Robotic versus Open Radical Cystectomy for Bladder Cancer: Evaluation of Complications and Survival

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Introduction

- **Background.** Robotic-assisted radical cystectomy (RARC) is an alternative approach to open radical cystectomy (ORC) for the management of bladder cancer. Early data suggest RARC is a safe and comparable option to ORC for cancer control, but studies have not demonstrated a clear benefit in morbidity for RARC over ORC.
- **Purpose.** We aimed to compare Clavien complications, readmission, and survival for RARC to ORC at Loyola Medical Center.

Methods

- Patients diagnosed with bladder cancer of any stage undergoing RARC or ORC at Loyola University Medical Center (2005-2021) were included.

Clinical Variables Collected

- Age, Sex, Race, Comorbities
- Prior intravesical therapy
- Hydronephrosis
- Bladder cancer histology
- Clinical stage of bladder cancer
- Receipt of neoadjuvant chemotherapy

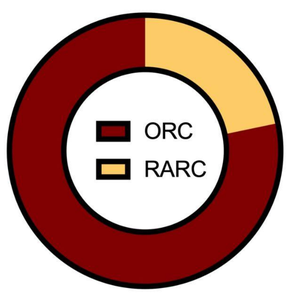
- Early and recent time periods were based on median RARC case (August 2016). RFS and OS were evaluated with Kaplan-Meier curves and multivariable Cox proportional hazards regression models.

Compared Between Groups

- Rates of aborted surgery
- Clavien complications
- Survival (recurrence-free) (RFS)
- Overall survival (OS)

Results

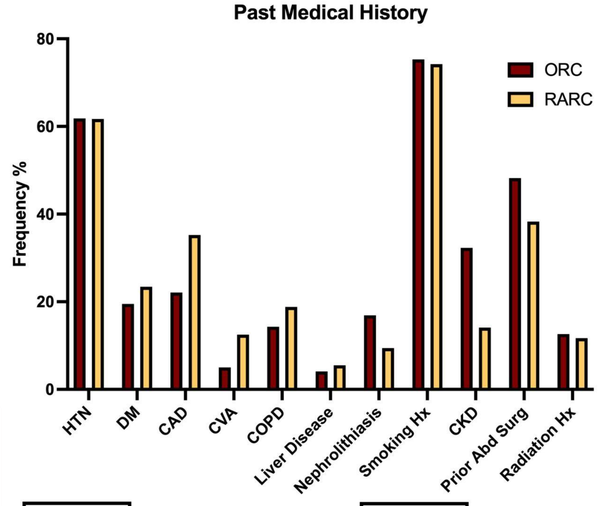
[Figure 1A]



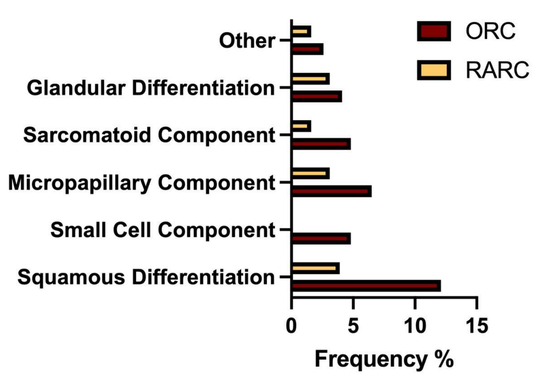
[Figure 1B] More RARC patients had coronary artery disease, stroke history, but fewer with chronic kidney disease compared to ORC

[Figure 2A] Patients receiving RARC had less variant histology compared to ORC.

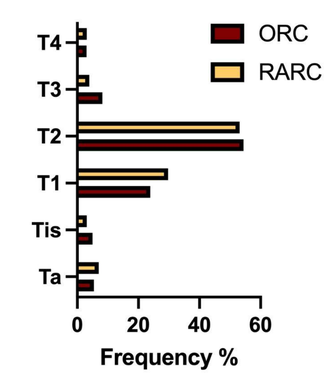
[Figure 1B]



[Figure 2A]



[Figure 2B]

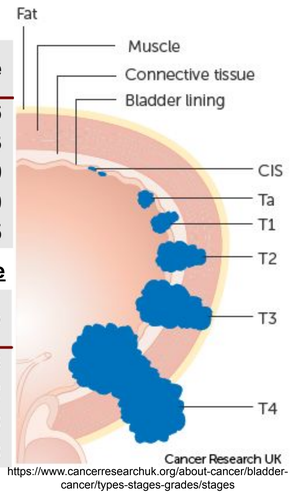


[Table 1A] **Hazard Ratios of Clinical Tumor Size**

Risk Factor (cTx)	Hazard Ratio (HR) (95% CI for HR)	P-Value
Tis	1.521 (0.647-3.580)	0.336
T1	1.391 (0.682-2.835)	0.363
T2	1.453 (0.717-2.944)	0.299
T3	1.766 (0.769-4.057)	0.180
T4	2.655 (1.023-6.890)	0.045

