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Robotic Radical Cystectomy with Intracorporeal Urinary Diversion – Tips and Tricks

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Abbreviations:
ORC = open radical cystectomy;
RARC = robotic assisted radical cystectomy;
LND = lymphadenectomy.

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Rezumat

Cistectomia radicală robotică cu derivație urinară intracorporeală - tips and tricks

Cistectomia radicală reprezintă tratamentul standard în cazul pacienților diagnosticați cu tumori vezicale invazive muscular (MIBC). Pe parcursul ultimelor două decenii s-a observat o schimbare în abordarea chirurgicală a MIBC, de la chirurgie deschisă la chirurgie minim invazivă. În prezent, în majoritatea centrelor urologice terțiare, cistectomia radicală robotică cu derivație urinară intracorporeală reprezintă abordarea chirurgicală standard. Scopul prezentului studiu este de a descrie în detaliu etapele chirurgicale ale cistectomiei radicale robotice şi derivației urinare şi de a prezenta experiența noastră cu această procedură. Din punct de vedere chirurgical, cele mai importante principii care ar trebui să ghideze chirurgul în efectuarea acestei proceduri sunt: 1. realizarea unui spațiu extins de lucru şi acces atât la nivelul pelvisului, cât şi al abdomenului şi utilizarea „tehnicii spațiilor"; 2. respectarea principiilor oncologice ale intervenției chirurgicale, cu atenție acordată marginilor de rezecție şi limitării riscului de diseminare tumorală; 3. atenție atat la manipularea ureterelor cât şi a intestinului pentru a evita leziunile iatrogene; 4. atenție în realizarea anastomozei uretero-ileale pentru a asigura rezultate funcționale bune pe termen lung. Analizând baza noastră de date, am identificat 213 pacienți diagnosticați cu cancer de vezică urinară invaziv muscular, pentru care s-a practicat cistectomie radicală minim invazivă (laparoscopic sua robotic) între ianuarie 2010 şi decembrie 2022. Dintre aceştia, în 25 de cazuri, cistectomia radicală a fost realizată prin. abord

robotic. În ciuda faptului că este una dintre cele mai dificile intervenții chirurgicale urologice, cu pregătire şi pregătire atentă chirurgul este capabil să atingă maximul oncologic şi rezultate funcționale bune prin efectuarea cistectomiei radicale robotice cu derivație urinară intracorporeală.

Cuvinte cheie: cistectomie radicală robotică, derivație urinară intracorporeală, limfadenectomie, tumoră vezicală

Abstract

Radical cystectomy represents the standard surgical treatment in case of muscle invasive bladder cancer. During the last two decades a change in the surgical approach of the MIBC has been observed, from open surgery to minimal invasive surgery. Nowadays, in the majority of tertiary urologic centers, robotic radical cystectomy with intracorporeal urinary diversion represents the standard surgical approach. The aim of the current study is to describe in detail the surgical steps of the robotic radical cystectomy and the reconstruction of the urinary diversion and to present our experience. From the surgical point of view, the most important principles which should guide the surgeon when performing this procedure are: 1. Good working place and access both to the pelvis and abdomen and use of the "technique of spaces"; 2. Respect the oncological principles of the surgery with attention to the margin resection and limitation of the risk of tumour spillage; 3. Attention to both the ureter and bowel manipulation in order to avoid grasping lesions; 4. High care in realisation of the uretero-ileal anastomosis so that good long term functional results are achieved. We analyzed our database of 213 patients diagnosed with muscle invasive bladder cancer who underwent minimally invasive radical cystectomy (laparoscopic and robotic approaches) between January 2010 and December 2022. We identified 25 patients for whom the robotic approach was used to perform the surgery. Despite being one of the most challenging urologic surgical procedures, with careful preparation and training, the surgeon is able to achieve the maximum oncological and functional results by performing robotic radical cystectomy with intracorporeal urinary.

Key words: robotic radical cystectomy, bladder cancer, intracorporeal urinary diversion, lymphadenectomy

Introduction

Radical cystectomy has been the standard surgical treatment for muscle invasive bladder cancer for the last decades (1). Despite the fact that the first open procedures were performed in the late 1800s, the clear principles of radical cystectomy were proposed by Marshall and Whitmore only in 1949 (2). The same principles are followed nowadays, but the preferred approach shifted from open (ORC) to minimally invasive. In 2003, Menon et al. published the first series of 17 cases of robotic assisted radical cystectomy (RARC) (3). A retrospective review of more 2401 patients with muscle invasive bladder cancer, treated in 12 high level centers from USA and Europe, showed a change from open approach towards robotic approach in performing radical cystectomy (2006-2008: 29% vs 71% while in 2015-2018: 54% vs 46%) (4).

The shift of the surgical approach may be due to the continuous efforts to improve the oncological and surgical outcomes of radical cystectomy. Among the urologic procedures, radical cystectomy has the highest morbidity and risk of complications (5). Also, patient's recovery is slower compared to other urological

procedures (6). After radical cystectomy, the quality of life is affected, the patient having to learn to care and live with the ostomy bag (7). Moreover, in case of neobladder, the patient has to understand when the bladder is full and has to learn how to evacuate the urine (8-10). All in all, radical cystectomy presents multiple challenges both for the surgical team and for the patient, and surgery optimisation is essential in order to achieve the optimal oncological and functional results.

Aim of the Study

In the current study, our aim is to present our experience in performing radical robotic cystectomy with intracorporeal urinary diversion and to discuss the technical surgical details of this procedure. We divided the current study into two main parts: I. Presentation of the surgical technique; II. Presentation of our experience.

