakage and a spherical configuration of the neobladder.

Supplementary Video 1 The video showed the process of constructing the neobladder, especially the steps at which the ileum was folded.

References

1. Stein JP, Lieskovsky G, Cote R, et al. Radical cystectomy in the treatment of invasive bladder cancer: long-term results in 1,054 patients. *J Clin Oncol*. 2001;19:666–675.
2. Stenzl A, Cowan NC, De Santis M, et al. The updated EAU guidelines on muscle-invasive and metastatic bladder cancer. *Eur Urol*. 2009;55:815–825.
3. Camey M, Le Duc A. L'entéro cystoplastie avec cystoprostatectomie totale pour cancer de la vessie. Indications, technique operatoire, surveillance et resultats sur quatrevingtsept cas. *Ann Urol*. 1979;13:114–117.
4. Hautmann RE, de Petriconi R, Gottfried HW, et al. The ileal neobladder: complications and functional results in 363 patients after 11 years of followup. *J Urol*. 1999;161:422–427.
5. Studer UE, Turner WH. The ileal orthotopic bladder. *Urology*. 1995;45:185–189.
6. Shabsigh A, Korets R, Vora KC, et al. Defining early morbidity of radical cystectomy for patients with bladder cancer using a standardized reporting methodology. *Eur Urol*. 2009;55:164–176.
7. Fujisawa M, Isotani S, Gotoh A, et al. Health-related quality of life with orthotopic neobladder versus ileal conduit according to the SF-36 survey. *Urology*. 2000;55:862–865.
8. Mansson A, Caruso A, Capovilla E, et al. Quality of life after radical cystectomy and orthotopic bladder substitution: a comparison between Italian and Swedish men. *BJU Int*. 2000;85:26–31.
9. Jonsson MN, Adding LC, Hosseini A, et al. Robot-assisted radical cystectomy with intracorporeal urinary diversion in patients with transitional cell carcinoma of the bladder. *Eur Urol*. 2011;60:1066–1073.
10. Desai MM, Berger AK, Brandina RR, et al. Robotic and laparoscopic high extended pelvic lymph node dissection during radical cystectomy: technique and outcomes. *Eur Urol*. 2012;61:350–355.
11. Jensen SE, Cella D. Use and interpretation of the National Comprehensive Cancer Network-Functional Assessment of Cancer Therapy symptom indexes in palliative research and treatment: special considerations in ovarian cancer. *J Palliat Care Med*. 2013;3:3–7.
12. 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;240:205–213.
13. Yossepowitch O, Dalbagni G, Golijanin D, et al. Orthotopic urinary diversion after cystectomy for bladder cancer: implications for cancer control and patterns of disease recurrence. *J Urol*. 2003;169:177–181.
14. Bianchi G, Sighinolfi MC, Pirola GM, et al. Studer orthotopic neobladder: a modified surgical technique. *Urology*. 2016;88:222–225.
15. Schrier BP, Laguna MP, van der Pal F, et al. Comparison of orthotopic sigmoid and ileal neobladders: continence and urodynamic parameters. *Eur Urol*. 2005;47:679–685.
16. Hinman Jr F. Selection of intestinal segments for bladder substitution: physical and physiological characteristics. *J Urol*. 1988;139:519–523.
17. Mills RD, Studer UE. Metabolic consequences of continent urinary diversion. *J Urol*. 1999;161:1057–1066.
18. Thoeny HC, Sonnenschein MJ, Madersbacher S, et al. Is ileal orthotopic bladder substitution with an afferent tubular segment detrimental to the upper urinary tract in the long term? *J Urol*. 2002;168:2030–2034.
19. Stein JP, Skinner DG. T-mechanism applied to urinary diversion: the orthotopic T-pouch ileal neobladder and cutaneous double-T-pouch ileal reservoir. *Tech Urol*. 2001;7:209–222.
20. Stein JP. Improving outcomes with radical cystectomy for high-grade invasive bladder cancer. *World J Urol*. 2006;24:509–516.
21. Basillote JB, Abdelshehid C, Ahlering TE, et al. Laparoscopic assisted radical cystectomy with ileal neobladder: a comparison with the open approach. *J Urol*. 2004;172:489–493.
22. Gill IS, Fergany A, Klein EA, et al. Laparoscopic radical cystoprostatectomy with ileal conduit performed completely intracorporeally: the initial 2 cases. *Urology*. 2000;56:26–29.
23. Gill IS, Kaouk JH, Meraney AM, et al. Laparoscopic radical cystectomy and continent orthotopic ileal neobladder performed completely intracorporeally: the initial experience. *J Urol*. 2002;168:13–18.
24. Pruthi RS, Nix J, McRackan D, et al. Robotic-assisted laparoscopic intracorporeal urinary diversion. *Eur Urol*. 2010;57:1013–1021.
25. Simonato A, Gregori A, Lissiani A, et al. Laparoscopic radical cystoprostatectomy: a technique illustrated step by step. *Eur Urol*. 2003;44:132–138.
26. Ludwig AT, Inampudi L, O'Donnell MA, et al. Two-surgeon versus single-surgeon radical cystectomy and urinary diversion: impact on patient outcomes and costs. *Urology*. 2005;65:488–492.
27. Richards KA, Hemal AK, Kader AK, et al. Robot-assisted laparoscopic pelvic lymphadenectomy at the time of radical cystectomy rivals that of open surgery: single institution report. *Urology*. 2010;76:1400–1404.
28. Pfitzenmaier J, Lotz J, Faldum A, et al. Metabolic evaluation of 94 patients 5 to 16 years after ileocecal pouch (Mainz pouch 1) continent urinary diversion. *J Urol*. 2003;170:1884–1887.
29. Hautmann RE, Botto H, Studer UE. How to obtain good results with orthotopic bladder substitution: the 10 commandments. *Eur Urol Suppl*. 2009;9:712–717.
30. Kouba E, Sands M, Lentz A, et al. A comparison of the Bricker versus Wallace ureteroileal anastomosis in patients undergoing urinary diversion for baldder cancer. *J Urol*. 2007;178:945–948.