# Total intracorporeal robot-assisted laparoscopic ileal conduit (Bricker) urinary diversion: technique and outcomes

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REHMAN J, SANGALLI MN, GURU K, DE NAEYER G, SCHATTEMAN P, CARPENTIER P, MOTTRIE A. Total intracorporeal robot-assisted laparoscopic ileal conduit (Bricker) urinary diversion: technique and outcomes. The Canadian Journal of Urology. 2011;18(1):5548-5556.

***Objective:*** *Several recent preliminary reports have demonstrated that Robot-Assisted Cystectomy with total intracorporeal Ileal Conduit (RACIC) is a feasible option over the open technique. We report our stepwise surgical procedure of robotic total intracorporeal ileal conduit urinary diversion, technical consideration, development, refinements and initial experience. Only the ileal conduit urinary diversion is described with no emphasis on the cystectomy's steps.*

***Methods:*** *Between February 2008 and September 2009, nine patients underwent RACIC for muscle invasive transitional cell carcinoma (TCC). The entire procedure, including radical cystoprostatectomy, extended pelvic node dissection (ePLND), ileal conduit urinary diversion (Bricker) including isolation of the ileal loop (20 cm ileal segment) 15 cm away from the ileocecal junction, restoration of bowel continuity with stapled side-to-side ileo-ileal anastomosis, retroperitoneal transfer of the left ureter to the right side, and bilateral stented (8 F feeding tube) ileo-ureteral anastomoses in a Wallace faction were all performed exclusively intracorporeally using the "da Vinci Si" surgical robot and finally the conduit stoma was fashioned.*

***Results:*** *The RACIC was technically successful in all nine patients (three females and six males. Mean age 74.1; 57 to 87) without open conversion. The mean operative time including extended pelvic lymphadenectomy and urinary diversion was 346.2 minutes (210 to 480). Mean operative time of diversion is 72 minutes (52-113) mean estimated blood loss 258 mL (200 to 500) and the median hospital stay were 14 days (10 to 27). In all three female patients, the specimen was extracted through the vagina. There were no intraoperative complications and only one major postoperative complication: one postoperative iatrogenous necrosis of the ileal conduit caused by uncareful retraction of the organ bag and thereby probably injuring the conduit pedicle, as the ileal conduit was well vascularised at the end of the operation, requiring an open revision (in male patient extracted through the suprapubic incision). A clear liquid diet was started on the third postoperative day. All patients returned to normal activity within 2 weeks (from date of surgery). Postoperative renal function was normal with mean postoperative creatine 0.99 mg/dL) and excretory urography revealed unobstructed upper tracts in all cases.*

***Conclusion:*** *Robot-assisted radical cystoprostatectomy with intracorporeal ileal conduit urinary diversion for the treatment of high risk or invasive bladder cancer with urinary diversion is technically feasible. The robotic system aids in performing a meticulous dissection and all operative steps of the open procedure are replicated precisely while adhering to the sound oncologic principles of traditional radical cystectomy. Robotics brings an unprecedented control of surgical instruments, shorten the learning curve, and allow open surgeons to apply more easily their technical skill in a minimal invasive fashion. Robotic cystectomy with total intracorporeal ileal conduit urinary diversion offers operative and perioperative benefits and functional outcome. In our hands results comparable to open experience with further reduced perioperative morbidity, early recovery, resumption of normal activities, excellent cosmesis and increased quality of life (QOL). In addition, minimal blood loss, fluid shifts, and electrolyte loss considerably reduce systemic and cardiovascular stress in these older groups of patients.*

**Key Words:** robot-assisted, RACIC, technique

Accepted for publication November 2010

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## Introduction

Radical cystectomy (en bloc radical cystoprostatectomy excision with extended lymph node dissection or ePLND) remains the gold standard for muscle invasive bladder cancer (>= pT2a) bladder cancer and high risk superficial tumors resistant to intravesical treatment (pT1G3, pTis).[1] Open radical cystectomy (ORC) has been the traditional standard for treating localized muscle invasive bladder cancer setting the bar for other surgical approaches to be compared against. But open radical cystectomy, extended lymph node (ePLND) dissection with urinary diversion remains a major procedure, which is very demanding for patients. The morbidity of a long open abdominopelvic procedure, however, can be significant on account of abdominal incision with prolonged retraction of the abdominal wall, blood loss, prolonged exposure of the bowel, electrolyte and fluid shifts and hypothermia. This result is a high level of postoperative pain, often requiring narcotic administration for several days, longer periods of hospitalization and convalescence in this elderly patient population with substantial comorbidities.[2]

