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European Association of Urology

Prostate Cancer

Satisfaction and Regret after Open Retropubic or Robot-Assisted Laparoscopic Radical Prostatectomy

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Article info

Article history:
Accepted June 13, 2008
Published online ahead of print on June 23, 2008

Keywords:
Health related quality of life
Radical prostatectomy
Regret
Satisfaction

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Abstract

Background: To counsel patients adequately, it is important to understand the variables influencing satisfaction and regret following prostatectomy.
Objective: To identify independent predictors for satisfaction and regret after radical prostatectomy.
Design, setting, and participants: Patients who had undergone retropubic radical prostatectomy (RRP) or robot-assisted laparoscopic radical prostatectomy (RALP) between 2000 and 2007 were mailed cross-sectional surveys composed of sociodemographic information, the Expanded Prostate Cancer Index Composite (EPIC), and questions regarding satisfaction and regret.
Measurements: Sociodemographic variables, perioperative complications, type of procedure, length of follow-up, and EPIC scores were evaluated as independent predictors of satisfaction and regret in multivariate logistic regression analysis.
Results and limitations: A total of 400 patients responded (response rate 61%) of whom 84% were satisfied and 19% regretted their treatment choice. In multivariate analysis, lower income (odds ratio [OR], 0.08; 95% confidence interval [CI], 0.03–0.23), shorter follow-up (OR, 0.63; 95% CI, 0.41–0.98), having undergone RRP versus RALP (OR, 4.45; 95% CI, 1.90–10.4)], urinary domain scores (OR, 2.70; 95% CI, 1.60–4.54), and hormonal domain scores (OR, 2.01; 95% CI, 1.30–3.12) were independently associated with satisfaction ($p \leq 0.039$). In terms of regret, RALP versus RRP (OR, 3.02; 95% CI, 1.50–6.07), lower urinary domain scores (OR, 0.58; 95% CI, 0.37–0.91) and hormonal domain scores (OR, 0.67; 95% CI, 0.45–0.98), and years since surgery (OR, 1.63; 95% CI, 1.13–2.36) were again predictive ($p \leq 0.041$). African American race (OR, 3.58; 95% CI, 1.52–8.43) and lower bowel domain scores (OR, 0.73; 95% CI, 0.55–0.97) were also independently associated with regret ($p \leq 0.028$).
Conclusions: Sociodemographic variables and quality of life were important variables associated with satisfaction and regret. Patients who underwent RALP were more likely to be regretful and dissatisfied, possibly because of higher expectation of an ''innovative'' procedure. We suggest that urologists carefully portray the risks and benefits of new technologies during preoperative counseling to minimize regret and maximize satisfaction.

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0302-2838/$ – see back matter doi:10.1016/j.eururo.2008.06.063

1. Introduction

The often indolent nature of prostate cancer makes health-related quality of life (HRQoL) and satisfaction with treatment increasingly important for patients, providers, payers, and regulators [1–3]. Treatment satisfaction is mainly derived from perceived differences between expectations and experience [4]. Regarding regret, there are various definitions, but most acknowledge that regret is aversive, should be avoided if possible, involves an intimate interplay of thought and feeling, is distinct from other emotions (such as disappointment), and involves comparison of some event or process with ''what might have been'' [5]. Posttreatment regret in prostate-cancer patients has been previously considered as an unsettling feeling of having made a poor treatment choice under conditions of uncertainty [6,7].

When confronted with the diagnosis of localized prostate cancer, patients have to opt for one treatment over another in the absence of solid scientific evidence favoring a specific treatment [8,9]. In this setting, pretreatment patient education and counseling are pivotal parts of the decision-making process [10]. For urologists to counsel patients adequately prior to radical prostatectomy (RP), it is important to understand the variables influencing postoperative treatment satisfaction and regret.

Previous studies have shown that approximately 16% of patients with localized prostate cancer regret their treatment choice [11,12]. Poor general health [12] as well as bother due to urinary dysfunction [7] and sexual [7,12] dysfunction have been found to be independent predictors for regret after primary treatment. Two studies did not find a significant association between regret and type of treatment chosen [12,13]. However, Diefenbach et al indicated that patients who underwent RP reported higher levels of regret than patients who underwent external-beam radiation therapy (XRT) or brachytherapy [7]. None of these studies addressed the influence of different types of surgery on satisfaction and regret after RP.