In the first part we discuss separately the patient positioning and trocar placement, the robotic radical cystectomy, and the total intracorporeal urinary diversions surgical techniques.

In the second part we present our experience by analyzing our prospective maintained database of patients diagnosed with muscle invasive bladder cancer who underwent minimally invasive radical treatment. Between January 2010 and December 2022, we identified 213 patients who underwent surgical treatment (laparoscopic and robotic), of which 25 were operated using the robotic approach.

Discussions

Patient Positioning and Trocar Placement

For patient positioning, the Pasadena Consensus Panel recommends the 30° Trendelenburg dorsal decubitus (11). Despite this, we consider that is better to use a limited 15° Trendelenburg position, in order to have better access to the ileum for the urinary diversion. Also, depending on the robotic system used, the patient should be in French position for DaVinci S, Si and X platforms, while for the DaVinci Xi the robot may be docked laterally to the patient. In case of female patients, French position should always be used in order to extract the specimen through the vagina. Arms should be adducted in arm guards in order to provide the optimal space to the assistant surgeon.

Access to the peritoneal cavity may be obtained either using the Veres needle or the Hasson technique. We prefer the latter, in order to have clear and visible access and to avoid complications associated with the Veres techniques (12).

In terms of port placement there are two widely used configurations. The Karolinska configuration uses the umbilicus as the reference point (13), while the City of Hope configuration uses the pubic symphysis (14). In our daily practice we use the Karolinska configuration with the optic trocar 2 cm incision made approximately 5 cm cephalad to the umbilicus. After the pneumoperitoneum is obtained the working trocars are placed laterally to the umbilicus with 9-10 cm between them: on the left side two 8 mm trocars for the robotic arms, while on the right side one 8 mm trocar for the robotic scissors and the 12 mm trocar for the AirSeal. Another 5 mm trocar is placed 5 cm cephalad between the optic and right robotic arm, usually being used for the suction. City of Hope configuration places the optic trocar on midline at 25 cm from the pubic symphysis while the second, third, and fourth arms 20-23 cm from the pubic symphysis (11). Regardless of the configuration used, the common mistake which has to be avoided is placing the trocars too caudally because there will be limitation both for bowel access and manipulation and for performing extended lymphadenectomy.

Robotic Radical Cystectomy and Lymphadenectomy

In our daily practice, firstly we perform the radical cystectomy followed by lymphadenectomy (*Fig. 1, Fig. 2*). There are surgeons who

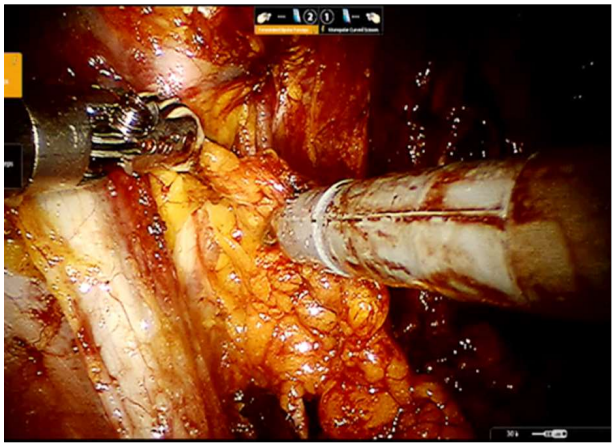

Figure 1. Left pelvic lymphadenectomy

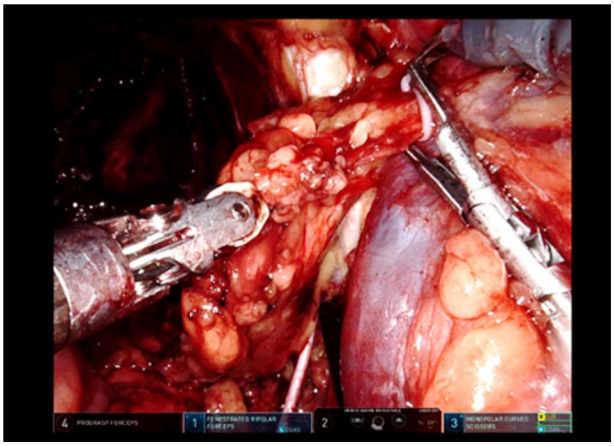

Figure 2. Right pelvic lymphadenectomy

advocate for performing the lymphadenectomy as the first step of the surgery due to several reasons: better dissection and bladder pedicles exposure, better guidance to perform the internal iliac dissection due to urachus suspension in anatomic position and identification of umbilical artery, difficult and high risk step of the procedure better to be done when the surgeon is not tired (11). Ozen et al showed that in case of open radical cystectomy, starting the procedure with the LND shortens statistically significantly both the cystectomy time and the total surgical time (15). In contrast, in case of the robotic approach the timing of the eLND did not influence the duration of the surgery (16). Regardless of the timing of the eLND, this is one of the most important steps from an oncological point of view, a higher number of resected lymph nodes being associated with better OS (17,18).

The best way to master the surgical steps related to radical cystectomy is by incorporation of the "technique of spaces" (19). There are four spaces of dissection and, in our practice, we approach them in the following order: periureteral space, anterior rectal space, lateral pelvic space, and retropubic space (*Fig. 3*).