There is a steep learning curve for conventional laparoscopic procedures due to the counter intuitive nature of dissection (rigidity of tool axes) and suturing, two dimensional visualization, difficulties for angular exposition and dissection (four degrees of freedom or 4-DOF as compared to open surgery which has six degrees of freedom or 6-DOF) and compromising ergonomics (counter intuitive motion and discomfort of surgeon). The arrival of robotic technology (da Vinci) has dramatically enhanced a surgeon's ability to perform minimally invasive surgery with precision and accuracy. The daVinci Surgical System (Intuitive Surgical Inc., Sunnyvale, CA, USA) replicates the surgeon's hand movements (seven degree of movements or 7-DOF, in real-time with laparoscopic instruments (master-slave, meaning controlled by surgeon) to provide an unsurpassable view of the operative field and an unrestricted ability to execute complex surgical tasks with dexterity (filtering of hand tremor, motion scaling and three dimensional vision.

Complex open and laparoscopic pelvic operations often are difficult to perform given the deep and confined spaces of the bony pelvis; thus, robotic assistance offers significant advantages. With the second generation of robot performing extended pelvic lymphadenectomy (ePLND) and bowel surgery is easier because its arms are more sleek and versatile in mobility. Moreover, magnification and three dimensional vision in high definition offered by the optical instrumentation can enable more precise dissection and better preservation of anatomical structures and further improved oncologic and functional outcome.

After obtaining experience with robotic radical prostatectomy, we embarked on robotic radical cystectomy with extracorporeal urinary diversion and then we progressed to total intracorporeal technique. Our robotic cystectomy and urinary diversion technique provides an anatomic approach, very familiar to most urologists. Our goal is to transfer the technical steps that we usually use in our open technique. In this manuscript we describe our robotic urinary diversion (ileal conduit).

## Methods and surgical technique

Between February 2008 and September 2009, nine patients underwent Robotic Assisted Cystectomy and Ileal Conduit (RACIC) for muscle invasive transitional cell carcinoma (TCC) at Onze-Lieve-Vrouw (OLV) Hospital, Aalst, Belgium. The entire procedure, including radical cystoprostatectomy, extended pelvic node dissection, ileal conduit Bricker urinary diversion[3] including isolation of the ileal loop (20 cm ileal segment) 15 cm from the ileocecal junction, restoration of bowel continuity with stapled side-to-side ileo-ileal anastomosis, retroperitoneal transfer of the left ureter to the right side, and bilateral stented (8 F feeding tube) ileo-ureteral anastomoses in a Wallace faction were all performed exclusively intracorporeally with robotic assistance and finally the conduit stoma was fashioned as in open fashion.

### *Preop preparation*

Mechanical bowel preparation preoperatively comprises clear liquids for the 24 hours prior to surgery and oral self-administration of 2-5 liters of electrolyte lavage solution in the afternoon before the surgical procedure. Sequential compression stockings, subcutaneous low molecular heparin and broad-spectrum antibiotics are given before the surgical procedure. The position for an external stoma is evaluated and marked on the skin of the patient. (Alternatively patient may undergo outpatient, mechanical-only, bowel preparation with the use of Magnesium citrate or Fleets Phosphosoda and a Fleets1 enema the morning of surgery, along with a clear liquid diet a day prior to surgery).

It is important to place these robotic laparoscopic ports appropriately, Figure 1. This is one of the most critical steps for successful use of robotic tool with precision and facilitate, along with the cystectomy

**Figure 1.** Ports and stoma sites marked preop.

in the small pelvis, extended pelvic lymph node dissection, ureter mobilization, and transferring the left ureter to the right under the sigmoid mesentery without collision of the arms. The patient's stature, body mass index, pelvis girdle configuration, and positioning also have an important bearing on the robotic arm ergonomics, length, and mobility that impact the movements inside the body. It is also equally important that all elements of the patient set up are consistent and reproducible. After completing the extirpative portion of the procedure (radical cystoprostatectomy, extended pelvic lymph node dissection) the total intracorporeal ileal conduit urinary diversion is performed as described below.

