First Canadian experience with same-day discharge after robot-assisted radical prostatectomy

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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 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 (first case) was the only predictive factor for SDD success (OR 4.08, 95% confidence interval 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 postoperative surgical care. The primary outcome measures of research focused on postoperative care often include length of stay (LOS). With advances in laparoscopic surgery, and subsequently robotic surgery, the standard mean LOS following robot-assisted robotic prostatectomy (RARP) has been reduced to 24–48 hours.

Considering the 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 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 centers 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 postoperative course, SDD-RARP offers similar perioperative 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 inter-

KEY MESSAGES

- Most patients undergoing RARP have a swift and uneventful recovery.
- The most common reason for not being enrolled on the 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 LOS in hours as opposed to days challenges the status quo of routine admission after major surgery and allows select patients the option of SDD.

nationally, 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 was an option postoperatively, in addition to the standard of care admission pathway. Pros and cons of each option were discussed but no final decision was made until after the operation; discharge was offered if strict criteria were met and the patient was comfortable with the discharge plan. All RARPs were conducted via a transperitoneal approach using the Intuitive Surgical DaVinci® Si and Xi Surgical Systems and with identical approaches. All surgeries included a standard PLND. Postoperative care included early ambulation (within three hours) and diet (within 2–4 hours), scheduled non-narcotic analgesics (acetaminophen 650 mg every four hours and ketorolac 10 mg intravenous every six hours), and intravenous fluids. Patients were provided routine postoperative instructions, as well as a custom printout based on patient feedback and common questions (Appendix 1; available at *cuaj.ca*).

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 preoperative values. Secondary outcomes included LOS (in hours), operative time, estimated blood loss (EBL), unscheduled emergency department (ED) visits, readmission, complications, and clinicopathological 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 postoperative monitoring.

Statistical methods

Variables up to 90 days postoperatively were collected. The covariates analyzed included patient demographics, distance travelled, clinicopathological factors, and perioperative/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, body mass index (BMI) (kg/m^2), 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, CA, U.S.).

RESULTS

A total of 187 patients underwent RARP in 2021 at our center. A total of 70 (37.4%) patients underwent RARP prior to the 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) and 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 vs. 64.7 years, p=0.047), while there were no significant differences between cohorts in other baseline demo-

graphics, 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% confidence interval [CI] 38.3–64.5) in comparison to the IP-RARP group (123.5 km, 95% CI 54.3–192.7, p=0.048).

As expected, the 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, p=0.002). Excluding those successfully discharged the same day of surgery, implementation of the SDD pathway did not have an impact of mean LOS (30.7 hours vs. 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) in comparison to 16.4 hours (95% CI 12.4–20.4, p<0.0001), a total decrease of 13.3 hours LOS. 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 EBL was higher in the IP-RARP cohort, although not statistically significant (283.3 mL, 95% CI 237.0–329.7, 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 post-SDD vs. 197.8 mL, 95% CI 173.6–222.0 pre-SDD, p=0.002) (data not shown).

In total, 12 SDD patients and 12 IP patients presented to the ED (p=1.0). The vast majority of presentations to the ED were secondary to catheter-related issues (eight for bypassing, two for hematuria, and seven for blockage). There were no hospital admissions in SDD cohort, with four readmissions in the IP cohort (p=0.1). There was no significant difference in the number of complications between cohorts, with one Clavien-Dindo ≥3 complication in the SDD cohort and three 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 (odds ratio [OR] 4.08, 95% CI 1.59–11.62, p=0.005) (Table 2).

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
	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 kilometers 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 (minutes)	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

*One patient presented to the emergency department (ED) twice. **Two patients present to the ED twice. ASA: American Society of Anesthesia; BMI: body mass index; CI: confidence interval; IR: inpatient; SDD: same-day discharge; RARP: robotic-assisted radical prostatectomy.

Clinicopathological data for all patients is outlined in Table 3, with no differences identified in preoperative serum prostate-specific antigen levels, multiparametric magnetic resonance imaging Prostate Imaging – Reporting and Data System scores, International Society

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

Variable	OR (95% CI)	p
Age	0.99 (0.90–1.09)	0.8
Case order	0.24 (0.08–0.58)	0.002
BMI	0.96 (0.87–1.07)	0.8
ASA score	0.50 (0.19–1.22)	0.1
CCI	0.95 (0.48–1.86)	0.9
Distance travelled (km)	1.00 (0.99–1.00)	0.6
Prostate volume (cc)	0.97 (0.94–1.00)	0.1
Nerve sparing	1.19 (0.77–1.89)	0.4
Operative time (minutes)	0.99 (0.96–1.02)	0.5
EBL (mL)	1.00 (0.99–1.00)	0.3

ASA: American Society of Anesthesiology; BMI: body mass index; CI: confidence interval; CCI: Charlson comorbidity index; EBL: estimated blood loss.

of Urologic Pathology (ISUP) grade group, lymph node counts, or final pathology.[13]

DISCUSSION

We present the first Canadian data following implementation of a SDD 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 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, which 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% who were discharged the same day did not undergo a PLND. Given changes in urological 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 five patients, four of which were the need for insertion of a percutaneous drain for an abscess (n=2), urine leak (n=1), and lymphocele (n=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.

Table 3. Prostate cancer characteristics

Feature (95% CI)	SDD-RARP	IP-RARP	p
	n=57	n=60	
Mean preoperative 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

P-values determined using two-sided student t-tests for continuous variables and Mann-Whitney U-tests for categorical variables. IP: inpatient; ISUP: International Society of Urologic Pathology; mpMRI: multiparametric magnetic resonance imaging; PI-RADS: Prostate Imaging-Reporting and Data System; PSA: prostate-specific antigen; RARP: robotic-assisted radical prostatectomy; SDD-RARP: same-day discharge.

> “Same-day surgery can be offered safely to patients undergoing RARP and PLND.”

In a comprehensive, systematic review and meta-analysis of all radical prostatectomy approaches, presentation to the ED was observed in 11.7% of patients, resulting in a 3.6% readmission to hospital.[16] In our study, a total of 24 patients presented to the ED 90 days postoperatively, predominately relating to catheter issues, with no significant difference between cohorts. Additionally, only four patients required readmission to hospital, none of whom were on the SDD pathway postoperatively. These rates are comparable to those reported by other centers offering SDD-RARP, although some included unscheduled office visits.[3,7,9,17] Irrespective of the discharge pathway, select patients will present to the ED, with few requiring readmission to hospital. No patient who was discharged the same day presented to ED within 24 hours.

Limitations

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; 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 et al had high success rates despite patients travelling, on average, 121 km.[3] No formal patient experience or perception of SDD post-RARP was collected, although 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 center. Case order (second case), older age, and increased living distance were factors identified that 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 ED visits or readmission, revealing that same-day surgery can be offered safely to patients undergoing RARP and PLND.

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This paper has been peer-reviewed.

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