# Return to work after robot-assisted laparoscopic prostatectomy versus radical retro-pubic prostatectomy

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SALNER A, STAFF I, JAHIEL RI, BELLIZZI KM, CHAMPAGNE A, TORTORA J, WONG AG, MCLAUGHLIN T, WAGNER J. Return to work after robot-assisted laparoscopic prostatectomy versus radical retro-pubic prostatectomy. *Can J Urol* 2019;26(2):9708-9714.

*Introduction:* We compared the return-to-work interval (RTWI) after radical retro-pubic prostatectomy (RRP) and robot-assisted laparoscopic prostatectomy (RALP) in men being treated for early-stage prostate cancer.

*Materials and methods:* We mailed a 28-item questionnaire to a random sample of 2,696 patients who either had RRP from 1995 to 2004 or RALP from 2004 to 2011.

**Results:** We received analyzable questionnaires from 315 patients; 178 had RALP and 137 had RPP. The median RTWI was shorter in the RALP group than in the RRP group (3 versus 4 weeks, p = .016). The percent of subjects who had not returned to work 4 weeks after surgery was 23.6% for RALP and 38.2% for RRP (p = .010). In multivariate regression analysis, surgical approach was a significant predictor of RTWI independent of other social/clinical variables that were associated with either surgical approach or RTWI (p = .014). **Conclusion:** Our data support a shortening of RTWI by RALP.

**Key Words:** return to work, work force, prostate cancer, robot-assisted laparoscopic prostatectomy, radical retro-pubic prostatectomy

### Introduction

Primary prostate cancer surgery is highly prevalent in men of working age. Approximately 164,690 men

Accepted for publication February 2019

Acknowledgements

This study was supported by a grant from the Institute for Health Technology Studies (InHealth). This work would not have been possible without the contributions of the late Dr. Rene Jahiel, who conceived of this study and played a leadership role in its completion and in drafting the original grant application and earlier versions of the manuscript.

Address correspondence to Dr. Tara McLaughlin, Urology Division, Hartford Healthcare Medical Group, 85 Seymour Street, Suite 416, Hartford, CT 06106 USA were diagnosed with prostate cancer in the United States in 2018.<sup>1</sup> The long term costs to employers due to prostate cancer can be greater than those associated with other cancers. For example, once a disability claim enters into the long term disability system, the average wage replacement cost for a prostate cancer claim is  $37,000 \pm 7,400$ , higher than many other cancers including colorectal, breast, lung and liver.<sup>2</sup> It is clear that interventions that facilitate a return to the work force after radical prostatectomy (RP) may significantly lessen the productivity lost due to prostate cancer at the population level.

Nearly half of all men with diagnosed with prostate cancer undergo RP.<sup>3</sup> RP is performed through three main surgical procedures. Open retropubic radical prostatectomy (RRP), established in the 1980s as the gold standard for localized prostate cancer; laparoscopic radical prostatectomy (LRP), first performed in 1992; and robotic assisted laparoscopic radical prostatectomy (RALP) introduced in 1999 and rapidly adopted in the early 2000s.<sup>4</sup> Comparing outcomes for these procedures is challenging. While some prospective nonrandomized comparative studies have been reported,46 results from prospective randomly designed trials are not available.<sup>7</sup> Our ability to make comparisons between these approaches is hampered by several factors. First, surgeons often modify the procedures to improve outcomes.<sup>8</sup> Second, each procedure involves a learning curve and clinicians must obtain experience with an adequate volume of cases to attain optimal performance.<sup>9-12</sup> Thus outcomes at low-volume institutions tend to be inferior relative to those at highvolume ones.<sup>9</sup> Third, common practices may be used even when not supported by medical evidence.8 Finally, data on complications and functional outcomes are often not reported in a way that is useful for meta-analysis.<sup>13</sup> Given these qualifications, the literature as a whole reveals no consistent advantage of any one of these three procedures over the others in terms of cure, continence or potency.<sup>7,13-15</sup> RALP however has consistently been associated with shorter hospital stays, less operative bleeding and postoperative anemia, shorter duration of indwelling catheter and less postoperative pain.<sup>11-17</sup>

The object of the present study was to examine the association of surgical technique (RALP versus RRP) on self-reported time to return to work, while accounting for a host of other medical and social factors associated with surgical approach or return to work interval, in patients who had primary prostate cancer surgery at a large urban community hospital in the Northeastern United States offering RRP from 1995 to 2004 and RALP from 2004 to 2011.