Because our institution has performed a high number of retropubic radical prostatectomies (RRP) and robot-assisted laparoscopic prostatectomies (RALP), we sought to specifically address differences in satisfaction and regret among procedures and to further characterize variables that result in postoperative satisfaction and regret in this patient population.

2. Methods

2.1. Patients and data collection

Out of 1327 patients who had undergone RRP ($n = 966$) or RALP ($n = 361$) at our institution between 2000 and 2007, 655 had signed informed consent for the institutional review board–approved Duke Longitudinal Urologic Surgery Patient Outcome Database. Using a cross-sectional design, they were sent follow-up questionnaires composed of questions regarding sociodemographic variables, additional treatments received (such as hormonal therapy [HT] and/or XRT) and questions structured to elicit patient-perceived perioperative complications. The Expanded Prostate Cancer Index Composite (EPIC), a validated prostate cancer–specific quality-of-life questionnaire [14], was included as well as questions regarding satisfaction with treatment and regret of treatment choice. Patients who did not respond to the mailed surveys received up to three reminder phone calls from the database staff. The database provided information on race, type of RP performed, length of follow-up, preoperative prostate-specific antigen (PSA), pathological variables, and secondary treatment.

2.2. Satisfaction and regret

Satisfaction was measured with a five-level Likert item ranging from ''extremely dissatisfied'' to ''extremely satisfied.'' Only patients responding that they were ''satisfied'' or ''extremely satisfied'' with their treatment for prostate cancer were classified as satisfied, whereas all other patients were classified as dissatisfied. Regret was measured by a previously validated five-level Likert item ranging from ''all of the time'' to ''none of the time,'' addressing whether patients wished they could have changed the kind of treatment they received [15]. As initially proposed, responses of ''some of the time,'' ''most of the time,'' or ''all of the time'' were categorized as regret, whereas all other responses were categorized as no regret [15].

2.3. Sociodemographics and complications

Race was categorized as African American or non–African American. Higher education was defined as ''college graduate'' or completion of ''graduate or professional school.'' Patients reported their annual combined household income by choosing one of five ranges. ''Married'' patients were categorized as married, whereas all others were categorized as not married. Patients reporting they were ''living with partner or spouse'' were treated as living with a spouse. Patients working ''full-time'' or ''part-time'' were grouped as being employed; all others were grouped as being not employed. Regarding complications, patients were classified as having experienced a patient-perceived complication if they reported at least one complication out of a list of common possible complications (including urinary retention, bladder-neck contracture, wound infection/dehiscence, repeat surgery, and ''other'') on the questionnaires. Patients who received XRT or HT after RP by either database data or self-report on the questionnaires were treated as having received secondary XRT or HT, respectively.

2.4. Disease-specific, health-related quality of life

Answers from the EPIC were coded on a scale from 0 to 100 and disease-specific domain scores were calculated for each of the domains (urinary, sexual, bowel, hormonal) as previously described [16]. Higher scores for each of the domains represent a better HRQoL. Missing values for single responses were imputed to the median prior to calculation of the domain scores.

2.5. Statistical analysis

Differences between responders to the questionnaire and nonresponders, between patients undergoing RALP versus RRP, between satisfied and dissatisfied patients, and between regretful and nonregretful patients were compared using the student t test, the Wilcoxon rank-sum test, the chi-square test, or Fisher exact test.

Multivariate logistic regression analyses were performed in order to identify variables significantly associated with satisfaction and regret. All models were adjusted for tumor stage (pT2 vs pT3), prostatectomy Gleason score (<7, 7, or >7), and preoperative PSA level (logarithmically transformed). Age at time of the survey, income, length of follow-up, and EPIC domain scores were used as continuous variables, whereas race, education, marital and relationship status, employment status, complications, type of procedure, postoperative XRT, and postoperative HT were categorical variables. Of note, relationship status was not included in these multivariate models because it highly correlated with marital status (Spearman R^2: 0.70).

In order to check whether the dichotomization of satisfaction and regret changed our results, we additionally analyzed our data with proportional-odds logistic-regression models. In these models, satisfaction and regret were treated as five-level ordinal outcome variables. In addition, sensitivity analyses were performed limiting the analysis to (1) patients with at least 18 mo of follow-up and (2) patients with organ-confined disease with Gleason score 2–7.

Results were considered statistically significant at a two-sided $p < 0.05$. For univariate analysis due to multiple comparisons the Bonferroni correction was applied. Therefore, $p < 0.00625$ was considered statistically significant when comparing responders and nonresponders, and $p < 0.002$ was used when comparing satisfied with dissatisfied patients, regretful with nonregretful patients, and RRP with RALP patients. All statistical analyses were performed using R version 2.5.1 [17] with the packages Hmisc and Design [18].

