

# Predicting Adverse Early Peri-operative Outcomes: Insights From The Asian Robot-assisted Radical Cystectomy Consortium

Alvin Lee<sup>1</sup>, John Carson Allen Jr<sup>2</sup>, Jeremy Yuen-Chun Teoh<sup>3,4</sup>, Eddie Shu-Yin Chan<sup>5</sup>, Erica On-Ting Chan<sup>5</sup>, Seok-Ho Kang<sup>5</sup>, Manish I. Patel<sup>6,7</sup>, Satoru Muto<sup>8</sup>, Shigeo Horie<sup>8</sup>, Cheng-Kuang Yang<sup>9</sup>, Chikara Ohyama<sup>10</sup>, Shingo Hatakeyama<sup>10</sup>, Ruiyun Zhang<sup>11</sup>, Haige Chen<sup>11</sup>, Kiffinut Kijvikai<sup>12</sup>, Lui-Shiong Lee<sup>1</sup>

<sup>1</sup>Department of Urology, Sengkang General Hospital and Singapore General Hospital, Singapore, <sup>2</sup>Duke-NUS Graduate Medical School, Singapore, <sup>3</sup>S.H. Ho Urology Centre, Department of Surgery, The Chinese University of Hong Kong, Hong Kong, China, <sup>4</sup>European Association of Urology Young Academic Urologists, Urothelial Carcinoma Working Group (EAU-YAU), <sup>5</sup>Department of Urology, Korea University, School of Medicine, Seoul, Republic of Korea, <sup>6</sup>Discipline of Surgery, Sydney Medical School, University of Sydney, Sydney, New South Wales, Australia, <sup>7</sup>Department of Urology, Westmead Hospital, Westmead, New South Wales, Australia, <sup>8</sup>Graduate School of Medicine, Department of Urology, Juntendo University, Tokyo, Japan, <sup>9</sup>Division of Urology, Department of Surgery, Taichung Veterans General Hospital, Taichung, Taiwan, <sup>10</sup>Department of Urology, Hirosaki University Graduate School of Medicine, Hirosaki, Japan, <sup>11</sup>Department of Urology, Renji Hospital, School of Medicine, Shanghai Jiao Tong University, Shanghai, People's Republic of China, <sup>12</sup>Division of Urology, Department of Surgery, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand.

## Background

- Predictive factors of perioperative outcomes in robot-assisted radical cystectomy (RARC) from multicentre cohorts are lacking.

## Objectives

- By interrogating our database, our objective was to report the early peri-operative outcomes of the robot-assisted radical cystectomy and to elucidate any peri-operative factors that could be optimised.

## Materials and Methods

- Consecutive patients undergoing RARC in 9 centres within Asia were prospectively included into the Asian RARC Consortium registry. All patients underwent RARC and those who had open or laparoscopic radical cystectomy were excluded. Standardized data-collection forms were used to record the clinical variables and peri-operative outcomes.
- The variables analysed included patients' age at cystectomy, body mass index (BMI), smoking history, comorbidities (such as hypertension, diabetes mellitus, ischaemic heart disease), pre-operative renal impairment, presence of hydronephrosis, tumour and nodal stage and whether they had received neoadjuvant chemotherapy.

- The peri-operative outcomes analysed included length of hospital stay, 30-day readmission rates, estimated blood loss, time to solid food intake and major complications. Major complications were defined as having a Clavien-Dindo  $\geq 3$  complication.
- Predictive factors with a p-value of  $<0.10$  were included in the final logistic regression model. All tests were considered statistically significant if there was a p-value of  $<0.05$ . Multiple imputation was performed to account for missing data.

## Results

- Across 9 centres within Asia, 569 consecutive patients underwent RARC from 2007 to 2020. The pre-operative baseline characteristics are presented in Table 1.

**Table 1: Baseline demographics of patients undergoing RARC (n=568).**

Mean age at cystectomy, years (SD)	67.5 (+/-12.3)
Mean BMI, kg/m <sup>2</sup> (SD)	24.4 (+/-3.3)
Male gender, n (%)	485 (85.2)
Smoking history, n (%)	282 (50.5)
Comorbidities, n (%)	
Hypertension	243 (42.8)
Diabetes Mellitus	129 (22.7)
Ischemic Heart Disease	37 (6.5)
Previous abdominal surgery	81 (14.2)
Hyperlipidaemia	78 (13.7)
Pre-operative renal impairment, n (%)	90 (15.9)
Pre-operative hydronephrosis, n (%)	115 (20.3)
Pre-operative clinical T stage, n (%)	
Tis	21 (3.7)
Ta	25 (4.5)
T1	160 (28.5)
T2	244 (43.5)
T3	85 (15.2)
T4	26 (4.6)
Pre-operative clinical node positive, n (%)	47 (8.3)
Neoadjuvant chemotherapy	173 (30.6)
Type of urinary reconstruction	
Intra-corporeal	262 (46.1)
Extra-corporeal	307 (53.4)
Peri-operative outcomes	
Mean estimated blood loss, ml (SD)	473 (+/- 419)
Mean time to solid food intake, days (SD)	5.3 (+/- 4.1)
Mean length of hospitalisation stay, days (SD)	16.8 (+/- 12.1)
Clavien-Dindo $\geq 3$ complications, n (%)	83 (15.6)
30-day readmission rate, n (%)	129 (23.9)
30-day mortality, n (%)	0
90-day mortality, n (%)	1 (0.2)
Positive surgical margin rate, n (%)	128 (22.7)
Mean lymph node yield, n (SD)	20.8 (14.0)
Histology, n (%)	
Urothelial	520 (93.2)
Non-urothelial or undetermined	38 (6.8)

