Chapter 68
Robotic Radical Cystectomy and Urinary Diversions: Step-by-Step Technique

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Abstract Robot assisted radical cystectomy (RARC) experience is increasing worldwide, minimizing surgical insult, resulting in postoperative morbidity reduction while offering greater ergonomics for the surgeon. In this chapter, we will cover technical tips and tricks to perform a RARC.

Keywords Bladder cancer • Robot-assisted radical cystectomy

Introduction

Radical cystectomy (RC) represents the gold standard treatment for muscle invasive bladder cancer (MIBC), and remains a complex multi-step surgery irrespective of surgical

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approach, being associated with a high rate of complications [3, 14]. With the purpose of reducing such morbidity, minimally invasive approaches have been settled and the 2015 EAU-guidelines [16] consider laparoscopic radical cystectomy (LRC) with extracorporeal urinary diversion (ECUD) a viable option. However, LRC has never gained wide acceptance in the urological community due to long operative time, to the difficulties related to both extended PLND and urinary diversions reconfiguration.

Following our first series reported in 2001 [1, 5] about 50 cases were necessary to standardize the technique [10–12] and with the advent of robotic surgery, we naturally set up in 2007 a radical cystectomy program (RARC) [9].

Up to date RARC experience is increasing worldwide, minimizing surgical insult, resulting in postoperative morbidity reduction while offering greater ergonomics for the surgeon. Several meta-analyses demonstrated that RARC decreases blood loss and reduces overall complication rates, resulting in reduced transfusion rates, shorter time to normal diet and length of stay (LOS) [6, 15], without compromising oncologic safety as compared to open surgery [13]. Several urinary diversions have been described, but only limited randomized clinical trials (RCT) performed by few hyper-specialized tertiary referral centers stressed the advantage offered by intracorporeal urinary diversion (ICUD).

In this chapter, we will cover technical tips and tricks to perform RARC.

Patient Selection

The exclusion criteria for RARC include: (a) persisting sign of locally advanced/frozen pelvis cancer, extensive lymph node involvement, after neoadjuvant chemotherapy (cT3-4

disease); (b) the presence of contraindications to laparoscopy and steep Trendelenburg position (30°): ASA score > 3, severe cardiac and/or lung insufficiency.

Enhanced Recovery Protocol

In order to reduce peri-operative stress response and to aid faster patient recovery we regularly apply an Enhanced Recovery Protocols (ERP) [2, 3]. Our multidisciplinary team regularly suggests the patient preoperative smoking cessation, weight lose and physical activity. The ERP protocol advises no preoperative mechanical bowel preparation, early postoperative nasogastric and drainage tubes removal as well as early feeding and patient mobilization.

Patient Position and Ports Configuration

RARC is commonly performed via a 6-port laparoscopic approach. Supraumbilical optical port position allows performing an easier extended pelvic lymphnode dissection (e-PLND) (Fig. 68.1a) as well as easy identification and isolation of the ureters.

In case of extracorporeal urinary diversion (ECUD) reconfiguration, we insert through a 6 cm supraumbilical incision a medium size Alexis laparoscopic system (Alexis O wound protector/retractor and laparoscopic cap; Applied Medical, Rancho Santa Margarita, CA, USA) in order to allow faster specimen removal (Fig. 68.1b) easier bowel exteriorization, wound protection and effective pneumoperitoneum restoration to perform ileal-urethral anastomosis when a neobladder is created.

Whenever a 12-mm endoscopic stapler is planned (ICUD), we adopt the Karolinska technique [7] by inserting a 12-mm

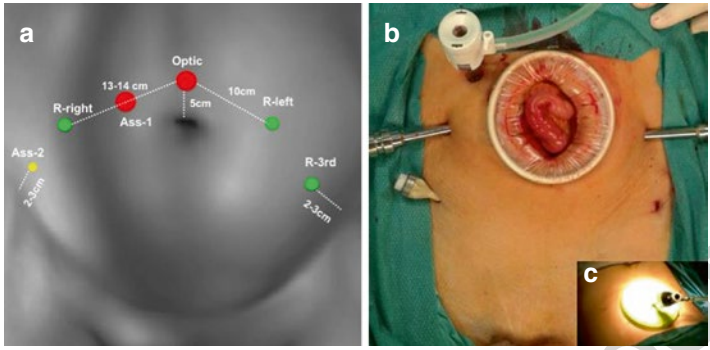

FIG. 68.1 Ports configuration. (**a**) Classic 6 port approach (**b**) Trocars and Alexis wound retractor placed supraumbilically (**c**) Alexis Laparoscopic Cap allowing pneumo-peritoneum creation

trocar placed in the left iliac fossa. The fourth 8-mm robotic trocar will be inserted through this trocar as long as necessary.

