

First Canadian experience with same-day discharge after robot-assisted radical prostatectomyBraden Millan¹, Raees Cassim¹, Michael Uy¹, Benjamin Bay¹, Bobby Shayegan¹¹Division of Urology, Department of Surgery, McMaster University, Hamilton, ON, Canada

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ABSTRACT

Introduction: We aimed to evaluate the feasibility and safety of implementing a same-day discharge (SDD) protocol for robot-assisted radical prostatectomy (RARP) and pelvic lymph node dissection.

Methods: We performed a prospective cohort study including all consecutive eligible patients undergoing RARP in 2021 following initiation of SDD RARP protocol in April. Baseline characteristics were compared using t-tests, Mann-Whitney U tests, and odds ratios (OR) calculated using multiple logistic regression to assess for predictors of SDD success.

Results: A total of 117 patients underwent RARP in 2021 following initiation of the SDD protocol. Fifty-seven patients were initiated on the SDD pathway, and 60 patients underwent surgery as an inpatient (IP-RARP). Of those on the SDD pathway (SDD-RARP), 33 (58%) were successfully discharged the same day of surgery, while 24 (42%) failed SDD. Baseline demographics were well-balanced between cohorts. Case order, increased patient age, and distance travelled to the hospital were factors associated with selection of patients for the IP-RARP protocol. In total, 12 SDD and 12 IP patients presented to the emergency

KEY MESSAGES

- Most patients undergoing robot-assisted radical prostatectomy (RARP) have a swift and uneventful recovery.
- The most common reason for not being enrolled on the same-day discharge (SDD) pathway was case order, older age, and increased distance travelled.
- Case order was the only identified predictor of SDD success, with higher success for the first case of the day.
- Our SDD patients had few complications, further supporting the safety of the pathway.
- Reporting length of stay in hours as opposed to days challenges the status quo of routine admission after major surgery and allows select patients the option of SDD.

department ($p=1.0$), and none within 24 hours of discharge. There were no hospital admissions in the SDD cohort, with four readmissions in the IP cohort ($p=0.1$). Multiple logistic regression revealed that case order (second case) was the only predictive factor for SDD success (OR 4.08, 95% confidence interval [CI] 1.59–11.62, $p=0.005$).

Conclusions: Implementation of an SDD pathway following RARP is feasible, with no increase in rates of complications, unscheduled visits, or readmissions.

INTRODUCTION

With the implementation of enhanced recovery after surgery protocols, research has continued searching for ways to improve post-operative surgical care. The primary outcome measures of research focused on post-operative care often include length of stay (LOS). With advances in laparoscopic surgery, and subsequently robotic surgery, the standard mean LOS following undergoing robot-assisted robotic prostatectomy (RARP) has been reduced to 24-48 hours. Considering the Coronavirus disease (COVID-19) pandemic, consensus recommendations were made in Canada regarding the management of prostate cancer given that the risks of serious morbidity of prostate cancer is outweighed by a SARS CoV-2 infection.¹ Due to the impact of the SARS CoV-2 on hospital resources, a significant number of inpatient surgeries were cancelled, while outpatient surgeries were less affected, with the need for admission to hospital being a major determinant for the time to clear the surgical backlog created.² Multiple centres have focused on the feasibility, safety, and benefits of implementing a same-day discharge (SDD) program for patients undergoing RARP.³⁻¹⁰ These studies have demonstrated that compared to the traditional inpatient post-operative course, SDD RARP offers comparable peri-operative outcomes.³⁻¹⁰ Originally, SDD RARP was offered to carefully selected patients, such as those with Grade Group 1 disease, however the addition of pelvic lymph node dissection (PLND) has not been shown to increase rates of complications.^{4, 5, 11, 12} Given the success observed internationally, we aimed to implement a SDD RARP protocol at a high-volume Canadian center.

METHODS

Patient selection and data collection

Prospective data collection for all patients undergoing RARP and PLND in 2021 by a single high-volume surgeon was performed (IRB No. #13825-C). Starting in April, all patients were informed that SDD would be an option postoperatively, in addition to the standard of care admission pathway. Pros and cons were discussed of each option and no final decision would be made until after the operation and discharge would only be offered if strict criteria were met and

the patient was comfortable with the discharge plan. All RARPs were conducted via a trans-peritoneal approach using the Intuitive Surgical DaVinci® Si and Xi Surgical Systems using identical approaches. All surgeries included a standard PLND. Post-operative care included early ambulation (within 3 hours) and diet (within 2-4 hours), scheduled non-narcotic analgesics (Acetaminophen 650mg q4h and Ketorolac 10mg IV q6h), and intravenous fluids. Patients were provided routine post-operative instructions, as well as a custom print out based on patient feedback and common questions (Appendix 1).