3. Results

Four-hundred men completed the questionnaires for a response rate of 61% (59% for RRP and 64% for RALP, $p = 0.180$). Fifty-five percent of the responders had undergone RRP and 45% had undergone RALP (Table 1). Nonresponders were younger (median age 58.4 yr vs 60.0 yr for responders, $p < 0.001$) and included a higher proportion of African Americans (25% of nonresponders vs 14% of responders, $p < 0.001$), but there were no significant differences in PSA level, type of prostatectomy, pathological stage, Gleason score, and secondary XRT or HT between responders and nonresponders ($p \geq 0.180$). Moreover, there were no significant differences in responding and nonresponding African Americans regarding these variables ($p \geq 0.249$).

Table 1 – Baseline variables

	No. (%)	Median (IQR)
Age at surgery (years)	–	60.0 (55.7–64.9)
Age at survey (years)	–	61.5 (57.4–66.6)
Length of follow-up (years)	–	1.5 (0.8–2.4)
African American	55 (13.8)	–
PSA level (ng/ml)	–	5.4 (4.1–7.2)
Type of prostatectomy	–	–
RRP	219 (54.8)	–
RALP	181 (45.2)	–
Pathological stage	–	–
T2	312 (78.0)	–
T3a	65 (16.3)	–
T3b	23 (5.8)	–
Pathological Gleason score	–	–
<7	165 (41.3)	–
7	198 (49.5)	–
>7	37 (9.3)	–
Satisfied	324 (83.9)	–
Regretful	73 (19.1)	–

Note: Percentages may not add up to 100% due to rounding.
IQR, interquartile range; PSA, prostate-specific antigen; RRP, retropubic radical prostatectomy; RALP, robot-assisited laparoscopic prostatectomy.

The distribution of various patient characteristics by procedure type is shown in Table 2. Patients undergoing RALP had significantly lower pathological stage and shorter follow-up (Table 2). There was a trend for RALP patients having less Gleason 8–10 disease and receiving less secondary HT, however, this was not considered to be statistically significant (Table 2).

Eighty-four percent of the patients were satisfied with their treatment while only 19% regretted their choice of treatment. Fourteen patients (4%) did not answer the satisfaction question, and 18 patients (5%) did not answer the regret question. Stage, postoperative Gleason score, and presence of biochemical recurrence were not associated with satisfaction and regret (data not shown).

Table 3 compares satisfied patients with dissatisfied patients. There was a trend towards more dissatisfaction in patients with higher income and in patients reporting postoperative complications; however, this was not considered statistically significant (Table 3). Satisfied patients had significantly higher scores in every domain of the EPIC

Table 2 – Patient characteristics by procedure type

	RRP (n = 219)	RALP (n = 181)	p
Age at surgery, median (IQR)	60.3 (56.0–66.3)	59.2 (55.3–63.7)	0.034*
African American, number (%)	28 (12.8)	27 (14.9)	0.638#
PSA level, median (IQR)	5.3 (4.1–7.2)	5.5 (4.2–7.1)	0.900$
Pathologic stage pT3, number (%)	65 (29.7)	23 (12.7)	<0.001#
Gleason score 8–10, number (%)	28 (12.8)	9 (5.0)	0.010#
Higher education, number (%)	147 (68.1)	109 (61.9)	0.246#
Income, number (%)	75 (75–150)	75 (40–150)	0.208$
Married, number (%)	195 (89.9)	152 (85.9)	0.290#
Living with spouse, number (%)	201 (92.6)	161 (89.9)	0.442#
Employed, number (%)	129 (59.4)	109 (60.9)	0.850#
Complication, number (%)	84 (38.4)	52 (28.7)	0.055#
Secondary XRT, number (%)	21 (9.6)	11 (6.1)	0.267#
Secondary HT, number (%)	16 (7.3)	3 (1.7)	0.009†
Follow-up (years), median (IQR)	1.7 (1.0–2.5)	1.1 (0.7–2.1)	<0.001$
Urinary domain, median (IQR)	82.6 (67.4–91.7)	85.4 (72.6–93.8)	0.092$
Urinary function, median (IQR)	83.3 (66.6–100)	88.3 (71.6–100)	0.162$
Urinary bother, median (IQR)	82.1 (67.9–89.3)	82.1 (71.4–92.9)	0.148$
Sexual domain, median (IQR)	30.8 (19.2–45.7)	27.6 (15.7–40.1)	0.107$
Sexual function, median (IQR)	21.8 (6.5–43.5)	19.4 (8.8–32.9)	0.282$
Sexual bother, median (IQR)	50.0 (25.0–75.0)	43.8 (25.0–68.8)	0.134$
Bowel domain, median (IQR)	96.4 (91.1–98.2)	96.4 (91.1–98.2)	0.493$
Bowel function, median (IQR)	96.4 (92.0–96.4)	96.4 (89.3–96.4)	0.226$
Bowel bother, median (IQR)	96.4 (89.3–100)	96.4 (89.3–100)	0.957$
Hormonal domain, median (IQR)	93.2 (86.4–100)	93.2 (88.6–100)	0.755$
Hormonal function, median (IQR)	95.0 (85.0–100)	95.0 (85.0–100)	0.792$
Hormonal bother, median (IQR)	95.8 (87.5–100)	95.8 (87.5–100)	0.561$