Firstly, the "periureteral space" refers to the ureter dissection which is performed in a no-touch fashion. At the level of intersection with the iliac vessels the ureters are identified, dissected circumferentially and isolated using a vessel loop (*Fig. 4*). The vessel loop allows

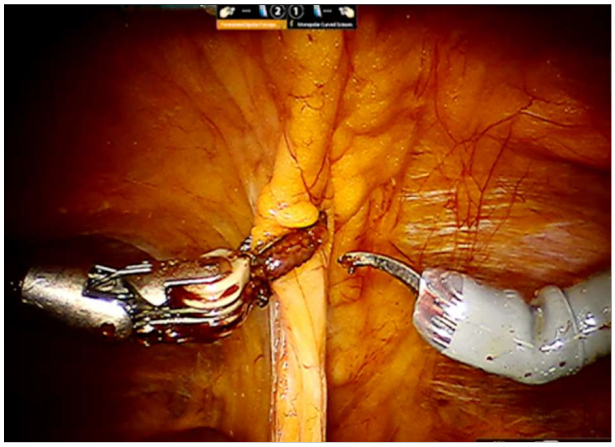

Figure 3. Retropubic space dissection. Uracus traction using the third robotic arm grasper

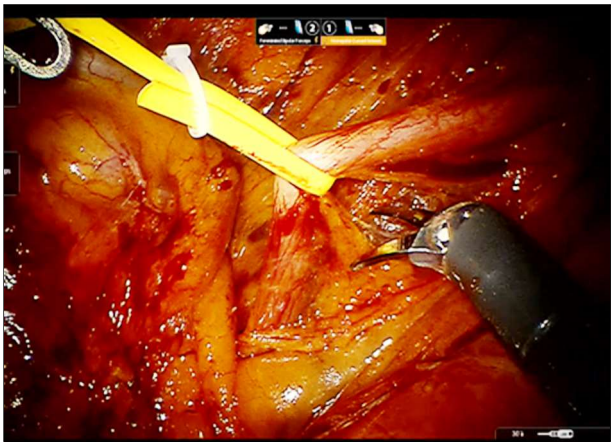

Figure 4. Ureteral space dissection – Left ureter dissection. Preservation of the periureteral fat and using vessel loop for the „no touch" ureter manipulation

ureter manipulation without the risk of grasping lesions. Cranial dissection of the ureters above the intersection with iliac vessels should be avoided or minimized in order to prevent ureteral devascularization which is an important risk factor for ureteroileal anastomosis stenosis. Higher rates of ureteric strictures have been observed on the left side (20-22), which may be due to more extensive dissection and mobilization of the ureter with subsequent vascularization destruction in order to manage the ureteral transposition to the right.

After the ureter dissection up to the bladder, a XL hem-o-lok is applied on the distal end, in order to avoid urine spillage and a XL hem-o-lok with a suture is applied on the proximal end with 1 cm distance between the two (*Fig. 5*). We use the suture on the hem-o-lok for easier manipulation of the ureter which is sectioned distally. The resected ureteral fragment is introduced in a glove finger and extracted, in order to minimize the risk of tumor spillage. Ureteral frozen sections are helpful to minimize the risk of upper urinary tract tumor recurrence (23,24).

There are variations of the surgical technique for male and female patients. In men, the cystoprostactectomy is performed consisting of removal of the bladder, prostate, seminal vesicles, and distal parts of the deferent ducts (1). In women, an anterior pelvectomy is realized with removal of the bladder, uterus, ovaries, and anterior part of the vagina (1).

Bladder dissection always has to start in the posterior with the dissection of "anterior rectal space" (*Fig. 6*). In men, incision of the parietal peritoneum at the level of Douglas pouch is performed followed by identification of seminal vesicles. The pararectal space is developed bluntly in order to avoid neurovascular bundle lesions, these structures being lateral to the rectum (11). After the dissection of the deferent ducts and seminal vesicles, the dissection of the prostate posterior plane is performed with respect to the Denonvilliers fascia up to the level of urethra. The posterior dissection of the prostate is facilitated by the 30° angle of the camera oriented upwards. During this step, the lateral dissection of the neurovascular bundles is started in patients candidates for nerve-sparing surgery. Lateral bladder dissection (*Fig. 7*) may be performed with or without the opening of the endopelvic fascia, while the bladder pedicles may be dissected and sectioned either using the hem-o-loks or the vessel sealing devices (Ligasure, Endo GIA vascular stapler) (25), the latter reducing the

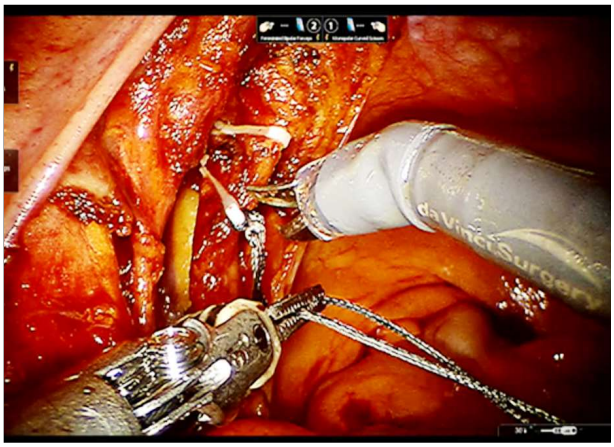

Figure 5. Ureter division. Use of hem-o-lok with suture for ureter manipulation and distal end ureter sampling for frozen sections