Extended Pelvic Lymph Node Dissection (ePLND)

We routinely perform PLND as the very first step of RARC as it allows the identification and preparation of the principal anatomical landmarks (ureters, vas deferens, hypogastric and vesical vessels) and sets-up the cystectomy part of the procedure. By lifting up umbilical ligament, bladder can be easily translated ensuring better exposure of iliac and obturator areas.

An extended or super-extended template is adopted (Fig. 68.2). From an oncological point of view we are keen to remove all lymph nodes with an en-block fashion trying to avoid any nodal incision and manipulation in order to avoid disease spread during the procedure.

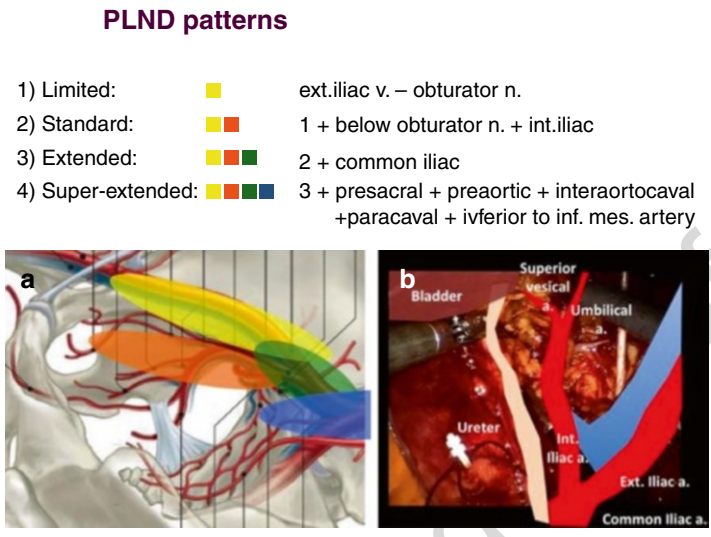

Fig. 68.2 Pelvic Lymph-node dissection patterns. (**a**) The limits of Extended PLND. Cranial border: ureter and common iliac artery; lateral border: psoas muscle and genitofemoral nerve; medial border: umbilical artery, peritoneum and bladder; distal border: Cloquet lymphnode. The limits of Superextended PLND extended + presacral area (**b**) PLND allows the identification and preparation of the principal anatomical landmarks (ureters, vas deferens, hypogastric and vesical vessels) and sets-up the cystectomy

Robotic Radical Cystectomy

Ureters are bilaterally identified at their crossing on the iliac vessels and carefully dissected towards the bladder. It is mandatory to handle ureters with care and to prevent the excessive skeletonization in order to preserve vascular integrity and therefore avoiding the dreaded risk of ureteral stenosis at follow-up. For oncological reasons the section of the ureters should always performed through 2 hem-o-lok clips (Weck Surgical Instruments, Teleflex Medical, Durham, NC, USA) and the most cranial clip has a pre-placed tie, which will facili-

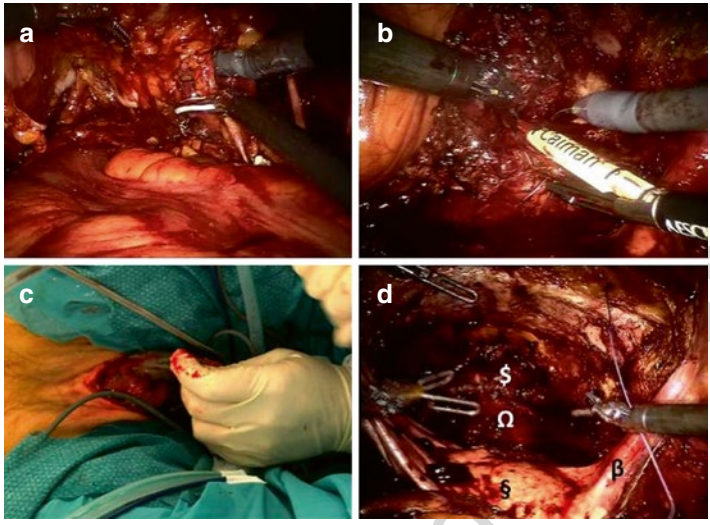

Fig. 68.3 Robotic radical cystectomy. (**a**) Pedicle section with Ultrasonic SonoSurg G2 (Olympus Corp., Tokyo, Japan). (**b**) Pedicle section with Advance Bipolar Caiman vessel Sealer (Bbraun, Aesculap, Center Valley PA, USA). (**c**) Transvaginal extraction of the specimen. (**d**) Female sexual-sparing approach: After suture of the anterior vagina wall ($), uterus (§), cervix (Ω) and fallopian tubes (β) are shown

tate subsequent handling of the ureters. Intraoperative frozen section of distal ureteric-margin is always performed.