* Student t test; # Chi-square test; † Fisher exact test; $ Wilcoxon rank sum test.
IQR, interquartile range; RRP, retropubic radical prostatectomy; RALP, robot-assisited laparoscopic prostatectomy; PSA, prostate-specific antigen; XRT, external-beam radiation therapy.

instrument. Although more RRP patients than RALP patients were satisfied (87.1% vs 80.1%), this difference was not statistically significant (Table 3).

Table 4 compares patients with and without regret. There was a trend toward more regret among African American patients, but this was not considered to be statistically significant. Regretful patients had significantly lower scores in every EPIC domain, with the exception of the sexual domain (Table 4). Some 24.1% of RALP patients were regretful compared to 14.9% of RRP patients, but this difference was not considered to be statistically significant (Table 4).

After adjusting for stage, prostatectomy Gleason score, and PSA in multivariate logistic regression analysis, lower income, retropubic as opposed to robotic surgery, shorter follow-up, and higher urinary and hormonal domain scores were independently associated with treatment satisfaction (Table 5). Likewise, African American race, RALP versus RRP, a longer follow-up time, and lower urinary, bowel, and hormonal domain scores were independently associated with regret (Table 5).

We also analyzed satisfaction and regret in proportional-odds models. Although more variables were associated with satisfaction and regret due to the increased power of these models, the adjusted odds ratios were very similar (data not shown). We therefore feel that our results from the logistic-regression models are conservative.

When we restricted the analyses to patients with at least 18 mo of follow-up, lower income, retropubic as opposed to robotic surgery, and higher urinary domain scores and hormonal domain scores remained significantly associated with satisfaction (n = 167, data not shown). Regarding regret, only African American race and RALP versus RRP remained significant; this is likely to be due to the reduced power of this sensitivity analysis (n = 166, data not shown). For both satisfaction and regret, all adjusted odds ratios remained similar to those of the main analysis. Similarly, the analysis limited to patients with organ-confined disease with Gleason score 2–7 identified income, RRP versus RALP, length of follow-up, and urinary domain scores as significantly associated with satisfaction (n = 250, data not shown). Regarding regret, this sensitivity analysis found RALP versus RRP, length of follow-up, and urinary and hormonal domain scores to be significant (n = 249, data not shown).