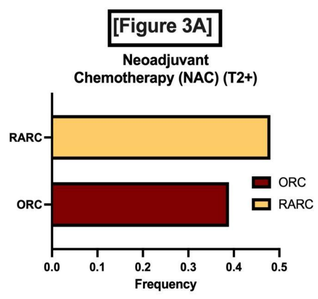
[Table 1B] **Hazards Ratios of Persistent Nodal Size**

Risk Factor (pNx)	Hazard Ratio (HR) (95% CI for HR)	P-Value
NX	2.152 (0.545-8.482)	0.273
N1	1.890 (1.152-3.102)	0.012
N2	3.106 (2.061-4.681)	0.000
N3	5.418 (3.255-9.019)	0.000

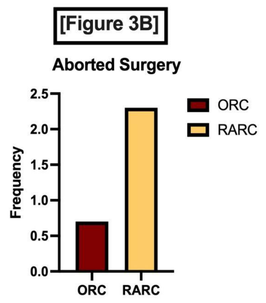


https://www.cancerresearchuk.org/about-cancer/bladder-cancer/types-stages-grades/stages

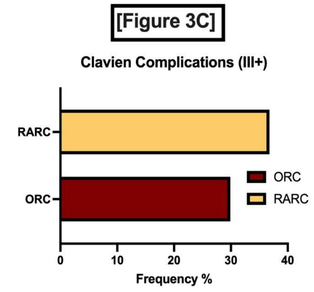
[Figure 3A]



[Figure 3B]



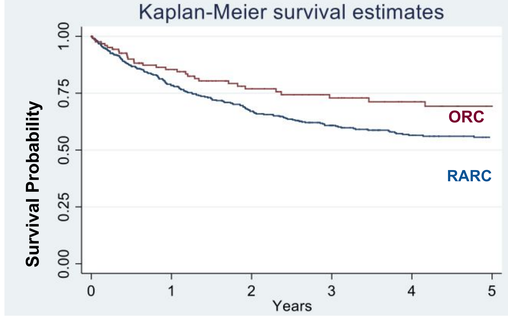
[Figure 3C]



[Table 2A] **Hazard Ratios of Histological Variants**

Risk Factor (Bladder Histology)	Hazard Ratio (HR) (95% CI for HR)	P-Value
UC with Variant	1.009 (0.728-1.398)	0.954
Small Cell Neuroendocrine	0.965 (0.233-3.993)	0.961
Adenocarcinoma Only	0.753 (0.183-3.096)	0.695
Squamous Cell Carcinoma	1.658 (0.765-3.593)	0.200
Other	0.535 (0.099-2.888)	0.468

[Graph 1] **Kaplan-Meier Survival Curves by Study Group (ORC vs. RARC)**



[Table 2B] **Hazards Ratios of Neoadjuvant Chemotherapy**

Risk Factor (NAC)	Hazard Ratio (HR) (95% CI for HR)	P-Value
Yes	0.660 (0.452-0.964)	0.032
Prior BCG Therapy	1.067 (0.765-1.488)	0.702

[Table 3] **Hazards Ratios of Surgical Approach and Age**

Surgical Approach	Hazard Ratio (HR) (95% CI for HR)	P-Value
Robotic	0.710 (0.487-1.037)	0.077
Age (at surgery)	1.024 (1.008-1.040)	0.002

BCG = Bacillus Calmette-Guerin; intravesical immunotherapy treatment for early-stage bladder cancer

UC = Urothelial carcinoma

Clavien Post-Operative Complications
0 No Clavien Complication
1 Any unexpected complication not meeting higher definition
2 Broad (transfusions, non-OTC meds)
3 Procedure or intervention required
4 Organ dysfunction requiring ICU
5 Death

Discussion

- Age, sex, race, cT stage, and receipt of neoadjuvant chemotherapy were comparable between groups
- [Figure 3B] 2.3% of RARC cases were aborted due to inability to tolerate insufflation or bladder fixation while 0.7% of ORC cases were aborted due to abdominal metastatic disease.
- [Figure 3C] Major Clavien ≥3 complications occurred in 31.4% of those who completed cystectomy with 36.8% for RARC vs. 29.9% for ORC (p=0.31).
- Complication rates of RARC improved somewhat in more recent years (RARC 27.0% vs. ORC 27.8%, p=0.75)
- 90-day readmission improved slightly from 43.1% to 37.9% (p=0.22) from the early to recent time period with no difference by surgical approach (p=0.12).
- [Tables 3] With 3.2 years mean follow-up, RFS (HR 0.86 (95%CI 0.55-1.34), p=0.51) and OS (HR 0.71 (95%CI 0.49-1.04), p=0.08) were comparable in adjusted multivariable Cox models.

Conclusion

RARC has comparable 90-day complication rates, readmission rates, and early survival outcomes to ORC. Morbidity of radical cystectomy remains significant but with slight improvements in more recent years.

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