BMI = Body Mass Index, SD = Standard Deviation

### Peri-operative outcomes: Major complications (Clavien-Dindo $\geq 3$ )

- Our major complication (rate was 15.6%). A history of diabetes mellitus (OR 1.82, 95% CI 1.08 – 3.06,  $p=0.0253$ ) and pre-operative hydronephrosis (OR 1.77, 95% CI 1.04 – 3.03,  $p=0.0365$ ) was associated with a higher rate of CD  $\geq 3$  complications. Neoadjuvant chemotherapy was a protective factor (OR 0.35, 95% CI 0.19 – 0.67,  $p=0.0016$ ). (Table 2) The utilisation of intra-corporeal urinary reconstruction or neobladder creation were not associated with an increased risk of major complications.

### Peri-operative outcomes: Length of hospitalisation stay

- The mean length of hospitalisation stay was 16.8 days. A history of diabetes mellitus (OR 1.62, 95% CI 1.06 – 2.48,  $p=0.0264$ ) and previous neoadjuvant chemotherapy (OR 3.78, 95% CI: 2.55 – 5.60,  $p<0.001$ ) were independently associated with prolonged hospitalisation stay  $\geq 21$  days. Intracorporeal reconstruction was independently associated with a shorter hospitalisation stay  $<21$  days (OR 0.60, 95% CI 0.42 – 0.87,  $p=0.0067$ ).

**Table 2: Multivariate logistic regression analysis of predictive factors for the peri-operative outcomes**

	OR (95% CI)	P-value
<b>Clavien-Dindo <math>\geq 3</math> complications</b>		
Diabetes Mellitus	1.82 (1.08 – 3.06)	0.0253
Neoadjuvant chemotherapy	0.35 (0.19 – 0.67)	0.0016
Pre-operative hydronephrosis	1.77 (1.04 – 3.03)	0.0365
<b>Estimated blood loss <math>\geq 600</math>ml</b>		
Male gender	2.47 (1.17 – 5.19)	0.0268
Neoadjuvant chemotherapy	0.65 (0.39 – 1.05)	0.0769
Intracorporeal reconstruction	0.38 (0.24 – 0.60)	$<0.001$
<b>Hospital stay <math>\geq 21</math> days</b>		
History of smoking	1.38 (0.96 – 1.99)	0.0852
Diabetes Mellitus	1.62 (1.06 – 2.48)	0.0264
Neoadjuvant chemotherapy	3.78 (2.55 – 5.60)	$<0.001$
Intracorporeal reconstruction	0.60 (0.42 – 0.87)	0.0067
<b>30-day readmission</b>		
Diabetes Mellitus	1.51 (0.94 – 2.43)	0.0854
Previous abdominal surgery	2.27 (1.32 – 3.89)	0.0031
Neoadjuvant chemotherapy	0.38 (0.23 – 0.64)	0.0003
Pre-operative hydronephrosis	2.55 (1.60 – 4.06)	$<0.001$
<b>Time to solid food intake <math>\geq 7</math> days</b>		
History of smoking	5.79 (3.44 – 9.75)	$<0.001$
Pre-operative positive nodal status	3.93 (1.20 – 12.92)	0.0242

Variables with  $p<0.1$  significance were included in the final multivariate logistic regression model

### Peri-operative outcomes: Thirty-day readmission

- Thirty-day readmission rate was 23.9%. The predictive factors for readmission within 30-days were a history of previous abdominal surgery (OR 2.27, 95% CI 1.32 – 3.89,  $p=0.0031$ ) and pre-operative hydronephrosis (OR 2.55, 95% CI 1.60 – 4.06  $p<0.001$ ). Prior neoadjuvant chemotherapy was protective (OR 0.38, 95% CI 0.23 – 0.64,  $p=0.0003$ ).

### Peri-operative outcomes: Estimated blood loss

- The mean estimated blood loss was 473ml (+/- 419ml). Male gender was associated with a greater than 600ml estimated blood loss (OR 2.47, 95% CI 1.17 – 5.19,  $p=0.0268$ ) while intracorporeal reconstruction was associated with a lower bleeding risk (OR 0.38, 95% CI 0.24 – 0.60,  $p<0.001$ ).

### Peri-operative outcomes: Time to solid food intake

- The mean time to solid food intake was 5.3 days. A history of smoking (OR 5.79, 95% CI 3.44 – 9.75,  $p<0.001$ ) and pre-operative positive nodal status (OR 3.9, 95% CI 1.20 – 12.92,  $p=0.0242$ ) were predictive factors for prolonged time to solid food intake ( $\geq 7$  days).

## Conclusions

Optimising relevant pre-operative factors can help improve RARC outcomes. NAC was associated with lower major complication rates.