The primary outcome measure was SDD success defined as discharge from hospital on the day of surgery. Patients were required to ambulate without assistance, have good pain control, tolerate oral intake, and have vital signs within 20% of their pre-operative values. Secondary outcomes included LOS (in hours), operative time, estimated blood loss (EBL), unscheduled emergency department visits, readmission, complications, and clinicopathologic data. Comparison was made to those who underwent inpatient RARP as well as those prior to implementation of the SDD protocol.

Exclusion criteria for SDD-RARP included patient choice, any cases that were not routine per the surgeon's discretion, no responsible adult to stay with them overnight, and uncontrolled obstructive sleep apnea mandating perioperative monitoring.

Statistical methods

Variables up to 90 days postoperatively were collected. The covariates analyzed included patient demographics, distance travelled, clinicopathological factors, perioperative and postoperative outcomes. Differences between cohorts were calculated by the Mann Whitney U test for categorical data and the student t-test for continuous data. Covariates used in the multiple logistic regression analysis to identify any predictive variables for success of SDD included age, case order, BMI (body mass index, kg/m²), American society of anesthesia (ASA) score, Charlson comorbidity index (CCI), distance traveled (km), prostate volume (cc), nerve sparing, operative time (minutes), and EBL (mL). Statistical significance was set at the p=0.05 level. Statistical analysis was performed using GraphPad Prism version 8 (GraphPad Software, San Diego, California USA).

RESULTS

A total of 187 patients underwent RARP in 2021 at our centre. A total of 70 (37.4%) patients underwent RARP prior implementation of the SDD protocol. Following implementation of the SDD RARP protocol, 117 patients underwent RARP, where 57 (48.7%) were initiated on the SDD pathway (SDD-RARP), 60 (51.2%) were excluded from the SDD pathway and underwent surgery as an inpatient (IP-RARP). The most common factor for IP-RARP was patient preference. Of those on the SDD pathway, 33 (57.9%) were successfully discharged the same day of surgery, while 24 (42.1%) failed SDD (Table 1).

Those initiated on the SDD pathway were younger (62.4 versus 64.7; $p=0.047$), while there were no significant differences between cohorts in other baseline demographics, including BMI, ASA score, and CCI (Table 1). The proportion of patients with an ASA score of 4 were higher in the cohort who underwent IP-RARP, although not statistically significant between the two groups ($p = 0.2$). Distance traveled was shorter for those included on the SDD pathway (SDD-RARP 51.4 km, 95% CI 38.3-64.5 km) in comparison to the IP-RARP (123.5 km, 95% CI 54.3-192.7 km; $p = 0.048$).

As expected, the length of stay (LOS) was shorter in the SDD-RARP cohort, driven by those who were successfully discharged home the same day of surgery (16.4 hours, 95% CI 12.4-20.4 hours; $p=0.002$). Excluding those successfully discharged the same day of surgery, implementation of the SDD pathway did not have an impact of mean length of stay (30.7 hours versus 31.3 hours; $p = 0.9$). The overall impact of the SDD pathway on LOS before and after for all comers was 29.7 hours (95% CI 26.7-32.8 hours) in comparison to 16.4 hours (95% CI 12.4-20.4 hours; $p < 0.0001$), a total decrease of 13.3 hours length of stay. The case order distribution was significantly different between SDD-RARP and the IP-RARP cohorts with 36/57 being the first case of the day ($p = 0.007$). Mean operative time was similar for the SDD-RARP and IP-RARP cohorts ($p = 0.9$). The distribution of nerve sparing, including non-nerve sparing, unilateral, or bilateral was not different between cohorts ($p = 0.2$). Mean estimated blood loss (EBL) was higher in the IP-RARP cohort, although not statistically significant (283.3 mL, 95% CI 237.0-329.7 mL, $p = 0.2$). The number of lymph nodes removed per patient was not significantly different between the SDD-RARP and IP-RARP cohorts ($p = 0.7$). Comparison of all patients who underwent RARP pre (historical control) and post initiation of the SDD pathway showed only a statistically significant difference in the mean EBL (264.6 mL, 95% CI 235.3 – 293.9 mL post-SDD versus 197.8 mL, 95% CI 173.6 – 222.0 mL pre-SDD; $p = 0.002$; data not shown).