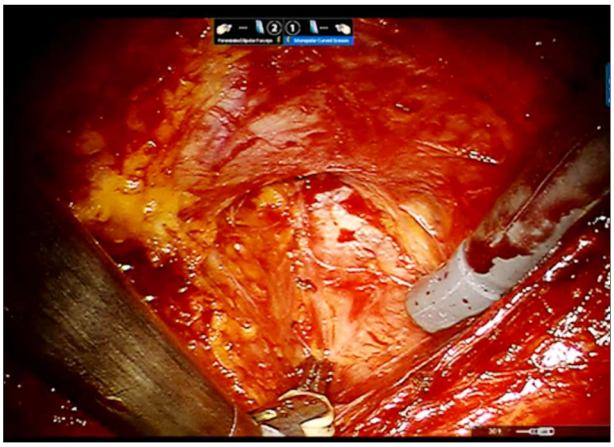

Figure 6. Anterior rectal space dissection. The third robotic arm with the grasper performs an anterior traction of the bladder, while the secpnd robotic arm with the bipolar forceps performs a posterior traction in order to create the tissue tracts

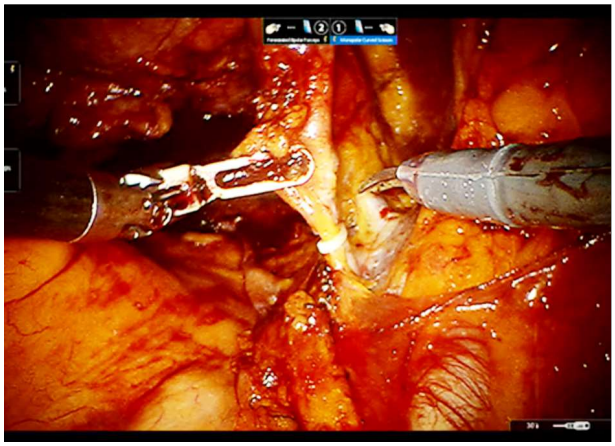

Figure 7. Lateral pelvic space dissection with ligation of the umbilical artery

operating time. Anterior dissection of the bladder is performed from the level the urachus umbilical insertion up to the prostatic apex. In order to avoid neurovascular bundles destruction, we changed our technique and prefer to incise the dorsal venous complex up to the prostatic apex and suture it after the cystectomy specimen is completely mobilized. At the prostatic apex, the urethra has to be dissected circumferentially and after the bladder is emptied and the bladder catheter is removed, an XL hem-o-lok seals the urethra in order to avoid tumor spillage (14). Frozen sections of the urethra have to be obtained for the patients at risk: those with CIS, male patients with prostatic urethra urothelial carcinoma (1). The cystoprostatectomy specimen together with the resected lymphatic tissue are placed in the organ bag and extracted through a five centimeters incision performed in the left iliac fossa.

In female patients, there are two gestures that have to be done in order to optimize access to the posterior plane: 1. Anterior retraction of the uterus either using a stay suture (26) or using the third robotic arm; 2. a vaginal manipulator eases the posterior bladder dissection with the vaginal incision and dissection (11,27). The AirSeal System is extremely helpful to maintain the pneumoperitoneum while the vagina is opened. Reducing the gas leakage may be done with placement of the dressing glove at the level of vaginal introitus. For the vaginal wall closure we prefer using an absorbable barbed suture (V-Lock 2-0). Also, the vagina is suspended using a non-absorbable suture either to the sacral promontory or to the pubis in order to prevent prolapse (11).

Robotic Intracorporeal Urinary Diversion

After bladder resection, the reconstructive part of the surgery follows with the creation of the urinary diversion. There are three common types of urinary diversions: ileal conduit, the most frequently used, the orthotopic neobladder, reserved for young, fit patients and the cutaneous ureterostomy, reserved in case of palliative cases (1,28,29). In the current paper, we will discuss technical aspects for the intracorporeal ileal conduit and orthotopic neobladder. Currently, the ileum is the preferred segment of the intestine for the creation of the urinary diversion (1,28). In order to optimize the procedure the 45 mm or 60 mm Endo GIA intestinal stapler is used (13,30). For safer manipulation, we recommend the use of the articulated intestinal stapler, even if similar results may be obtained with the rigid one. It is necessary to insert either a supplementary trocar on the left side of the patient, or the third robotic arm trocar to be changed with a 12 mm trocar in order to have access with the stapler device.

The creation of the urinary diversion has to follow two essential principles: 1. Proper positioning and place of choice for ileal harvesting; 2. Safe intestinal manipulation using the intestinal graspers and avoiding to cause crush lesions with the risk of intestinal fistula (11,14,31). There are two main techniques described in literature: the Marionette technique (30) which uses the marionette stitch (a suture through the abdominal wall) to harvest the ileal conduit and the ligaloop bands technique which uses the vessel loops through windows created in the mesentery (13). In our daily practice, we use a 10 cm vessel loop to establish the stapling places in order to obtain the ileal segment and the length of the conduit. For the

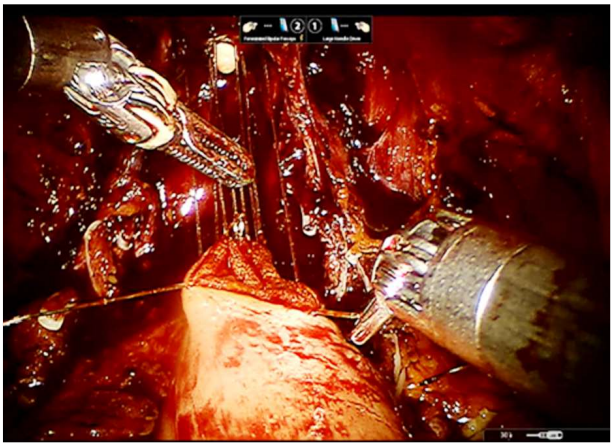

Figure 8. Urethro-ileal anastomosis using the van Velthoven technique – 3-0 Stratafix suture