## Robotic assisted laparoscopic ileal conduit (operative steps)

The radical cystectomy is performed, in the same way as described for invasive bladder cancer previously by our group,[4] the ports are shifted 4 cm-6 cm cranially, that helps in ileal conduit urinary diversion.

### *Step 1: Isolation, dissection, ligation and tagging of both ureters.*

The left paracolic gutter is incised along the line of Toldt, and the left ureter is identified over the left common iliac artery, distally to the left vesicoureteral junction clipped (using Weck locking clips), and divided. The right ureter is mobilized and divided in a similar fashion. Both ureters can be tagged with sutures. Generous periureteral fat is maintained to keep adventitial blood supply of the ureter. The single clip on the proximal cut end of the ureter prevents urine leakage onto the surgical field and creates ureteral hydrodistention, thus facilitating the subsequent uretero-ileal anastomosis.

(Technical consideration: If the available length of both ureters is considered too short by the surgeon, the former dissection is continued cranially and ureter mobilized proximally up the lower pole of the kidney and brought to the right side cranial to the inferior mesenteric artery).

### *Step 2: Retroperitoneal transfer of the left ureter to the right side*

Mobilization begins with dissection of the lateral attachments of the sigmoid colon. An atraumatic forceps is passed lifting the posterior peritoneum caudally towards the aortoiliac bifurcation. The posterior attachments (mesocolon) of the colon are then freed beginning at the sacral promontory in the presacral space providing an unobstructed passage or tunnel. This plane opens easily, as long as dissection remains close to the colon. The sigmoid colon is retracted superiorly and anteriorly, the blunt tip grasper is passed undersurface of the mobilized colon at the level of the sacral promontory and the ureter is grasped (with its tagged suture) and is passed underneath the sigmoid loop and brought to the contralateral side.

### *Step 3. Identification and isolation and suture marking 20 cm of ileal bowel segment for ileal conduit 15 cm from ileo-caecal segment*

Bowel including caecum, ileo-caecal junction and ileum are identified. A 20 cm ileal loop segment is isolated about 15 cm proximal to the ileocecal valve by placing marking sutures; the length of bowel is determined by running the bowel an inch at a time, the tip of the instruments being used as a measuring stick.

(Technical consideration: The use of a string of known length can also facilitate this process.)

### *Step 4: Anchoring and tenting the selected ileal loop segment to the anterior abdominal wall (two pulley sutures)*

Care is taken to maintain good vascularity of the isolated bowel segment by visual inspection of the mesentery, as well as transillumination in order to help to identify the mesenteric vessels. Three transparietal holding sutures (fixed sutures) are placed (on both extremities of the selected ileal loop and one on its midportion) in order to improve presentation and avoid any kinking. The transversal mesenteric vessels are gently coagulated with the Gyrus forceps as needed. Alternatively, sutures can be used before cutting them.

(Technical consideration: 1) A cystoscope or laparoscope can be used from one of the assistant ports in order to help identify the mesenteric vessels with transillumination. 2) Instead of fixed holding sutures on both extremities of the selected ileal loop pulley sutures can be applied percutaneously with the help of Keith needle to pull, tent and relax the either end of isolated bowel.

*Step 5: Bowel resection and isolation of the ileal conduit*

A 20 cm segment of selected small bowel is now isolated using Endo GIA visualizing vascularity and integrity. The ileal conduit is put caudal to the two bowel ends. The isolated bowel segment has oral (proximal) and aboral (distal) ends, which are marked to keep orientation.

