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Original article

Analysis of open and intracorporeal robotic assisted radical cystectomy shows no significant difference in recurrence patterns and oncological outcomes

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Abstract

Objectives: To report and compare early oncological outcomes and cancer recurrence sites among patients undergoing open radical cystectomy (ORC) and robotic-assisted radical cystectomy with intracorporeal urinary diversion (iRARC).

Methods and materials: A total of 184 patients underwent radical cystectomy for bladder cancer. ORC cases ($n = 94$) were performed between June 2005 and July 2014 while iRARC cases ($n = 90$) were performed between June 2011 and July 2014. Primary outcome was recurrence free survival (RFS). Secondary outcomes were sites of local and metastatic recurrence, cancer specific survival (CSS) and overall survival (OS).

Results: Median follow-up for patients without recurrence was 33.8 months (interquartile range [IQR]: 20.5–45.4) for ORC; and 16.1 months (IQR: 11.2–27.0) for iRARC. No significant difference in age, sex, precystectomy T stage, precystectomy grade, or lymph node yield between ORC and iRARC was observed. The ORC cohort included more patients with ≥pT2 (64.8% ORC vs. 38.9% iRARC) but fewer pT0 status (8.5% ORC vs.vs. 22.2% iRARC) due to lower preoperative chemotherapy use (22.3% ORC vs. 34.4% iRARC). Positive surgical margin rate was significantly higher in the ORC cohort (19.3% vs. 8.2%; $P = 0.042$). Kaplan-Meir analysis showed no significant difference in RFS (69.5% ORC vs. 78.8% iRARC), cancer specific survival (80.9% ORC vs. 84.4% iRARC), or OS (73.5% ORC vs.vs. iRARC 83.8%) at 24 months. Cox regression analysis showed RFS, cancer specific survival and OS were not influenced by cystectomy technique. No significant difference between local and metastatic RFS between ORC and iRARC was observed.

Conclusion: This study has found no difference in recurrence patterns or oncological outcomes between ORC and iRARC. Recurrent metastatic sites vary, but are not related to surgical technique.

Keywords: Bladder cancer; Intracorporeal urinary diversion; Open cystectomy; Outcomes; Recurrence; Robotic-assisted cystectomy

1. Introduction

Radical cystectomy with lymphadenectomy remains the gold standard of curative treatment for muscle invasive or recurrent high grade non–muscle-invasive bladder cancer [1]. Minimally invasive radical cystectomy has evolved to include robotic-assisted laparoscopic techniques with intracoporeal urinary diversion, largely as a result of developments in robotic technology, and in a number of centers has become the surgical approach of choice in selected cases [2–4].

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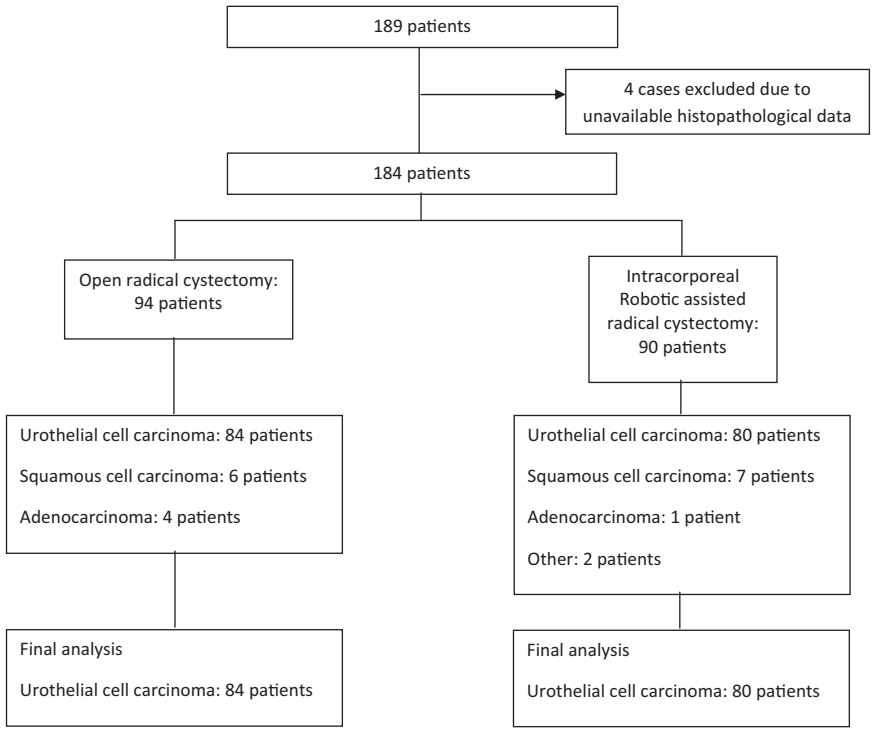

Fig. 1. Patients selected for recurrence free survival and overall survival analysis.

Evidence from retrospective case series that compare open radical cystectomy (ORC) to intracorporeal robotic-assisted radical cystectomy (iRARC) reports that iRARC carries a lower risk of major complications and reduced transfusion rate [5]. However, it is equally important that oncological outcomes following iRARC should at least be equivalent to ORC. It is also essential to determine if surgical technique influences the landing sites and pattern of recurrence following radical cystectomy.

Although no studies exist that compare iRARC to ORC, a recent systematic review suggests that early oncological outcomes after RARC were comparable with ORC [6]. To date, published studies reporting oncological outcomes after iRARC comprise largely of case series, with few studies comparing the outcomes of robotic and open surgery [7,8]. Recently, in a series of 383 patients undergoing radical cystectomy over a 13 year period, Nguyen et al. reported a larger proportion of extrapelvic lymph node metastasis and peritoneal carcinomatosis following RARC compared with ORC, although statistical significance was not reached [9]. The authors found that RARC was not an independent predictor of recurrence after surgery [9]. Nonrandomized comparative series have the potential for bias and a randomized controlled trail by Bochner et al. has been performed comparing ORC and RARC, although it was not designed to determine a difference in survival benefit [10]. The trial was intended to detect a reduction in Clavian grades II to IV complication rate of $\geq$20% at 90 days but was closed early following a futility analysis.

In this study, we report early oncological outcomes of 184 consecutive open or iRARC cases within a tertiary referral center. Secondary objectives included a comparison of local vs. metastatic recurrence sites, cancer specific survival (CSS) and overall survival (OS) for ORC and iRARC.

2. Material and methods

2.1. Patient cohort

A retrospective analysis of 184 patients within a tertiary referral center underwent radical cystectomy for primary bladder cancer with curative intent (Fig. 1). ORC cases ($n = 94$) were performed from June 2005 to July 2014 whereas RARC cases ($n = 90$) were performed from June 2011 to July 2014. Overall, 4 cases were excluded based on the lack of histopathological data. Before 2013, RARC was performed at 1 of the 2 sites undertaking radical cystectomy. After 2013, all cystectomies were performed at 1 site. In 2014, 45 radical cystectomy cases were performed and in 2015 this increased to 63 cases. All 3 surgeons performing open cystectomy had performed $\geq$100 cases previously and the 2 iRARC surgeons, who also performed the ORC cases, performed 76 and 14 iRARCs respectively during the study period.

Inclusion criteria were patients with muscle invasive bladder cancer (MIBC) or high risk non-MIBC who had radical cystectomy and lymphadenectomy with curative intent. The type of urinary diversion was dependent on patient choice provided there were no absolute contraindications [11]. All patients underwent preoperative laboratory