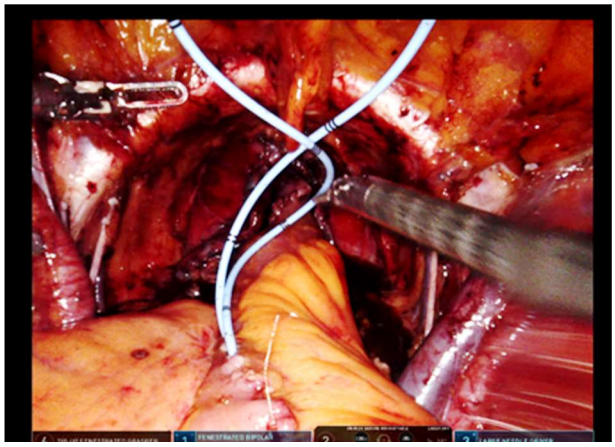

Figure 9. Final aspect of orthotopic neobladder

ileal conduit, we measure 10 cm from caecum for the first stapling line, and a further 20 cm for the second stapling line. For the orthotopic neobladder, firstly we measure 10 cm from the caecum to identify the first stapling line, followed by another 10 cm length of the ileum to establish the place for the urethro-ileal anastomosis and the efferent loop. For the afferent loop, further 30 cm of ileum are measured and the second stapling line is realized. The urethra-ileal anastomosis is performed between the ileum antimesenteric side and urethra, using an absorbable 3-0 suture (Stratafix or Quill) in a van Velthoven fashion (*Fig. 8*), protected by a 20 Ch Foley catheter. Increased attention has to be paid to the ileum mobilization, in order to realize a tension free anastomosis. Always, the ileal segment exclusion has to be realized after the anastomosis was finished. To complete the creation of the neobladder, the efferent loop and 10 cm of the afferent loop of the harvested ileum are detubularised using an anti-mesenteric incision, followed by a continuous suture of the posterior, respectively anterior margins, using a nonabsorbable suture (Stratafix 3-0, V-Lock 3-0) (*Fig. 9*).

The bowel continuity is realized by creation of an opening in the distal and proximal ileal ends. The two segments will be anastomosed using two stapling lines at the level of anti-mesenteric border. In this way, we avoid a stenotic latero-lateral ileal anastomosis. Finally, the anastomosis is completed by a transverse stapling line to close the two ileal ends. A careful dissection of the mesentery on each side of the ileal ends helps to avoid using an extra stapler load. If there is any mesenteric window it has to be closed using interrupted sutures (32). The closure has to be performed with care in order to avoid lesions of the mesenteric vascularization.

After the creation of the ileal conduit or the neobladder, the left ureter has to be brought to the right, through the rectosigmoid window, which should be large enough in order to avoid ureteral tension which may determine both ischemic lesions and ureteral obstruction (31). The aim of the posterior rectosigmoid ureteral transposition is to avoid internal bowel hernia and occlusion. Attention has to be paid during the ureter transposition in order the avoid ureter twisting which will enhance the risk of ischemic lesions (33).

There are two techniques described for the uretero-ileal anastomosis: the Wallace technique and the Bricker technique (11,14, 33). In both techniques the ureters are spatulated for a 2-3cm length. In the Wallace technique, the posterior walls of the ureters are sutured side to side using an absorbable 4-0 Vycril suture realizing the Wallace plate (*Fig. 10*). Afterwards, the ureteral catheterization is performed using two single-J 40 cm ureteric stents after being passed through the ileal conduit. Finally, the Wallace plate is

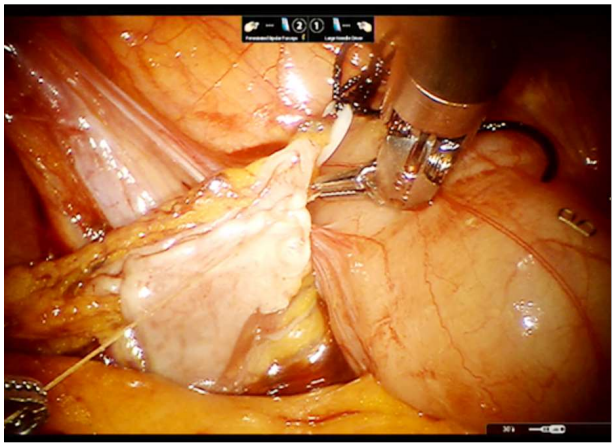

Figure 10. Posterior suture of the two spatulated ureters with the creation of the Wallace plate