*Step 6: Restoration of bowel continuity with stapled side-to-side ileoileal anastomosis, Figure 2*

The small bowel continuity is re-established by side-to-side anastomosis using laparoscopic Endo GIA stapler (tissue load). The ends of the small bowel are secured together with an interrupted silk suture placed anti-mesenterically 5 cm from the stapled ends. The fourth arm grasps this suture to hold the bowel ends under tension caudally to ease the right positioning of the Endo GIA jaws. The Endo GIA stapler is fired along the adjacent antimesenteric sides of the small bowel. One transverse firing of the Endo GIA stapler is used to close the open ends of the ileal limbs. Interrupted sutures may be used to imbricate over the staple lines. The mesenteric trap (defect in the mesentery or mesenteric window) is closed using running 4-0 Vicryl sutures. The distal ileum is relocated in the abdomen.

*Step 7: Bilateral ureteral spatulation and ureteral anastomosis in a Wallace fashion, Figure 3*

We prefer Wallace anastomosis, as there is reduced stenosis or stricture than separate anastomosis.[5,6] A Prograsp forceps placed through the fourth arm grasp the end of both ureters in a fashion that they are nicely lined up one next to the other. After a 3 cm longitudinal incision was made along the anterior aspect of the distal ends (spatulated) and a wide anastomosis is formed in Wallace fashion. This is done using a Monocryl 4/0 suture and is done in a running fashion.

(Technical consideration: The silk suture is used to stabilize the ureter with the fourth arm as it is partially transected and spatulated).

*Step 8: Deanchoring the ileal segment (lateralized)*

The ileal segment is released by cutting the anchoring or pulley sutures and this isolated bowel segment used for ileal conduit is outside the continuity of bowel. The oral (proximal) and aboral (distal) sides are defined. The staplers are excised on both sides.

*Step 9: Ureteroileal tension free anastomosis, Figure 4, -proximal or oral ends -posterior layer first*

The ureteroileal anastomosis is fashioned in a refluxing manner. First the posterior anastomosis is performed starting proximal at the spatulation site of the right ureter. Running 4-0 Monocryl sutures are used for the anastomosis.

*Step 10: Passage of ureteral stents*

Prior to completing the anterior layer of the ureteroileal anastomosis, ureteral stents (8 F feeding tubes or 8 F single pigtail ureteral stents inserted over a 0.035 inch


**Figure 2.** Ileo-ileal bowel anastomosis.


**Figure 3.** Wallace spatulated ureteral anastomosis.

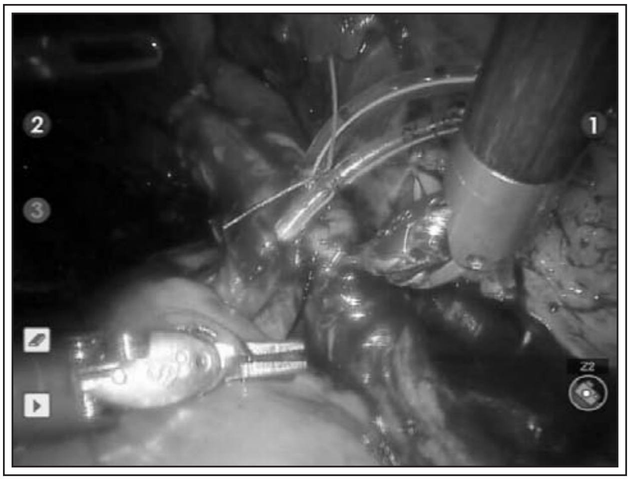

**Figure 4.** Uretero-ileal anastomosis.

**Figure 5.** Postop with stoma fashioned

guide wire) are introduced through the aboral or distal end of the isolated ileal loop. They are introduced through via the ipsilateral lateral assistant port and guided into the ileal conduit using a fenestrated grasping forceps, delivered near the oral (proximal or butt end) of the loop at the prospective ureteroileal anastomotic site and then advanced into the ureters. The stents are secured with an absorbable stitch to the conduit (at the site of ileo-ureteral anastomosis) to prevent the stents from falling out during manipulation and in the postoperative period.

### *Step 11: Uretero-ileal watertight anastomosis (anterior layer)*

Distal uretero-ileal anastomosis using 4/0 Monocryl is completed over 8 F ureteric stents.

(Technical consideration: The parietal peritoneum should be sutured around the base of the conduit to cover the urinary anastomosis with peritoneum. This will also prevent the ureteroileal anastomosis from twisting).

