Robot-assisted Intracorporeal Urinary Diversion

Where Do We Stand in 2014?

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KEYWORDS

• Robot-assisted radical cystectomy • Intracorporeal urinary diversion • Outcomes • Robotic surgery

KEY POINTS

- Robot-assisted radical cystectomy with intracorporeal urinary diversion (ICUD) has made considerable progress.
- Long duration of operation was a major limitation when it was first adopted, but results from selective centers are encouraging.
- Reduced complications, readmissions, and mortality rates are key benefits that have been reported for ICUD.
- Sequential case number and mentored training in high-volume centers can help robotic surgeons to incorporate ICUD in their practices.

INTRODUCTION

Nearly a decade ago Menon and colleagues[1] reported the first robot-assisted radical cystectomy (RARC). This development was much anticipated after the success of robotic technology for performing radical prostatectomy. Open radical cystectomy (ORC) remains the gold standard treatment of localized muscle invasive bladder cancer; however, the use of a minimally invasive approach is advocated to reduce the morbidity and mortality associated with the open technique.[2,3] Use of robotic technology allows the surgeon to perform delicate operative steps in the confined pelvic space with precision and accuracy; steps that may be difficult to perform with open or conventional laparoscopic approach.[2] In addition, the 10-times magnification and EndoWrist technology provide an ideal platform to perform an intracorporeal urinary diversion, which would allow the procedure to be performed in a minimally invasive way, and may eventually reduce the complications of a morbid procedure. Soon after RARC, the first robot-assisted intracorporeal neobladder was reported by Beecken and colleagues.[4] Despite an early report of intracorporeal urinary diversion (ICUD), it was selectively performed. Increase in operative time, lack of expertise with the new technology, and the learning curve for the extirpative part of the procedure were the probable reasons for slow adoption of ICUD. With increasing expertise and better results more centers are performing ICUD, which is a logical progression after RARC, to prove its benefit. RARC with ICUD provides better operative outcomes compared to open surgery, with minimal blood loss, fluid shifts, and electrolyte disturbance, and a decrease in perioperative morbidity.[1,5] In addition, ICUD provides

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better cosmesis and improved quality-of-life (QoL) outcomes.[1] Most commonly performed ICUD includes intracorporeal ileal conduit (ICIC) and intracorporeal neobladder (ICNB) of the Studer type. This article presents the current status of ICUD and reviews the literature evaluating the operative and functional outcome parameters related to ICUD.

OPERATIVE CONSIDERATIONS

Intracorporeal Ileal Conduit (ICIC)

Important surgical points of consideration from previously described techniques include:

1. **Port placement**. In order to perform the ICIC, the postplacement for the RARC needs to be slightly higher (cranial) than that commonly used for robot-assisted radical prostatectomy. This placement allows the arms to adequately reach the bowel mesentery. The 6-port configuration includes placement of an additional 12-mm port near the pubic symphysis. This port is used to perform the enteroenteric anastomosis using the GIA stapler.
2. **Marionette stitch**. This stitch is place percutaneously, using 150 cm (60 in) of 1 silk suture with a Keith needle. The needle is passed through the hypogastrium and through the distal end of the bowel segment; it is then brought back through the same location on the anterior abdominal wall. This stitch is kept untied to give free movement of the bowel segment during the creation of the conduit.[6] The marionette stitch is placed lower than the stoma site to improve ease of fourth arm manipulation.[7]

Intracorporeal Neobladder (ICNB)

A large number of ICNB series have been reported by the Karolinska group, highlighting the key steps of the procedure. Similar to the ICIC, the port placement is important to allow access to the bowel mesentery. The following points are of special consideration while performing ICNB:

3. **Reducing the Trendelenburg**. In case of a limitation to perform a tension-free urethroneobladder anastomosis, the Trendelenburg and break in the operating table should be reduced to allow mobilization of the mesentery deep into the pelvis, for a tension-free anastomosis.
4. **Use of traction stitches or loops**. Some investigators recommend performing the urethroneobladder anastomosis before the bowel is configured into a pouch. In order to protect the anastomosis from any traction, it can be held securely on either side by passing a loop around the bowel.

PERIOPERATIVE OUTCOMES AND COMPLICATIONS

RARC with urinary diversion was introduced to decrease postoperative complications and improve convalescence. Despite these benefits ICUD was not popular with robotic surgeons. Factors that may have encouraged the recent attempts to incorporate ICUD in RARC include:

1. Standardization of RARC, promising oncologic outcomes and extended pelvic lymph node dissection (ePLND) technique.
2. The ability of a robotic platform to facilitate the suturing maneuverability inherent in the intracorporeal technique.
3. Most importantly, performing the entire procedure intracorporeal results in decreased insensible fluid losses, early return of bowel function, and less incisional morbidity, because of the decreased bowel manipulation and exposure.[8]

Intra Corporeal Ileal Conduit

The data on perioperative outcomes have the limitation of not reporting the diversion time. Few studies have reported the time for diversion separately from overall operative time. In addition, it is difficult to differentiate complications of the extirpative part of the RARC from the construction of the ICUD. The largest series of 100 robot-assisted ICUDs, by Azzouni and colleagues,[7] reported a median overall operative time and diversion time of 352 and 123 minutes, respectively. The median estimated blood loss was 300 mL. The diversion time showed a decreasing trend from the first 25 to the last 25 patients. Infection was the most common complication (51 cases). The highest Clavien grade for the infectious cases was 2. Most of the infections (34 cases) were reported in the early postoperative period (1–30 days). The gastrointestinal (GI) tract was the second most common organ system involved in the complications (36 cases). Despite being the second common cause of complications, no GI or anastomotic leak was reported in the series, which could have been related to the ICUD. A decline in high-grade complications was noted over the relevant period (first 25 to last 25 cases), in contrast with an increase in low-grade complications. To date, this remains the largest single-institution ICUD series. In contrast, the International Robotic Cystectomy Consortium (IRCC) reported 106 ICIC when comparing the ICUD with extracorporeal urinary diversion