Table 3 – Characteristics of satisfied and dissatisfied patients

	Satisfied		Dissatisfied		*p*
	No. (%)	Median (IQR)	No. (%)	Median (IQR)	
Age at survey (years)	–	62.0 (57.5–66.7)	–	60.1 (57.4–66.5)	0.575*
Non–African American	284 (84.3)	–	53 (15.7)	–	0.793#
African American	40 (81.6)	–	9 (18.4)	–	
No higher education	108 (83.7)	–	21 (16.3)	–	0.885#
Higher education	211 (83.7)	–	41 (16.3)	–	
Income (1000 USD)	–	75 (75–150)	–	113 (48.8–150)	0.030$
Not married	35 (76.1)	–	11 (23.9)	–	0.173#
Married	287 (85.2)	–	50 (14.8)	–	
Living alone	27 (79.4)	–	7 (20.6)	–	0.464†
Living with spouse	296 (84.3)	–	55 (15.7)	–	
Not employed	126 (82.9)	–	26 (17.1)	–	0.786#
Employed	196 (84.5)	–	36 (15.5)	–	
No complication	223 (87.1)	–	33 (12.9)	–	0.025#
Complication	101 (77.7)	–	29 (22.3)	–	
Type of procedure					0.083†
RRP	183 (87.1)	–	27 (12.9)	–	
RALP	141 (80.1)	–	35 (19.9)	–	
No secondary XRT	296 (83.6)	–	58 (16.4)	–	0.801†
Secondary XRT	28 (87.5)	–	4 (12.5)	–	
No secondary HT	309 (84.2)	–	58 (15.8)	–	0.524†
Secondary HT	15 (78.9)	–	4 (21.1)	–	
Follow-up (years)	–	1.4 (0.8–2.4)	–	1.7 (1.1–2.7)	0.167$
Urinary domain	–	86.8 (74.3–93.8)	–	71.9 (57.1–83.2)	<0.001$
Urinary function	–	88.3 (71.6–100)	–	69.1 (53.3–88.3)	<0.001$
Urinary bother	–	85.7 (71.4–92.9)	–	71.4 (54.5–82.1)	<0.001$
Sexual domain	–	31.4 (19.6–45.5)	–	25.0 (13.5–30.8)	<0.001$
Sexual function	–	22.2 (8.3–42.1)	–	17.6 (6.9–25.7)	0.020$
Sexual bother	–	50.0 (25.0–75.0)	–	31.3 (12.5–50.0)	<0.001$
GI domain	–	96.4 (91.1–98.2)	–	92.9 (82.1–98.2)	<0.001$
GI function	–	96.4 (92.9–96.4)	–	92.9 (85.7–96.4)	<0.001$
GI bother	–	96.4 (91.1–100)	–	92.9 (78.6–100)	<0.001$
Hormonal domain	–	95.5 (88.6–100)	–	88.6 (71.0–95.5)	<0.001$
Hormonal function	–	95.0 (85.0–100)	–	85.0 (70.0–95.0)	<0.001$
Hormonal bother	–	95.8 (87.5–100)	–	87.5 (75.0–95.8)	0.128$

* Student *t* test; # Chi-square test; † Fisher exact test; $ Wilcoxon rank sum test.
RRP, retropubic radical prostatectomy; RALP, robot-assisited laparoscopic prostatectomy; XRT, external-beam radiation therapy; HT, hormonal therapy; IQR, interquartile range; GI, gastrointestinal.

4. Discussion

We found that undergoing RALP is independently associated with more frequent dissatisfaction and regret after RP. Length of follow-up and urinary and hormonal HRQoL were important variables associated with both satisfaction and regret, whereas African American race was additionally associated with regret after RP.

To our knowledge, this is the first study addressing the impact of surgical approach to prostatectomy on satisfaction and regret. After adjusting for multiple sociodemographic variables and EPIC domain scores, patients undergoing RALP were approximately 3–4 times as likely to be dissatisfied and regretful as patients undergoing RRP. We postulate that patients who chose the ''innovative,'' less invasive RALP may have higher expectations for their postoperative HRQoL compared to patients choosing more ''traditional'' surgery. Therefore, even though they achieved similar function and bother scores compared to patients who underwent RRP, they still experienced a higher level of dissatisfaction and regret. Expectations of future health states have been shown to partially influence patient-reported HRQoL [19]. Whether expectations regarding HRQoL after RP are indeed higher in patients undergoing RALP compared to patients undergoing RRP should be subject of further research. However, we suggest that urologists offering RALP should pay specific attention to carefully portraying risks and benefits regarding HRQoL after this ''new'' procedure, and that ideally they quote their own outcome data rather than