### *Step 12: Delivery of the aboral (distal) end through the marked stoma site and fashioning of conduit stoma, Figure 5*

The distal or aboral end of the ileal conduit loop is delivered directly through the anterior abdominal wall through the 8 mm port preselected stoma site, corresponding to inferior port placement site (in the right lower quadrant of the abdomen during cystectomy). The robotic arm is dislocated from the trocar, a grasping forceps is brought through that trocar and the distal end is grasped. A lunar incision is made around the trocar, the fascia is incised in the form of a cross as far that the opening allows a two fingers dilation of the abdominal wall musculature. The conduit end is delivered. With four Vicryl 2/0 stitches on the fascia, the muscularis of the conduit is fixed at about 3 cm, proximal to its end. The ileal conduit is then secured to the skin and stoma matured using absorbable sutures in an everted fashion by grabbing also two centimeters proximal at its musculature in each stitch. The abdomen is irrigated, inspected for bleeding, and inadvertent visceral injuries, the specimen is extracted in its organ bag through a supraumbilical incision, the trocars are removed under direct vision and the port sites closed with staples. A 10 mm drain is placed near the ileo-ureteral anastomosis to help detect urinary drainage.

### *Postoperative care*

After completing the procedure, all patients undergo routine care according to our radical cystectomy care pathway. The nasogastric tube is removed when flatus starts. Parenteral nutrition is commenced from the first day after RRC for 4-5 days. The patient can then begin solid nutrition. The drains are normally removed after 3 days, when the drainage is <1 00 m on the eighth day the ureteric stents are removed. Patient activity was encouraged as soon as possible, with most patients out of bed the night of surgery and ambulating on the first postoperative day. Patients are discharged once they are fully ambulant and tolerate oral nutrition. Serum creatinine and electrolytes are measured before hospital discharge.

## Results

The RACIC was technically successful in all nine patients (three females and six males. Mean age 74.1, range: 57 to 87) without open conversion, Table 1. The mean operative time including extended pelvic lymphadenectomy and urinary diversion (ileal conduit) was 346.2 minutes (210 to 480). Mean operative time of diversion was 72 minutes (52-113) mean estimated blood loss 258 mL (200 to 500) and the median hospital stay were 14 days (10 to 27), Table 2. In the three female patients, the specimen was extracted through the vagina. There were no intraoperative complications and only one major postoperative complication occurred: one postoperative iatrogenous necrosis of the ileal conduit caused by uncareful retraction of the organ bag and thereby probably injuring the conduit pedicle, as the ileal conduit was well vascularised at the end of the operation, requiring an open revision. A clear liquid diet was started on the third postoperative day. All patients returned to normal activity within 2 weeks (after operation). Postoperative renal function was normal (mean postoperative creatine 0.99 mg/dL) and excretory urography revealed unobstructed upper tracts, Table 3.

## Discussion

Open radical cystectomy, extended pelvic lymph node dissection and urinary diversion has been the traditional standard for treating localized muscle invasive bladder cancer, but open radical cystectomy remains a major procedure, confer substantial morbidity, even at high volume centres. Major complication rates are 10% to 12%; overall complication rates are 30% to 60%, and perioperative mortality ranges from 2%-5%.[7] There is an increasing trend toward minimally invasive approaches in an effort to reduce perioperative and long term morbidity of this radical extirpative operation. Smaller skin/fascial incisions decrease pain and convalescence, with the potential for decreasing certain perioperative complications. The laparoscopic and robotic assisted laparoscopic approach improve visualization of the surgical anatomy, provide more precise dissection because of magnification, decrease blood loss (due to the tamponading effect of the pneumoperitoneum) and decrease blood transfusion rates. Therefore, they provide shorter postoperative convalescence, shorter hospitalization, and earlier return to normal activities and work. Better understanding and refinements in pelvic surgical techniques (based on layered anatomic delineation and surgical dissection in surgical layers and dissection in avascular surgical spaces), with regard to radical cystectomy, continent urinary diversion, and the incorporation of nerve sparing for preservation of sexual function, as well as