In total, 12 SDD patients and 12 IP patients presented to the emergency department ($p = 1.0$). The vast majority of presentations to the emergency department were secondary to catheter related issues (8 for bypassing, 2 for hematuria and 7 for blockage). There were no hospital admissions in SDD cohort, with 4 readmissions in the IP cohort ($p = 0.1$). There was no significant difference in the number of complications between cohorts, with 1 Clavien-Dindo ≥ 3 in the SDD cohort and 3 in the IP cohort ($p = 0.8$, Table 1). Multiple logistic regression was performed using data from all patients following initiation of the SDD pathway ($n = 117$), and it revealed that only case order was predictive of SDD success, with increased success for the first case of the day (OR 4.08, 95% CI 1.59 – 11.62, $p = 0.005$; Table 2).

Clinicopathologic data for all patients is outlined in Table 3, with no differences identified in pre-operative serum prostate specific antigen levels, mp-MRI PI-RADS scores, international society of urologic pathology (ISUP) grade group, lymph node counts, or final pathology.¹³

DISCUSSION

We present the first Canadian data following implementation of a same-day discharge protocol after RARP and PLND. Our cohort is unique in that baseline characteristics, apart from age were not statistically significant between those initiated on the SDD pathway in comparison to the IP pathway suggesting that we have limited our inherent clinical selection bias. Additionally, our SDD success rate was similar to those previously reported, and in fact higher than their earlier experiences.^{3, 5, 7, 9, 14} Successful SDD was only associated with case order, with a higher percentage of patients being the first case of the day. No changes were made to our surgical technique for patients undergoing RARP and PLND and allows for extrapolation of our experience to other centers. This is evident in our data as operative time, EBL, nerve sparing, and lymph node counts were similar between SDD and IP-RARP cohorts. Of patients in the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database, 69% of patients who were discharged the same day did not undergo a PLND. Given changes in Urologic practice, fewer patient with low-risk prostate cancer will undergo definitive therapy, thus necessitating PLND for the majority of patients.¹⁵ Furthermore, although other studies did not specifically exclude more comorbid patients, the mean ASA (2.8, 95% CI 2.7-2.9 and CCI (4.1, 95% CI 3.4-4.4) for our SDD cohort are much higher, suggesting that SDD can be offered to a wider population of patients.^{3, 5, 7, 9, 14} Complications greater than Clavien-Dindo I-II occurred in 5 patients, 4 of which were the need for insertion of a percutaneous drain for an abscess (2), urine leak (1), and lymphocele (1), while a single event was a cardiac event requiring a coronary artery bypass graft 58 days post-RARP. The rate of complications was lowest in our SDDS cohort, with no significant differences between groups. Further evaluation in the form of a randomized trial is required to corroborate our findings.

In a comprehensive systematic review and meta-analysis of all radical prostatectomy approaches, presentation to the emergency department was observed in 11.7% of patients, resulting in a 3.6% re-admission to hospital.¹⁶ A total of 24 patients presented to the emergency department 90-days post-operatively, predominately relating to catheter issues, with no significant difference between cohorts. Additionally, just 4 patients required readmission to hospital, none of which were on the SDD pathway post-operatively. These rates are comparable to those reported by other centers offering SDD RARP, though some included unscheduled office visits.^{3, 7, 9, 17} Irrespective of the discharge pathway, select patients will present to the emergency department, with few requiring re-admission to hospital. No patient that was discharged the same day presented to ER within 24 hours.

There are limitations to our study, most notably a lack of randomization. The selection of patients on the SDD pathway was influenced by surgeon selection, whereby patients were offered SDD post procedure. Despite this, baseline characteristics were well balanced, excluding age, although a mean difference of 2.3 years is unlikely clinically significant. Patients had the option to stay overnight, and this decision could be made at any point following initiation on the

SDD pathways, and with further distances from the hospital in the IP-RARP cohort, this may have influenced their decision against SDD. Earlier studies included distance travelled as an exclusion criterion for SDD, however Abaza and colleagues had high success rates despite patients travelling on average 121 kilometers.³ No formal patient experience or perception of SDD post RARP was collected, though authors have previously shown that it is preferred over IP RARP in their single center study.¹⁸

CONCLUSIONS

Herein we have demonstrated the results on the feasibility and safety of implementing a SDD pathway in men undergoing RARP and PLND at a high-volume Canadian centre. Case order (second case), older age and increased living distance were factors identified which decreased our likelihood to initiate a patient on the SDD pathway, while case order was the only predictor of SDD success. There were no significant differences in emergency department visits, or readmission revealing that same day surgery can be offered safely to patients undergoing RARP and PLND.

