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Platinum Priority – Bladder Cancer

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Standardized Analysis of Frequency and Severity of Complications After Robot-assisted Radical Cystectomy

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Abstract

Background: Comprehensive and standardized reporting of adverse events after robot-assisted radical cystectomy (RARC) and urinary diversion for bladder cancer is necessary to evaluate the magnitude of morbidity for this complex operation.
Objective: To accurately identify and assess postoperative morbidity after RARC using a standardized reporting system.
Design, setting, and participants: A total of 241 consecutive patients underwent RARC, extended pelvic lymph node dissection, and urinary diversion between 2003 and 2011. In all, 196 patients consented to a prospective database, and they are the subject of this report. Continent diversions were performed in 68% of cases.
Outcome measurements and statistical analysis: All complications within 90 d of surgery were defined and categorized by a five-grade and 10-domain modification of the Clavien system. Univariable and multivariable logistic regression analyses were used to identify predictors of complications. Grade 1–2 complications were categorized as minor, and grade 3–5 complications were categorized as major. All blood transfusions were recorded as grade $\geq$2.
Results and limitations: Eighty percent of patients (156 of 196 patients) experienced a complication of any grade $\leq$90 d after surgery. A total of 475 adverse events (113 major) were recorded, with 365 adverse events (77%) occurring $\leq$30 d after surgery. Sixty-eight patients (35%) experienced a major complication within the first 90 d. Other than blood transfusions given (86 patients [43.9%]), infectious, gastrointestinal, and procedural complications were the most common, at 16.2%, 14.1%, and 10.3%, respectively. Age, comorbidity, preoperative hematocrit, estimated blood loss, and length of surgery were predictive of a complication of any grade, while comorbidity, preoperative hematocrit, and orthotopic diversion were predictive of major complications. The 90-d mortality rate was 4.1%. The main limitation is lack of a control group.
Conclusions: Analysis of postoperative morbidity following RARC demonstrates a considerable complication rate, though the rate is comparable to contemporary open series that followed similar reporting guidelines. This finding reinforces the need for complete and standardized reporting when evaluating surgical techniques and comparing published series.
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1. Introduction

Radical cystectomy with extended pelvic lymphadenectomy represents the most effective surgical treatment of muscle-invasive transitional cell carcinoma of the bladder and is a viable alternative for high-risk or refractory superficial disease [1]. Surgery has been traditionally performed with an open approach, but recently the use of laparoscopic and robot-assisted radical cystectomy (RARC) has increased [2–6]. Novel surgical techniques should ideally offer technical, functional, and oncologic enhancements. Minimally invasive surgeons have promoted decreased blood loss and shorter convalescence as benefits of laparoscopic radical cystectomy or RARC. Long-term oncologic and functional outcomes have not been adequately studied.

Despite improvements in surgical technique, technology, and perioperative care, cystectomy with urinary diversion remains a morbid operation with a substantial complication rate. Unfortunately, longitudinal comparative analyses have been difficult to interpret because of differences in reporting and nonstandardization. To objectively assess the full range of adverse events for an operation, a standardized reporting system for complications is required. Martin et al. established 10 criteria to improve the quality of reporting complications [7]. Recent studies examining cystectomy complications using a Clavien grading system have reported complication rates ranging between 48% and 74% [2,3,8–10].

As only limited randomized comparisons of robotic and open cystectomy currently exist [11], objective reporting of complications based on an established system becomes increasingly important. We sought to define the type, incidence, and severity of early postoperative morbidity in a large RARC series using a standardized reporting methodology according to the Martin criteria.