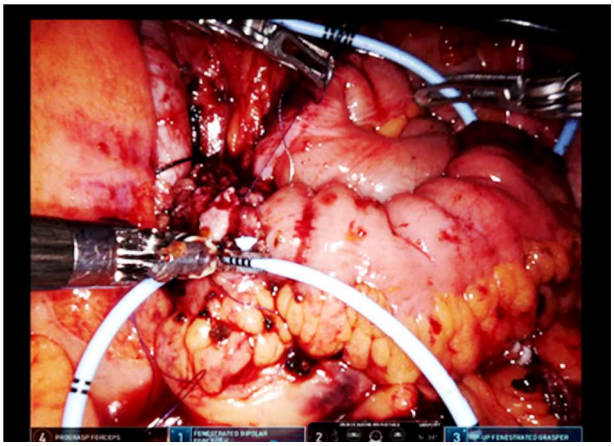

Figure 11. Ileal conduit with Bricker ureteral anastomosis

sutured to the ileal conduit using two hemi-surget non-absorbable 4-0 Vycril sutures. Despite using the Wallace technique in the beginning, we switched to the Bricker technique with creation of two enterostomies, followed by separate anastomoses of the ureters to the ileal conduit (*Fig. 11*). The uretero-ileal anastomosis is performed in a hemi-surget fashion using two absorbable Vycril 4-0 sutures. After completion of the posterior suture of the anastomoses, a single J 40 cm ureteral stent is passed through the ileal conduit and up to the level of the kidney. Despite the fact that Bricker and Wallace techniques have similar functional postoperative results (34), we made the switch to the Bricker technique, in order to avoid damage to both kidneys in case of an anastomosis complication. Several studies showed that the intracorporeal urinary diversion has a lower risk of anastomosis stricture due to reduced mobilization of the ureter followed by a better preservation of ureteric circulation compared to the extracorporeal techniques (20,35). To improve the functionality of the anastomosis, indocyanine green is used to confirm that both the ureters and the ileal conduit present good vascularization at the anastomosis level. Several studies have demonstrated the potential of ICG use for reduction of anastomosis stricture risk (36,37).

All in all, for a good uretero-ileal anastomosis, Narita et al. proposes five principles to be followed: (1) wide delicate dissection of the ureter and preservation of the periureteral tissues; (2) gentle handling of the ureter and security of periureteral tissues at the anastomotic site; (3) use of indocyanine green to confirm good blood supply; (4) standardization of the ample ureteral spatulation length for Wallace ureteroenteric anastomosis through objective measurements; and (5) development of an institutional standardized procedure manual (38).

After the completion of the anastomosis, a non-absorbable silk 1 suture is used to fix the stents at the level of the distal part of the ileal conduit. The stoma site is prepared at the premarked location, and a Babcock forceps is used to grasp the distal ileal segment and stents using the mark silk suture to mature the stoma. The Wound, Ostomy and Continence Nurses Society strongly recommends the preoperative marking of the optimal location for the urinary diversion stoma in order to optimize patient's independence in stoma care, predictable pouching system wear times, and resumption of normal activities (39).

Our Experience

Since 2010, we have performed 213 minimally invasive radical cystectomies. Due to the fact that the robotic surgical program had not been

financed by the authorities since 2012, we were obliged to make the switch towards the laparoscopic approach in the public hospital. We continued to perform this procedure using the robotic approach only in the private system. Until December 2022, 25 patients diagnosed with muscle invasive bladder cancer underwent robotic radical cystectomy. The performed urinary diversion was: cutaneous ureterostomy (10 cases); intracorporeal ileal conduit (7 cases); intracorporeal orthotopic ileal neobladder (8 cases). The median age was 59 years (42-72 years) and all of them were male. The average operating time was 400 minutes (240-600 minutes). The average blood loss was 330ml (100-600 ml). Intensive care unit stay was on average 5 days (1-16 days), while median total hospital stay was 14 days (6-30 days). The final pathology result revealed urothelial carcinoma pT1-T2: 65% (16) of cases and pT3-T4 (9 cases), associated carcinoma in situ in 5 cases, and positive lymph nodes in 5 cases.

Most of the cases with cutaneous ureterostomy were performed at the beginning of the robotic surgical program in our center. Apart from this reason, an advanced disease (pT3/pT4 N+) or multiple comorbidities with increased anesthesia risk were common for 8 in 10 patients. Of the 7 cases of intracorporeal ileal conduit, the uretero-ileal anastomosis was performed using the Wallace or Bricker technique in 4, respectively 3 cases. For the orthotopic neobladder we always used the same technique described earlier in the article. Postoperative early complications were encountered in 12 cases, of which 8 were Clavien 1 and 2 (anemia requiring blood transfusion in 4 cases, prolonged ileus in 1 case, lymphorrhea in 1 case, 2 cases of pyelonephritis). The Clavien 3 and 4 complications encountered were 1 case of ileal anastomosis fistulae, 1 case of volvulus and 2 cases of urinary fistulae. One case of the urinary fistulae was treated conservatively while the other one required uretero-ileal re-anastomosis.

When we compare our experience with the literature, we observe similar operating times (ranging from 210 to 676 minute) and duration of hospital stay (ranging from 5 – 9.7 days) (40). From the perspective of postoperative complications, Leow et al observed a 46% decreased risk of Clavien-Dindo 1 and 2 complications, but no difference for Clavien-Dindo 3-4 complications, when robotic and open approaches were compared (41). There are multiple meta-analyses which show that robotic radical cystectomy presents fewer complications than open surgery (42-44).

Conclusions

The most important principles which should guide the surgeon performing robotic radical cystectomy with intracorporeal urinary diversion are: 1. Good working space and access both to the pelvis and abdomen; 2. Respect the oncological principles of the surgery with attention paid to the resection margins and limitation of the risk of tumour spillage; 3. Attention to both ureter and bowel manipulation in order to avoid grasping lesions; 4. High care in realization of the uretero-ileal anastomosis so that good long term functional results are achieved.

Despite being one of the most challenging urologic surgical procedures, with careful preparation and training the surgeon is able to achieve the maximum oncological and functional results by performing robotic radical cystectomy with intracorporeal urinary.

Conflicts of Interests

The authors declared no potential conflicts of interest.