TABLE 1. **Preoperative demographics**

| **Characteristics** | **Mean (range)** |
|---|---|
| # of patients (n) | n = 9 |
| Male (n) | n = 6 |
| Female (n) | n = 3 |
| Age (years) | 74.1 (57 to 87) |

TABLE 2. **Operative parameters**

| **Variables** | **Mean (range)** |
|---|---|
| Operating time (minutes) | |
| Overall | 346.2 minutes (210 to 480) |
| Robot time (ileal conduit) | 72 minutes (52-113) |
| Estimated blood loss (mL or cc) | |
| Mean | 258 mL (200 to 500) |
| Hospital length of stay (days) | 14 days (10 to 27) |

TABLE 3. **Complications**

| | Number (%) |
|---|---|
| **Intraoperative** | |
| Bladder injury | none (0%) |
| Rectal injury | none (0%) |
| Bowel injury | none (0%) |
| Blood transfusions | none (0%) |
| Conversion to laparoscopic | none (0%) |
| Conversion to open | none (0%) |
| Death | none (0%) |
| **Postoperative** | |
| Anastomotic leakage | none (0%) |
| Pelvic fluid collection | none (0%) |
| Pulmonary embolus | none (0%) |
| Death | none (0%) |
| Ureteric complications | none (0%) |
| Stomal complications | none (0%) |
| Other comment | one postoperative necrosis of ileal conduit (iatrogenic injury of conduit pedicle) |

organ sparing surgery in the female, have allowed for effective cancer control, as well improvement in quality of life. Minimal access radical cystectomy delivers a high quality, locoregional oncologic clearance comparable to ORC, thereby guaranteeing equivalent oncologic outcomes. Additionally it reduces morbidity and shortens convalescence, thereby leading to improved postoperative quality of life.

Several investigators have described the feasibility of laparoscopic[8-19] and robotic[4,20-29] approaches for patients undergoing radical cystectomy for transitional cell carcinoma of the urinary bladder. The techniques that have been described appear to duplicate the surgical principles of open radical cystectomy. Laparoscopic cystectomy with different urinary diversions has shown to provide intraoperative and postoperative advantages when compared to open surgery.[25,30-33] Complete laparoscopic intracorporeal urinary diversion has been performed by,[10,13,34] or by robot.[27,28,35,36] The main constraints for laparoscopic radical cystectomy and urinary diversion are longer operating time, long learning curve, morbidity, and complications.

The additional benefits of laparoscopic approaches include lower incidence of firstly postoperative ileus after the minimal invasive approach compared with the open surgery, principally because the bowel is manipulated less and fewer narcotics are necessary to control pain postoperatively and reduced intraoperative fluid and electrolyte shifts.[37] Secondly, there is a better preservation of the immune system than open surgery which results in a decreased incidence of infectious complications[38] and, thirdly, there are better health related quality of life (HR-QOL) outcomes.[39-41]

The first case of robotic assisted cystectomy and intracorporeal ileal neobladder was performed in 2002 by Binder et al in Frankfurt, Germany, completed in 510 min (8 hours 30 minutes) with an EBL of < 200 mL.[20,28] However, in cases of robot-assisted radical cystectomy with intracorporeal ileal neobladder, the operating times are clearly on the higher side. The initial large case series (n=17) describing the technique of robot-assisted radical cystectomies both in males and females was reported by Menon et al[21,22] using six ports with extracorporeal reconstruction of orthotopic ileal neobladder which greatly stimulated the surgeons in this field. In this series, mean operative time for cystoprostatectomy was 120 min, for ileal conduit 140 min and for orthotopic neobladder it was 168 min. Subsequently, various other authors also described their technique of RARC, with subtle modifications.[23-28] Abraham et al[42] in a prospective comparison of laparoscopic and RARC with ileal conduit urinary diversion, explored the utility of robotic assistance with the theoretical aim of overcoming the complexity of performing laparoscopic cystectomy. They concluded that RARC and IC (14 cases) were associated with lower blood loss and transfusion rates, as well as significantly fewer intraoperative and postoperative complications, compared with their 20 cases of laparoscopic radical cystectomy and ileal conduit.

