

## Robotic radical cystectomy with intracorporeal neobladder: Initial experience and outcomes

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### Abstract

**Introduction:** Total intra-corporeal robot-assisted radical cystectomy (RARC) with total intracorporeal neobladder formation is relatively new in the treatment of bladder cancer. We present our experience and believe it is the first Canadian reported series with this technique.

**Methods:** This is a case series of 4 patients, who underwent total RARC, pelvic lymphadenectomy and creation of an intra-corporeal ileal neobladder. Surgical technique is described and perioperative variables, pathologic data, and complication rates are reported.

**Results:** The mean patient age was 61.8 and the mean body mass index was 27.01 kg/m<sup>2</sup>. The mean operative time, estimated blood loss, time to full diet and length of stay were 522.8 minutes (standard deviation [SD] 74.5), 237.5 mL (SD 47.9), 9 days (range: 3–24) and 12.8 days (range: 6–31), respectively. All patients completed postoperative functional evaluation showing a mean neobladder capacity of 575 cc (range: 500–720). Surgical margins and pathological nodal status were negative in all patients with no evidence of disease recurrence or progression on follow-up. Three of the 4 patients suffered a complication within 90 days, with one occurring later in the first year. All early complications were Clavien grade I–II (grade I [n = 1]; grade II [n = 2]) and the later complication was grade IIIa. The mean follow-up was 632 days (range: 562–730). The limitation of our study is its small sample size with highly selected patients to compensate for the learning experience. The follow-up is short; however, the outcomes are comparable to early experiences reported at other institutions.

**Conclusions:** In our initial experience, RARC with total intracorporeal neobladder formation is safe. We expect that with experience the expense of robotic surgery can be compensated with early ambulation and shorter stay.

### Introduction

Radical cystectomy has been well-established as the gold standard treatment for muscle-invasive bladder cancer (MIBC) and for recurrent, high-grade superficial bladder cancer.<sup>1</sup> Robotic-assisted surgery is increasingly being performed to improve the outcomes by decreased blood loss, decreased time to return of bowel function, and decreased analgesia requirement.<sup>2</sup> While the experience with the robot-assisted radical cystectomy (RARC) has increased, very few authors have published their experience of orthotopic diversion in an intracorporeal fashion.<sup>3,4</sup> We report our initial experience, including technique, outcomes and complications, with robotic-assisted radical cystoprostatectomy with intracorporeal neobladder reconstruction.

### Methods

Between May and December of 2012, 4 patients underwent robot-assisted radical cystoprostatectomy and pelvic lymph node dissection with total intra-corporeal creation of ileal neobladder. These surgeries were performed by a single surgeon (BSM) at the Royal Alexandra Hospital in Edmonton, Alberta, Canada, using the daVinci Surgical System (Intuitive Surgical, Sunnyvale, CA). All male patients were under 65 years old, with a good performance status. Patients with previous extensive abdominal surgery and poor cardiopulmonary reserve were excluded.

Neoadjuvant platinum based chemotherapy was given to 2 patients (Table 1). Medical records were examined for outcome measures. They were operative (total operative time and estimated blood loss), perioperative (time to bowel movement and discharge from the hospital), pathological (margin status and pathological stage), and postoperative complications within 30 and 90 days and 1 year.

We followed the surgical technique for RARC and high-extended lymphadenectomy as previously described.<sup>3</sup> For intracorporeal pouch formation, all patients underwent W

**Table 1. Pathological data of patients**

Patient	Clinical	Neoadjuvant chemotherapy	Pathology	Surgical margins
1	cT2N0M0 High grade	Yes	ypT0N0(20)M0	Negative
2	BCG refractory cT1N0M0 and CIS High grade	No	pT1N0(5)M0 (pT2c(G6)N0M0)	Negative
3	BCG refractory cT1N0M0 and CIS High grade	No	pCISN0 (21) M0	Negative
4	cT2N0M0 High grade	Yes	ypT0N0(12)M0	Negative

BCG: bacillus Calmette-Guerin; CIS: carcinoma in situ.

Patient #2 had incidental prostate adenocarcinoma with a normal prostate-specific antigen (PSA) (1.7) and evaluation preoperatively. Postoperatively, his PSA remained undetectable.

pouches. A total of 65 cm of the ileum was isolated. An area of the ileum to reach the urethra in a tension-free manner was identified and marked with a traction suture along the anti-mesenteric border (Fig. 1). The bowel segments were divided with an Endo GIA stapler and then the integrity of the bowel was restored by a running 3/0 vicryl stitch in a single layer. The mesenteric trap was closed. In one case a Meckels diverticulum was excised and the bowel was repaired with 3/0 vicryl. The isolated bowel segment was then arranged in W shape and opened along the anti-mesenteric border, except for a 5-cm section along the traction suture where the incision was curved to make a U-shaped flap (Fig. 2). The four limbs of the W shape were then sutured with a running absorbable suture (Fig. 3). A small full-thickness segment of the bowel was excised in the site for the urethral anastomosis, which was then performed with the sutures tied from inside the neobladder (Fig. 4) over a 20Fr Foley catheter. The ureters were implanted using interrupted 4/0 polydioxanone into each limb of the pouch (Fig. 5, Fig. 6). Before closing the pouch, we placed an Angiocath through the anterior wall of the pouch to pass the slippery wire up the ureter. An 8Fr Single J stent was then exchanged over the guidewire and placed in the renal pelvis. The distal ends were taken out through the abdominal wall above the pubic symphysis. The remaining portion of the anterior wall of the pouch was then closed with a running 3/0 vicryl suture (Fig. 7).