2. Patients and methods

Between 2003 and 2011, 241 patients underwent RARC at City of Hope National Cancer Center. Forty-five patients were excluded because they declined participation in our bladder cancer (BCa) database or had concomitant surgery. The remaining 196 patients were consented to our institutional review board–approved cystectomy database. Indications for RARC included muscle-invasive BCa or high-grade refractory or recurrent multifocal bladder tumors not amenable to local therapy. Patients were offered neoadjuvant chemotherapy when indicated and underwent preoperative staging with computed tomography. Patients were offered orthotopic or cutaneous continent diversion or ileal conduit. Contraindications to orthotopic diversion included serum creatinine >2 ng/ml, disease at the urethral margin, or advanced disease. Contraindications to continent cutaneous diversion included poor manual dexterity, creatinine >2 ng/ml, significant comorbidity, symptoms of dementia, or advanced disease. Continent diversions were performed in 68% of cases.

Clinicopathologic and complications data were collected prospectively. In addition, independent review of all inpatient charts, outpatient notes, outside hospital notes, and correspondence with local physicians for complications was performed by academic urologists. All complications within 90 d of surgery were recorded and graded according to an established five-grade Clavien classification [12]. Clavien grade 1 or 2 complications were categorized as minor complications, and grade 3–5 complications were considered major. Preoperative comorbidities were computed using an age-adjusted Charlson comorbidity index (CCI) [13].

Presurgical patient preparation included clear liquids and GoLytely or magnesium citrate the day before surgery. Beginning in 2009, oral alvimopan was administered if there were no contraindications. Sequential compression devices were routinely used, and a second-generation cephalosporin was administered intravenously for 1 d perioperatively. In 2006, initiation of subcutaneous low-molecular-weight heparin began postoperatively with confirmation of stable hematocrit, and patients were also discharged home with a 4-wk supply.

2.1. Operative technique

Four experienced surgeons performed >97% of the RARCs. Robotic cystectomy with the da Vinci Surgical System robot was completed using a six-port transperitoneal approach. Bilateral ureters were freed down to the base of the bladder and clipped. Extended pelvic lymphadenectomy was performed bilaterally from the inferior mesenteric artery down to the node of Cloquet. Limits of dissection were the genitofemoral nerve (laterally) and the obturator fossae (posteriorly). Posterior dissection beneath the base of the bladder was performed, followed by dropping the bladder anteriorly. The dorsal venous complex was controlled using an

Table 1 – Patient demographics

Gender, no. (%)	
Female	32 (16.3)
Male	164 (83.7)
Age at surgery, yr, median (IQR)	70.4 (62.9–77.0)
BMI, median (IQR)	27.1 (24.1–30.5)
CCI, median (IQR)	5 (4–6)
ASA score, no. (%)	
II	41 (20.9)
III	123 (62.8)
IV	31 (15.8)
Patients with previous abdominal surgery, no. (%)	106 (54.1)
Receipt of neoadjuvant chemotherapy, no. (%)	43 (21.9)
Diversion type, no. (%)	
Ileal conduit	62 (31.6)
Continent cutaneous	48 (24.5)
Orthotopic neobladder	86 (43.9)
Surgery length, min, median (IQR)	432 (384–498)
EBL, ml, median (IQR)	400 (250–525)
Histology, no. (%)	
Transitional cell carcinoma	179 (91.3)
Adenocarcinoma	9 (4.6)
Squamous cell carcinoma	4 (2.0)
Mixed carcinoma	4 (2.0)
Nodal yield, median (IQR)	28 (19–39)
Pathologic T stage, no. (%)	
T0,Tis,Ta,T1	74 (37.7)
T2	52 (26.5)
T3	48 (24.5)
T4	22 (11.2)
Pathologic node status, no. (%)	
N0	152 (77.5)
N1	15 (7.7)
N2	27 (13.8)
N3	1 (0.5)
Positive surgical margins, no. (%)	8 (4.1)
Preoperative hematocrit, %, median (IQR)	39.6 (36.2–42.8)
Preoperative creatinine, median (IQR)	1.0 (0.9–1.2)
Length of stay, d, median (IQR)	9 (7–13)

IQR = interquartile range; BMI = body mass index; CCI = Charlson comorbidity index; ASA = American Society of Anesthesiologists; EBL = estimated blood loss.

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