# Materials and methods

### Study population and setting

The population consisted of men treated surgically at Hartford Hospital for clinically localized prostate cancer over a 17 year period from 1995 through 2011. RRP was performed at the institution from 1995 to 2004 and RALP from 2004 to 2011, with only a brief period of about 1 year when both were used. The study institution has one of the largest and most comprehensive prostate cancer programs in the Northeastern United States, with over 600 new prostate cancer patients treated annually.

# Sampling

Patients who received care at the institution for prostate cancer from December 2003 through 2011 were identified using the institution's IRB-approved Comprehensive Prostate Cancer Database and other medical records and hospital databases. The inclusion criterion was cancer stage T1-T3. There were no age exclusions. Patients receiving care at the institution prior to this date were identified using the institution's Cancer Registry. Only patients working at the time of surgery were eligible.

### Survey instrument

We developed a 28-item written questionnaire which asked about number of weeks off from work following surgery, source of income during time off, type of employment and features of work before and after surgery, work modifications and support on return to work; standard occupational classification<sup>18</sup> before and after surgery; household income and composition at time of and after surgery; demographic characteristics; a choice matrix about common symptoms after prostate cancer surgery and their contribution to RTWI; and a final open-ended inquiry: "How would you summarize the effects of your primary cancer treatment on your work life and ability to work?" The questionnaire was subjected to two rounds of pilot testing with prostate cancer survivors before final administration.

### Data collection

After Institutional Review Board approval of the project, the questionnaire was mailed to a random sample of 2,696 patients in 2011-2012 along with a cover letter, and two copies of the informed consent and HIPAA authorization forms. Only those patients returning a complete set of informed consents and HIPAA forms were included in the dataset. A code was assigned to each potential participant and a second packet was sent if there had been no response by the second or third week. Telephone calls were made to non-responders to elicit additional responses.

### Data analysis

The main dependent variable was return to work interval (RTWI), operationalized as time interval in weeks between date of surgery and patient self-report of their return to work. Statistical analyses were performed with the SPSS version 14. A p value of .05 was used to indicate statistical significance for all tests. Descriptive data on survey responders' demographic, economic, and clinical characteristics were reported as proportions for categorical variables, means and standard deviations for continuous variables, and median and inter-quartile range for ordinal data and continuous data with distributions that did not meet the assumptions of normality. RALP and RRP groups were compared on demographic factors, including age and education; employment characteristics including type of work and whether self-employed; and economics, including household income and the presence of supplemental income (e.g., from sick leave or disability). Univariate analyses were conducted using chi-square tests of proportions or Wilcoxon Ranked Sum tests. All factors that differed significantly between the two surgical groups and/or were associated with RTWI at p < .10 were included in a multivariate linear regression model predicting RTWI. A hierarchical approach was used with a first block consisting of demographic and economic variables followed by a second block of clinical characteristics. The final block consisted only of the primary factor of surgical approach (RALP versus RRP). Within each block, a simultaneous entry approach was used.

#### Results

We mailed questionnaires to a total of 2,696 patients between May 2011 and February 2012; we noted

that 773 patients were retired at the time of surgery, based on either self-report and/or hospital records. These patients were removed from the sample. Other patients were removed because they had non-surgical treatments (external radiation or brachytherapy). Out of 1,491 subjects who underwent primary prostate cancer surgery and who were known to be still in the work force at that time, we received 315 analyzable questionnaires. At time of surgery, these patients were aged 44 to 89 (mean 58); 65% had completed college; 56% were in executive or professional ranks; 24% were in middle management; 93% lived with spouse, family or significant other. After surgery, 99% continued working. Of these 315 patients, 178 had RALP and 137 had RPP. Table 1 indicates that the RALP cohort had significantly higher educational level, significantly shorter LOS and that the distribution of Gleason grade group differed between the RALP and RRP cohorts. The median RTWI was shorter in the RALP group than in the RRP group (3 versus 4 weeks, p = .016). The percent of subjects who had not returned to work 4 weeks after surgery

TABLE 1. Patient characteristics at surgery						
Characteristic at time of surgery	RALP	RRP	p value			
Age in yrs. (median, IQR)	58 (54, 62)	57 (53, 62)	.24			
Median income (2012 dollars)	138,750	152,500	.15			
Caucasian (n, %)	172 (96.6)	127 (92.7)	.19			
Live with spouse (n, %)	156 (91.2)	127 (85.5)	.22			
Completed college or higher (n, %)	102 (59.0)	97 (73.5)	.01			
Self-employed (n, %)	29 (17.0)	15 (11.2)	.21			
Blue collar (vs. other; n, %)	23 (13.8)	13 (9.8)	.39			
Working full time (vs. part time; n, %)	151 (84.8)	121 (88.3)	.47			
Receives supplementary income	103 (57.9)	84 (61.3)	.62			
Stage (n, %)			.85			
Stage 2	132 (74.2)	100 (75.8)				
Stage 3	46 (25.8)	32 (24.2)				
Gleason grade group			.001			
6 or lower	53 (29.9)	69 (50.4)				
3+4	92 (52.0)	63 (54.3)				
4+3	21 (11.9)	0 (0)				
8	3 (1.7)	3 (2.2)				
9 or 10	8 (4.5)	3 (2.2)				
Length of stay	1 (1,2)	3 (2,4)	.001			