All patients had two pelvic drains placed. The specimen was brought through a small supra-pubic incision, which was closed with 1 Vicryl stitch. All patients had a cystogram and flexible cystoscopy before the removal of stents 1 month postoperatively.

## Results

The mean patient age was 61.8 and the mean body mass index was 27.01 kg/m<sup>2</sup> (Table 2). The mean operative time, estimated blood loss, time to full diet, and length of stay were 522.8 minutes (standard deviation [SD] 74.5), 237.5 mL (SD 47.9), 9 days (range: 3–24), and 12.8 days (range: 6–31), respectively (Table 3). Surgical margins and pathological nodal status were negative in all patients with no evidence of disease recurrence or progression on follow-up. Three of the 4 patients suffered a complication within 90 days with one in the first year. All early complications were Clavien grade I–II (grade I [n = 1]; grade II [n = 2]) and the later complication was grade IIIa. The mean follow-up was 632 days (range: 562–730) (Table 4).

The retinopathy improved spontaneously, while ureteric narrowing was fibrotic and needed nephrostomy and insertion of a J stent. In terms of functional outcomes, 3 of 4 patients completed full functional assessment with urodynamics, voiding diary and clean intermittent cath-



**Fig. 1.** Setting up the ileum for the pouch.



**Fig. 2.** The isolated bowel segment is arranged in a W-shape and opened along the anti-mesenteric border.



**Fig. 3.** Making the posterior plate by stitching the posterior adjacent wall of the ileum.

eterization for post-void residual (PVR) volume. The mean bladder capacity was 575 cc (range: 500–700) with a PVR volume ranging from 0 to 60 cc. One patient was still using a single pad for nighttime incontinence. All patients suffered postoperative erectile dysfunction, yet their renal function remained stable postoperatively.

## Discussion

Laparoscopic cystectomy is well-established since the publication of the first report for pyocystis in 1992<sup>6</sup> followed by laparoscopic radical cystectomy for MIBC with an extra-corporeal ileal conduit urinary diversion.<sup>7</sup> The formation of an intra-corporeal continent diversion is more challenging and the first completely intracorporeal laparoscopic radical cystectomy with a continent urinary diversion was reported in 2001.<sup>8</sup> There is limited data on use of the robot to create orthotopic urinary diversion and only 107 cases have been reported thus far.<sup>11</sup>

The first report of total intracorporeal RARC and orthotopic urine diversion was reported by 2003.<sup>9</sup> The advantages of robotic surgery for radical cystectomy include functional outcome with less blood loss, early return of bowel function, less pain, and early discharge.<sup>2</sup> Nix and colleagues also



**Fig. 4.** Urethral anastomosis to the dependent part of the pouch.

confirmed the non-inferior oncological results with surgical margins and lymph node yield.<sup>2</sup>

Recently published larger studies for total intra-corporeal RARC<sup>4,10</sup> have confirmed its feasibility with good oncological function and complication results. In another series, Collins and colleagues review their initial experience with total intra-corporeal RARC at a Canadian centre with at least 1 year of follow-up. Our data is similar to other series from other centres with respect to blood loss, operative time, and complications. Even in this small series, the operative time was reduced and the learning curve was steep.

The functional outcomes were acceptable, with only 1 patient requiring pads at 1 year and with an acceptable neobladder capacity. Nerve-sparing surgery was attempted in only one patient who had an acceptable Sexual Health Inventory for Men (SHIM) score preoperatively. Unfortunately he did not recover his erectile function at the 1-year follow-up. With increasing experience, we believe a more favourable outcome can be achieved in a younger patient.

We recognize the complexity of this operation and that the benefit is minimal at present. Moreover, completing a total intra-corporeal RARC needs a dedicated operating room team and the added cost to the healthcare system may make it impossible to adopt routinely.



**Fig. 5.** Right ureteric anastomosis to the right open end of the W-pouch over a single J stent.



**Fig. 6.** Closure of the open limb after the right ureteric anastomosis.



**Fig. 7.** Closure of the anterior wall of the pouch.

## Conclusion

This study shows that total intra-corporeal RARC is a complex but feasible operation to treat bladder cancer, but the benefit to the patient may be minimal and the cost to the healthcare system may be prohibitive.

**Competing interests:** Authors declare no competing financial or personal interests.

This paper has been peer-reviewed.

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**Table 2. Patient baseline characteristics**

Age	61.8 years (SD 0.5)
BMI	27 kg/m <sup>2</sup> (SD 2.85)
ASA	Class 1 (n = 1) Class II (n = 3)

SD: standard deviation; BMI: body mass index; ASA: American Society of Anesthesiologists.

**Table 3. Patients' perioperative variables**

Operative time	522 minutes (SD 74.46)
Estimated blood loss	237 mL (SD 47.9)
Time to full diet	9 days (range: 3–24)
Length of stay	12.8 days (range: 6–31)

SD: standard deviation. No patient required a blood transfusion.

**Table 4. Postoperative complications according to the Clavien classification**

Clavien I	Seroma and electrolyte imbalance
Clavien II	Candidia urinary tract infection, unilateral ischemic retinopathy
Clavien IIIa	Unilateral anastomotic narrowing

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