Ethical Statement

Ethical approval was waived for these series.

References

1. Witjes JA, Bruins HM, Carrión A, Cathomas R, Compérat EM, Efstathiou JA, et al. European Association of Urology Guidelines on Muscle-invasive and Metastatic Bladder Cancer: Summary of the 2020 Guidelines. Eur Urol. 2021;79(1):82-104. Epub 2020 Apr 29.
2. Whitmore Jr WF, Marshall VF. Radical total cystectomy for cancer of the bladder: 230 consecutive cases five years later. 1962;87:853-68.
3. Menon M, Hemal AK, Tewari A, Shrivastava A, Shoma AM, El-Tabey NA, et al.

Nerve-sparing robot-assisted radical cystoprostatectomy and urinary diversion. BJU Int. 2003;92(3):232-6.
4. Zamboni S, Soria F, Mathieu R, Xylinas E, Abufaraj M, Andrea DD, et al. Differences in trends in the use of robot-assisted and open radical cystectomy and changes over time in peri-operative outcomes among selected centres in North America and Europe: an international multicentre collaboration. BJU Int. 2019;124(4):656-664.
5. Patel HD, Ball MW, Cohen JE, Kates M, Pierorazio PM, Allaf ME. Morbidity of urologic surgical procedures: an analysis of rates, risk factors, and outcomes. Urology. 2015;85(3):552-9.
6. Williams SB, Cumberbatch MGK, Kamat AM, Jubber I, Kerr PS, McGrath JS, et al. Reporting Radical Cystectomy Outcomes Following Implementation of Enhanced Recovery After Surgery Protocols: A Systematic Review and Individual Patient Data Meta-Analysis. Eur Urol. 2020;78(5):719-730.
7. Yang LS, Shan BL, Shan LL, Chin P, Murray S, Ahmadi N, et al. A systematic review and meta-analysis of quality of life outcomes after radical cystectomy for bladder cancer. Surg Oncol. 2016;25(3):281-97.
8. Urology Nursing Working Group. Neobladder Clinical Guideline and Patient Information. Agency for Clinical Innovation; 2013.
9. Urology. The Experts in Urologic Care. Radical Cystectomy and Neobladder: A Patient's Guide. UR Medicine.
10. Qu LG, Lawrentschuk N. Orthotopic Neobladder Reconstruction: Patient Selection And Perspectives. Res Rep Urol. 2019;11:333-341.
11. Chan KG, Guru K, Wiklund P, Catto J, Yuh B, Novara G, et al. Robot-assisted radical cystectomy and urinary diversion: technical recommendations from the Pasadena Consensus Panel. Eur Urol. 2015;67(3):423-31.
12. Marchand GJ, Masoud A, King A, Brazil G, Ulibarri H, Parise J, et al. Systematic review and meta-analysis of Veress needle entry versus direct trocar entry in gynecologic surgery. BMJ Surg Interv Health Technol. 2022; 4(1):e000121.
13. Jonsson MN, Adding LC, Hosseini A, Schumacher MC, Volz D, Nilsson A, et al. Robot-assisted radical cystectomy with intracorporeal urinary diversion in patients with transitional cell carcinoma of the bladder. Eur Urol. 2011; 60(5):1066-73.
14. Wilson TG, Guru K, Rosen RC, Wiklund P, Annerstedt M, Bochner BH, et al. Best practices in robot-assisted radical cystectomy and urinary reconstruction: recommendations of the Pasadena Consensus Panel. Eur Urol. 2015;67(3): 363-75.
15. Ozen H, Ugurlu O, Baltaci S, Adsan O, Aslan G, Can C, et al. Extended pelvic lymph node dissection: before or after radical cystectomy? A multicenter study of the Turkish society of urooncology. Korean J Urol. 2012;53(7):451-6.
16. Boga MS, Ates M. Timing of lymphadenectomy during robot-assisted radical cystectomy: before or after cystectomy? Fifteen cases with totally intracorporeal urinary diversions. Wideochir Inne Tech Maloinwazyjne. 2020; 15(4):596-601.
17. Koppie TM, Vickers AJ, Vora K, Dalbagni G, Bochner BH. Standardization of pelvic lymphadenectomy performed at radical cystectomy: can we establish a minimum number of lymph nodes that should be removed? Cancer. 2006; 107(10):2368-74.
18. Wright JL, Lin DW, Porter MP. The association between extent of lymphadenectomy and survival among patients with lymph node metastases undergoing radical cystectomy. Cancer. 2008;112(11):2401-8.
19. Ahmed YE, Hussein AA, Kozlowski J. Robot-Assisted Radical Cystectomy in Men: Technique of Spaces. J Endourol. 2018;32(S1):S44-S48.
20. Hosseini A, Dey L, Laurin O, Adding C, Hoijer J, Ebbing J, et al. Ureteric stricture rates and management after robot-assisted radical cystectomy: a single-centre observational study. Scand J Urol. 2018;52(4):244-248.
21. Shah SH, Movassaghi K, Skinner D, Dalag L, Miranda G, Cai J, et al. Ureteroenteric Strictures After Open Radical Cystectomy and Urinary Diversion: The University of Southern California Experience. Urology. 2015; 86(1):87-91.
22. Richards KA, Cohn JA, Large MC, Bales GT, Smith ND, Steinberg GD. The effect of length of ureteral resection on benign ureterointestinal stricture rate in ileal conduit or ileal neobladder urinary diversion following radical cystectomy. Urol Oncol. 2015;33(2):65.e1-8.