Prior to the bladder "take down" (Retzius space opening), the posterior space dissection allows the preparation of vesico-prostatic pedicles and the development of the recto-prostatic space. A transverse peritoneal incision at level of Douglas will lead to seminal vesicle and prostatic base dissection reaching the recto-urethralis muscle. Vesico-prostatic pedicles are commonly transected by the assistant using vessel-sealer devices (Fig. 68.3a, b). In case of nerve-sparing procedure an antegrade, energy- and traction-free approach is performed as commonly adopted during radical prostatectomy.

In female patients, a transvaginal-retractor facilitates the dissection of the recto-vaginal plane. A transvaginal

extraction of the specimen (Fig. 68.3c) is performed in case of ICUD. In case of a sexual-sparing approach the ovaries, fallopian tubes, uterus, and cervix, and most of the vaginal wall may be completely spared (Fig. 68.3d).

Robotic Intracorporeal Ileal Conduit

Once the cystectomy part has been completed, the robot is undocked and the Trendelenburg position is minimized. Bowel manipulation should be performed with caution, avoiding direct grasping with robotic instruments. Pro-grasp forceps and needle driver can exert extremely high-force leading to direct or delayed intestinal lesion or mesentery bleeding. A coordinated work with the assistant is necessary, in order to reduce tensions through the synchronous use of two atraumatic Johan Grasping and Cadier robotic forceps. The left ureter is generally passed below the sigmoid. A 20 cm long ileal segment is isolated (Endo-GIA 60) and ileo-ileal side-to-side anastomosis (Fig. 68.4a) is obtained (Endo-GIA 60 + 45). Some author described near infrared fluorescence after injection of indocyanine green [8] or lighting from urethra with cystoscope [4] in order to obtain a better visualization of the mesenteric vascular arcade. Ureters are spatulated for 1.5–2 cm and catheterized with Single-J inserted percutaneously. An "head-to-head" (Wallace I) uretero-ileal anastomosis (Fig. 68.4b) is performed after extraction of single-J through the isolated bowel tract. Ileocutaneous-stoma is performed only after the final decompression of pneumoperitoneum (Fig. 68.4c).

Mixed Intra-extracorporeal Ileal Neobladder

We routinely perform a double folded ileal neobladder as previously described in a mixed ECUD – ICUD technique [5]. Around 40 cm of ileum is harvested, and following uretero-enteric anastomoses (Fig. 68.5a–c) the neobladder is replaced in the abdomen and pneumoperitoneum is

Fig. 68.4 Robotic intracorporeal (ICUD) ileal conduit. (**a**) Bowel anastomosis: ileo-ileal side-to-side anastomosis. Application of two stapplers (Endo-GIA 60 mm and 45 mm, Covidien Autosuture, Mansfield, MA, USA) confers a wide anastomosis mouth. (**b**) Wallace I plate: Ureters are spatulated for 1.5–2 cm and then a Wallace type I plate is performed with 4-0 polydioxanone suture and then catheterized with Single-J inserted percutaneously. (**c**) Final aspect of ileal conduit (Bricker) stoma in a female patient. Single J's will be removed in postoperative day (POD) 10–12. Drain-tubes are removed in POD 2 and 3. A 22-ch Foley catheter is maintained into the stoma to prevent possible urinary-retention due to intestinal oedema

restored. At this stage it may be difficult to perform the anastomosis due to various drawbacks. A tension-free urethro-ileal anastomosis is key to proper healing process and to prevent anastomotic leakage. Maximizing urethral length together with the adoption of different tricks such as pressure on the perineum as well as incision of peritoneum above the mesentery aim at reducing the tension and thus at shortening the distance between the urethra and neobladder.

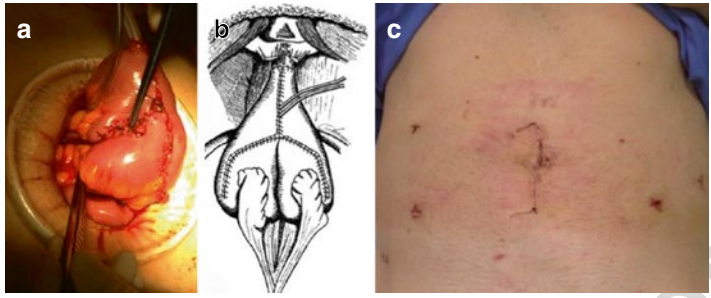

Fig. 68.5 Extracorporeal (ECUD) ileal orthotopic neobladder and intracorporeal urethra-neobladder anastomosis. (**a, b**) ECUD neobladder**:** detubularized ileal segment is modeled according to U configuration; posterior wall is completely sutured; ureteric anastomosis is then bilaterally performed. A further folding of ileum completes the anterior wall. (**c**) Postoperative aspect

Conclusions

RARC and urinary diversion represent a complex multisteps procedure and we warmly suggest to stress adequate planning, proper mentoring system, institution of ERP and establishment of a full dedicated double team.

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