RALP = robot-assisted laparoscopic prostatectomy; RRP = radical retro-pubic prostatectomy; IQR = inter-quartile range. Blue collar vs. other: In the survey, respondents were asked to identify the field in which they worked and their job title. The positions were then classified according to guidelines presented by the Bureau of Labor Statistics Standard Occupational Classification (SOC) System 2010.<sup>18</sup>

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TABLE 2. Associations with return to work					
Characteristic at time of surgery	n	Median RTWI (IOR)	p value		
Age category		~ ~ /	.001		
Under 60	185	4 (2, 6)			
60 +	108	3 (2, 4)			
Median income (2012 dollars)			.068		
No	132	4 (2, 6)			
Yes	130	3 (2, 5)			
Caucasian (n, %)			.241		
No	185	3 (0, 4)			
Yes	108	3 (2, 6)			
Living arrangement			.538		
Lives alone	19	3 (2, 6)			
Lives with spouse, partner or caretaker	267	3 (2, 5)			
Completed college or higher			.210		
No	101	4 (2, 6)			
Yes	187	3 (2, 6)			
Self-employed			.001		
No	248	4 (2, 6)			
Yes	44	2 (1, 3.75)			
Job category			.006		
Management/white collar	252	3 (2, 5)			
Blue collar	35	4 (3, 6)			
Work status			.017		
Part time	39	3 (2, 4)			
Full time	254	4 (2, 6)			
Receives supplementary income			.001		
No	116	2 (1.25, 4)			
Yes	177	4 (3, 6)			
Stage			.791		
Stage 2	214	3 (2, 5)			
Stage 3	74	3 (2, 5.25)			
Gleason grade group			.350		
6 or lower	114	3.5 (2, 6)			
3+4	143	3 (2, 6)			
4+3	19	3 (3, 5)			
8	6	2.5 (0, 4)			
9 or 10	10	2 (1, 5.25)			
RTWI = return to work interval in weeks; IQR = in	ter-quartile ran	ge			

was 23.6% for RALP and 38.2% for RRP (p = .010). Table 2 indicates that RTWI was significantly associated with age category, self-employment status, job category, work status (full versus part time) and supplementary income status. Three-step multivariate regression analysis, Table 3, indicated that surgical approach remained a significant (p = .012) predictor of RTWI independent of age, selfemployment, college education, household income, job category, supplementary income during sick leave, and clinical characteristics of stage and Gleason grade group.

	Independent predictors of RTWI (at final stage)				
Variable	Standardized beta	Zero order	Semi-partial	p value	
Age	173	241	157	.009	
Self-employed	006	093	005	.927	
College	078	126	066	.271	
Income (median)	088	117	080	.182	
Supplementary income	.181	.211	.160	.008	
Job category	.038	.096	.035	.580	
Work status	076	.043	070	.239	
Gleason grade group	063	130	060	.316	
Surgical method	.159	.167	.151	.012	
RTWI = return to work interval					

#### TABLE 3. Predicting return to work

## Discussion

We sought to compare RTWI for patients undergoing RALP versus RRP after radical prostatectomy for prostate cancer. We noted that the median RTWI was significantly shorter in the RALP group than in the RRP group in univariate comparisons. Further the contribution of surgical approach to RTWI remained significant after accounting for other variables that were associated with either surgical approach or RTWI.

A handful of studies have compared robotic and open radical prostatectomy in terms of sick leave taken in the year after surgery and other work related outcomes. Our results correspond to those of previous studies in which insurance data and government databases were used to derive sick leave time after radical prostatectomy.<sup>19-21</sup> A U.S. study of yearly insurance claims from prostate cancer patients<sup>20</sup> showed that sick leave time was shorter by 6 days in the group who had minimally invasive surgery as opposed to open surgery. When an additional adjustment was performed with propensity scoring, the mean sick leave associated with robotic surgery was 9 days shorter than with open surgery. In a study comparing sick leave after RRP and RALP in two Swedish-Danish institutions,<sup>19</sup> the median length of sick leave was 49 days for RPP and 11 days for RALP. The study was hampered by several drawbacks. First, some RALP patients (particularly higher income patients) actively sought RALP because they believed it to be better than RRP. Furthermore, the many surgeons may have had an a priori belief that patients would recover faster after RALP and therefore wrote shorter

sick notes upon discharge, therefore perhaps forcing a quicker return to work after RALP.