The ileal conduit was popularized by Bricker.[3] An extraperitoneal ileal conduit may be limited in the presence of a short mesentery or a wide abdominal wall that could prevent bowel exteriorization. This has prompted us to move toward the totally intracorporeal technique. In the early 1990s, two cases of laparoscopy assisted ileal conduit urinary diversion were described with bowel resection and anastomosis done extracorporeally.[9,43-45] In 2000, Potter reported a 5 year follow up of one patient undergoing total laparoscopic ileal conduit.[45] In completely laparoscopic cystectomies for bladder cancer with ileal conduit urinary diversion, Gill and coworkers reported total surgical times of 11 hours 30 minutes and 10 hours for their two first cases.[11]

The same procedure performed totally robotically was reported by Yohannes[46] with total procedure times of 10 hours and 12 hours for their two first cases. This procedure was performed on patients by radiation cystitis and the ileal conduit urinary diversion was done totally intracorporeally using robotic assistance. He also used robotic assistance to perform ureteroileal anastomosis during another laparoscopic ileal conduit.[47] Similarly Balaji[48] in 2004 reported on RARC with totally intracorporeal ileal conduit urinary diversion with robotic assistance in three patients, with an overall operation time, blood loss, and mean hospital stay of 11.5 hours, 250 mL, and 7.3 days, respectively. Hubert has also described robotic cystoprostatectomy and intracorporeal ileal conduit urinary diversion with robotic assistance in two tetraplegic men. The total surgical time was 9.25 and 6.75 hours, respectively. There were no intraoperative complications and postoperative hospital stay was 13 days in both cases.[49]

In our study, there is successful completion of intracorporeally robotic ileal conduit in all (n=9), 100% of patients in this study and satisfactory drainage of renal moieties at postoperative imaging highlight the possibility that robotic technology may be useful in promoting rapid incorporation of this technology in reconstructive urologic surgery. The entire procedure, including radical cystectomy, extended pelvic node dissection, ileal conduit urinary diversion (Bricker) including isolation of 20 cm ileal segment, restoration of bowel continuity, retroperitoneal transfer of the left ureter to the right side, and bilateral stented ileo-ureteral anastomoses in a Wallace faction were all performed exclusively intracorporeally with robotic assistance. The mean operative time including lymphadenectomy and urinary diversion was 346.2 minutes (210 to 480); mean operative time of diversion is 72 minutes (52-113) which are much shorter than in literature. Mean estimated blood loss 258 mL (200 to 500) and the median hospital stay were 14 days (10 to 27) which is better than our open series and in the literature. In all female patients (n=3), the specimen was extracted through the vagina, preventing need for any abdominal incision. There were no intraoperative complications and only one major postoperative complication: one postoperative necrosis of ileal conduit, unfortunately caused by uncareful organ bag retrieval, causing avascularisation of the ileal conduit. A clear liquid diet was started on the third postoperative day. All patients returned to normal activity within 2 weeks (from date of surgery). Postoperative renal function was normal (mean post operative creatinine 0.99 mg/dL) and excretory urography revealed unobstructed upper tract.

## Conclusion

Surgical management for bladder cancer has made a journey from an open approach to robotic surgery. The contribution of robotics to urological surgery has allowed reproducible surgical outcomes that equal and even may exceed the outcomes of open surgery with the advantages of a minimally invasive approach. Robotic technology can improve the operative qualities of the even the experienced laparoscopic or open surgeon. This robotic surgery provides decreased morbidity while adhering to the sound oncologic principles of traditional open surgery. The robotic system aids in performing a meticulous dissection and all operative steps of the open ileal conduit.

Robotic cystectomy and urinary diversion is feasible, safe, reproducible technique. Technically, anatomically and functionally it is an alternative to the open surgical procedure (with some operative and perioperative advantages). Our robotic technique provides an anatomic approach, familiar to most urologists and anatomical landmarks are very easy to follow and will transfer the technical steps that we usually use in our open technique. The successful completion of robotic cystectomy and intracorporeal robotic ileal conduit in 100% of patients in this study and satisfactory drainage of renal moieties at postoperative imaging highlight the possibility that robotic technology can promote rapid incorporation of robotics in reconstructive urologic surgery. In future we will see greater use of robotics with growing experience and popularization of this technique. □

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