23. Loeser A, Vergho DC. Frozen section analysis of ureteral margins in patients undergoing radical cystectomy for bladder cancer: differential impact of carcinoma in situ in the bladder on reliability and impact on tumour recurrence in the upper urinary tract. Urol Int. 2014;92(1):50-4.
24. Laukhtina E, Rajwa P, Mori K, Moschini M, Krajewski W, Albisinni S, et al. Accuracy of Frozen Section Analysis of Urethral and Ureteral Margins During Radical Cystectomy for Bladder Cancer: A Systematic Review and Diagnostic Meta-Analysis. Eur Urol Focus. 2022; 8(3):752-760.
25. Iii IMT, Kappa SF, Morgan TM, Barocas DA, Bischoff CJ, Keegan KA, et al. Blood loss associated with radical cystectomy: a prospective, randomized study comparing Impact LigaSure vs. stapling device. Urol Oncol. 2014; 32(1):45.e11-5.
26. Goonewardene SS, Bolton D, Lawrentshuk N. Robotic radical cystectomy: technical tips and tricks. J Robot Surg. 2017;11(2):287-288.
27. Nyame YA, Nandanan N, Greene DJ, Krishnamurthi V, Haber GP. Robotic Anterior Pelvic Exenteration for Bladder Cancer in Patient With Previous Kidney-Pancreas Transplantation. Urology. 2016;90:200-3.
28. 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(1):11-23.
29. Stein R, Hohenfellner M, Pahernik S, Roth S, Thüroff JW, Rübben H. Urinary diversion-approaches and consequences. Dtsch Arztebl Int. 2012;109(38): 617-22.
30. Guru K, Seixas-Mikelus SA, Hussain A, Blumenfeld AJ, Nyquist J, Chandrasekhar R, et al. Robot-assisted intracorporeal ileal conduit: Marionette technique and initial experience at Roswell Park Cancer Institute. Urology. 2010;76(4):866-71.
31. Kobayashi K, Goel A, Marlon P, Perez MM, Klumpp M, Tewari SO, et al. Complications of Ileal Conduits after Radical Cystectomy: Interventional Radiologic Management. Radiographics. 2021;41(1):249-267.
32. Poch MA, Raza J, Nyquist J, Guru KA. Tips and tricks to robot-assisted radical cystectomy and intracorporeal diversion. Curr Opin Urol. 2013; 23(1): 65-71.
33. Lobo N, Dupré S, Sahai A, Thurairaja R, Khan MS. Getting out of a tight spot: an overview of ureteroenteric anastomotic strictures. Nat Rev Urol. 2016;13(8):447-55.
34. Davis NF, Burke JP, McDermott T, Flynn R, Manecksha RP, Thornhill JA. Bricker versus Wallace anastomosis: A meta-analysis of ureteroenteric stricture rates after ileal conduit urinary diversion. Can Urol Assoc J. 2015; 9(5-6):E284-90.
35. Anderson CB, Morgan TM, Kappa S, Moore D, Clark PE, Davis R, et al. Ureteroenteric anastomotic strictures after radical cystectomy-does operative approach matter? J Urol. 2013;189(2):541-7.
36. Doshi CP, Wozniak A, Quek ML. Near-Infrared Fluorescence Imaging of Ureters with Intravenous Indocyanine Green during Radical Cystectomy to Prevent Ureteroenteric Anastomotic Strictures. Urology. 2020;144:220-224.
37. Ahmadi N, Ashra AN, Hartman N, Shakir A, Cacciamani GE, Freitas D, et al. Use of indocyanine green to minimise uretero-enteric strictures after robotic radical cystectomy. BJU Int. 2019;124(2):302-307.
38. Narita S, Saito M, Numakura K, Habuchi T. Incidence , Etiology , Prevention and Management of Ureteroenteric Strictures after Robot-Assisted Radical Cystectomy: A Review of Published Evidence and Personal Experience. Curr Oncol. 2021;28(5):4109-4117.
39. Care O, Salvadalena G, Hendren S, Mckenna L, Muldoon R, Netsch D, et al. WOCN Society and AUA Position Marking for Patients Undergoing Urostomy Surgery. J Wound Ostomy Continence Nurs. 2015;42(3):253-6.
40. Brodie A, Kijvikai K, Decaestecker K, Vasdev N. Review of the evidence for robotic-assisted robotic cystectomy and intra-corporeal urinary diversion in bladder cancer. Transl Androl Urol. 2020;9(6):2946-2955.
41. Leow JJ, Reese SW, Jiang W, Lipsitz SR, Bellmunt J, Trinh QD, et al. Propensity-matched comparison of morbidity and costs of open and robot-assisted radical cystectomies: a contemporary population-based analysis in the United States. Eur Urol. 2014;66(3):569-76.
42. Fonseka T, Ahmed K, Froghi S, Khan SA, Dasgupta P, Shamim Khan M. Comparing robotic, laparoscopic and open cystectomy: a systematic review and meta-analysis. Arch Ital Urol Androl. 2015;87(1):41-8.
43. Tang K, Xia D, Li H, Guan W, Guo X, Hu Z, et al. Robotic vs. open radical cystectomy in bladder cancer: A systematic review and meta-analysis. Eur J Surg Oncol. 2014;40(11):1399-411.
44. Li K, Lin T, Fan X, Xu K, Bi L, Duan Y, et al. Systematic review and meta-analysis of comparative studies reporting early outcomes after robot-assisted radical cystectomy versus open radical cystectomy. Cancer Treat Rev. 2013;39(6):551-60.