In a later study of physician-certified sick leave and disability pension based on data abstracted from the Swedish Social Insurance Agency,<sup>21</sup> robot-assisted radical prostatectomy was associated with a faster return to work after surgery relative to open RRP. Men who underwent the robotic approach lost fewer days from work per person year in a median of 3.6 years after they returned to work relative to those who underwent the open approach (12 days lost versus 15 days lost, respectively), although this difference was not statistically significant. It is possible that physicians' expectations regarding more positive outcomes after robotic surgery may have influenced them to write notes recommending shorter leave times relative to those who underwent open procedures.

Our results stand in contrast to other studies in which return to work after robotic versus open RP was addressed using patient self-report of work outcomes after these procedures.<sup>22,23</sup> In an analysis of over 1400 online questionnaires from patients undergoing these procedures at a high volume prostate cancer center in Germany, Cox proportional hazards modeling showed no significant effect of surgical approach on time to return to work after RP.<sup>22</sup> In a single surgeon analysis, the median self-reported length of time that patients undergoing RP felt affected in their work after the procedure was 2 months, with no differences noted on the basis of robotic versus open approach.<sup>23</sup>

Methodological differences may have contributed to the discrepancy in results between this study and others based on patient self-report. One such study<sup>22</sup>

used Cox proportional hazard analysis to analyze time to return to work and a second study<sup>23</sup> asked patients to report on the length of time that they felt "affected" in their work after open versus robotic RP. Our methodology differed from the methods used in both of these reports, and we controlled for a wide constellation of factors that were associated with either surgical approach or RTWI. Consistent with one of these studies,<sup>22</sup> we noted that self-employment was associated with a quicker return to work while working in a more physically demanding job (i.e., holding a "blue collar" job in our study) was associated with a longer return to work interval. We also noted a pattern of higher Gleason grade in the RALP cohort (spanning the time period of 2004-2011). This finding is probably not significant because, following revision of the Gleason procedure after 2005, Gleason tests have tended to yield higher scores than previously noted. In addition, active surveillance became an increasingly accepted practice during this period thereby shifting lower Gleason scores toward active surveillance and higher Gleason scores toward definitive treatment.24

Although the robotic approach shortens hospital stay, it is associated with higher hospitalization costs (approximately \$2,500 higher in one retrospective population-based study).<sup>25</sup> However, multiple sources illustrate that when employees do not return to work, the costs to employers are substantial. Increased burdens can stem from direct and indirect causes, including lost productivity and increased work load placed on other team members and on administrative and managerial staff tasked with replacing and retraining new employees.<sup>26-29</sup> The cost differential associated with the robotic approach seems justifiable given these burdens.

Our study has three main strengths. First, RTWI was obtained directly from patient self-report, avoiding the potential influence of physician expectation regarding sick leave time, a draw-back inherent in some of the previous studies described above. Second, we included a large number of demographic, social, and clinical variables in our multivariate analyses. Third, as RRP and RALP were not performed at our institution at the same time during most of the study period, we were able to minimize the influence of procedure selection by either patient or surgeon.

We acknowledge the study also had limitations. First, we cannot discount the potential influence of an unknown, time-dependent process on the shortening of return to work interval in RALP versus RRP. Attitudes toward postoperative recovery have changed over time,<sup>30</sup> along with pain control and social and financial pressures that may impact patients' decisions

to return to work. Such factors may have played a role in results that we obtained. Second, we were not able to randomize patients to surgical approach. However, as stated above, the fact that the different approaches were performed at our institution largely at different time points minimized the influence of selection bias. Third, this study relied on patient memory and, for some patients, up to 20 years expired between the surgery and the survey administered here. Fourth, the study involved only one hospital and one set of surgeons. While this may limit generalizability of the results, it ensured that the same perioperative procedures and standards were in place for all patients. It is known that there is a considerable variation among surgeons who perform RRP, and it is noteworthy that RTWIs of 3 weeks (i.e. as short as the RTWI of the RALP group in our study) have been reported in some RP series.<sup>31,32</sup> Our surgeons do not counsel patients differently on the time interval between surgery and returning to work and our preoperative instructions allow patients to make their own decisions in this regard. The shorter RTWI observed here for RALP is compatible with other biomedical findings, such as shorter durations of hospitalization and indwelling catheterization and less blood loss in patients who had RALP.17,33

### Conclusion

In conclusion, our data support the idea that RALP facilitates a quicker return to the work force after RP in men diagnosed with prostate cancer and may significantly lessen the productivity lost due to the disease and its associated treatment.

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