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Figures and Tables

Table 1: Baseline demographics, operative, and outcome data for same day discharge pathway and inpatient robotic assisted radical prostatectomy

Feature [95% CI]	SDD-RARP	IP-RARP	p-value
	N = 57	N = 60	
Mean age	62.4 [60.6 - 64.2]	64.7 [63.2 - 66.3]	0.05
Mean BMI	29.8 [28.7 - 30.9]	30.1 [28.8 - 31.4]	0.7
No. ASA score			
1	1	0	
2	12	13	
3	42	38	
4	2	9	
Mean ASA score	2.8 [2.7 - 2.9]	2.9 [2.8 - 3.1]	0.2
Charlson Comorbidity Index	4.1 [3.8 - 4.4]	4.4 [4.2 - 4.7]	0.07
Mean KMs traveled	51.4 [38.3 - 64.5]	123.5 [54.3 - 192.7]	0.05
Mean length of stay (hours)	16.4 [12.4 - 20.4]	31.8 [23.3 - 40.4]	0.002
Successful SDD (%)	34 (59.6)	-	
Operative characteristics			
Case order			
1	36	23	
2	21	37	0.007
Mean operative time (mins)	127.6 [123.1 - 132.0]	127.3 [122.1 - 132.4]	0.9
Mean estimated blood loss (mL)	244.8 [208.8 - 280.8]	283.3 [237.0 - 329.7]	0.2
Nerve sparing			
None	8	16	
Right	10	6	
Left	8	12	
Bilateral	31	26	0.2
Lymph Nodes	8.0 [6.7-9.4]	7.7 [6.3-9.0]	0.7
No. of unscheduled visits (%)			
Emergency department	12* (21.1)	12** (20.0)	1.0
90-day readmission rate	0 (0)	4 (6.7)	0.1
No. Clavien-Dindo complications (%)	6 (10.5)	13 (13.3)	0.8

SDD-RARP = same day discharge robot-assisted radical prostatectomy; IP-RARP = inpatient RARP; CI = confidence interval; BMI = body mass index; KM = kilometers; mL = milliliters; No. = number of; Case order: 1 = 0830 start; 2 = 1200. * 1 patient presented to ED twice. ** 2 patients present to ED twice. P-values determined using two-sided student t-tests for continuous variables and Mann-Whitney U-tests for categorical variables.

Table 2: Multiple logistic regression for same-day discharge success of all patient following initiation of the same-day discharge pathway

Variable	OR [95% CI] p-value	
	OR [95% CI]	p-value
Age	1.01 [0.92 - 1.12]	0.8
Case order	4.08 [1.59 - 11.62]	0.005
BMI	1.01 [0.90 - 1.14]	0.8
ASA Score	2.07 [0.79 - 5.87]	0.1
CCI	1.05 [0.53 - 2.11]	0.9
Distance travelled (km)	1.00 [1.00 - 1.01]	0.6
Prostate volume (cc)	1.03 [1.00 - 1.06]	0.1
Nerve sparing	0.84 [0.93 - 1.30]	0.4
Operative time (minutes)	1.01 [0.98 - 1.04]	0.5
EBL (mL)	1.00 [1.00 - 1.01]	0.3

CI = confidence interval; BMI = body mass index [kg/m²]; ASA = American society of anesthesia; CCI = Charlson comorbidity index; km = kilometers; cc = cubic centimeters; EBL = estimated blood loss; mL = milliliters.

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Table 3: Prostate Cancer Characteristics

Feature [95% CI]	SDD-RARP	IP-RARP	p-value
	N = 57	N = 60	
Mean Pre-operative PSA	11.2 [9.3 - 13.2]	10.8 [8.5 - 13.1]	0.5
mpMRI			
Yes	23	27	
No	24	33	
Mean PI-RADS score	4.1 [3.7-4.6]	4.2 [3.8 - 4.6]	1.0
Final ISUP Grade Group			
1	1	0	
2	33	39	
3	18	13	
4	3	5	
5	1	2	0.8
Final Pathology			
pT2N0	25	21	
pT3aN0	24	27	
pT3bN0	3	7	
pT3aN1	2	4	
pT3bN1	3	1	0.9

SDD-RARP = same day discharge robot-assisted radical prostatectomy; IP-RARP = inpatient RARP; PSA = prostate specific antigen; mpMRI = multi-parametric magnetic resonance imaging; PI-RADS = prostate imaging reporting and data system; ISUP = international society of urologic pathology; P-values determined using two-sided student t-tests for continuous variables and Mann-Whitney U-tests for categorical variables.

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