Table 4 – Characteristics of nonregretful and regretful patients

	No regret		Regret		p
	No. (%)	Median (IQR)	No. (%)	Median (IQR)	
Age at survey (years)	–	62.0 (57.4–66.7)	–	60.4 (57.5–65.9)	0.426*
Non–African American	277 (82.7)	–	58 (17.3)	–	0.029#
African American	32 (68.1)	–	15 (31.9)	–	
No higher education	98 (77.2)	–	29 (22.8)	–	0.281#
Higher education	206 (82.4)	–	44 (17.6)	–	
Income (1000 USD)	–	75 (75–150)	–	75 (40–150)	0.614$
Not married	32 (69.6)	–	14 (30.4)	–	0.063#
Married	275 (82.3)	–	59 (17.7)	–	
Living alone	23 (67.6)	–	11 (32.4)	–	0.069#
Living with spouse	285 (82.1)	–	62 (17.9)	–	
Not employed	122 (81.9)	–	27 (18.1)	–	0.764#
Employed	185 (80.1)	–	46 (19.9)	–	
No complication	207 (81.8)	–	46 (18.2)	–	0.611#
Complication	102 (79.1)	–	27 (20.9)	–	
Type of procedure					0.031#
RRP	177 (85.1)	–	31 (14.9)	–	
RALP	132 (75.9)	–	42 (24.1)	–	
No secondary XRT	283 (80.9)	–	67 (19.1)	–	1.000†
Secondary XRT	26 (81.3)	–	6 (18.8)	–	
No secondary HT	294 (81.0)	–	69 (19.0)	–	0.769†
Secondary HT	15 (78.9)	–	4 (21.1)	–	
Follow-up (years)	–	1.4 (0.8–2.3)	–	1.8 (1.1–2.9)	0.014$
Urinary domain	–	86.5 (74.3–93.8)	–	75.7 (59.7–84.7)	<0.001$
Urinary function	–	88.3 (71.6–100)	–	76.6 (60.0–95.0)	0.003$
Urinary bother	–	85.7 (71.4–92.9)	–	71.4 (57.1–85.7)	<0.001$
Sexual domain	–	30.8 (19.2–45.5)	–	26.3 (16.0–37.8)	0.054$
Sexual function	–	22.2 (8.3–41.9)	–	20.4 (8.3–43.0)	0.155$
Sexual bother	–	50.0 (25.0–68.8)	–	37.5 (18.8–62.5)	0.110$
GI domain	–	96.4 (91.1–98.2)	–	92.9 (82.1–96.4)	<0.001$
GI function	–	96.4 (92.9–96.4)	–	92.9 (85.7–96.4)	<0.001$
GI bother	–	98.2 (92.9–100)	–	92.9 (78.6–100)	<0.001$
Hormonal domain	–	95.5 (88.6–100)	–	90.9 (75.0–95.5)	<0.001$
Hormonal function	–	95.0 (85.0–100)	–	90.0 (75.0–95.0)	0.001$
Hormonal bother	–	95.8 (87.5–100)	–	91.7 (75.0–95.8)	<0.001$

* Student *t* test; # Chi-square test; † Fisher exact test; $ Wilcoxon rank sum test.
RRP, retropubic radical prostatectomy; RALP, robot-assisited laparoscopic prostatectomy; XRT, external-beam radiation therapy; HT, hormonal therapy; IQR, interquartile range; GI, gastrointestinal.

results from the published literature in order to maximize patient satisfaction and minimize regret.

Hu et al [12] evaluated predictors for regret in 96 patients at a mean of 34 mo after choosing either RP, XRT, or watchful waiting as primary treatment for prostate cancer. In their study, only current general health and current sexual function were found to be independent predictors of regret [12]. In our study, worse HRQoL in the urinary domain, the bowel domain, and the hormonal domain were independently associated with regret. Possible explanations for this difference include the broader age range of patients in our study and the lower degree of sexual dysfunction in Hu's study (sexual function scores 39.6 vs 28.8).

Davison et al [13] evaluated decisional regret in 67 patients at a mean of 10 mo after undergoing either RP, XRT, or watchful waiting for localized prostate cancer. The authors report that sexual function did not significantly affect levels of decisional conflict, whereas lower emotional function and lower urinary function were significantly associated with regret, which is consistent with our data.

African American race was significantly associated with regret. In line with this, a recently published study found significantly higher levels of regret in nonwhite, low-income, uninsured men with prostate cancer [20]. It has been argued that there is a broad black–white perception gap in health care [21]. We surmise this might have contributed to regret in our study. In addition, higher regret in African Americans in our study could be due to the fact that patients tend to give higher ratings of satisfaction to race-concordant physicians [22]. None of the attending physicians in the present study were African American. Further

Table 5 – Association of various variables with satisfaction and regret

Variable	Satisfaction*		Regret*	
	OR (95% CI)	p	OR (95% CI)	p
Age at survey	0.89 (0.49–1.63)	0.707	1.04 (0.62–1.73)	0.888
African American	0.41 (0.14–1.26)	0.119	3.58 (1.52–8.43)	0.004
Higher education	1.84 (0.83–4.08)	0.131	0.76 (0.39–1.50)	0.432
Income	0.08 (0.03–0.23)	<0.001	2.33 (0.97–5.58)	0.057
Married	2.39 (0.90–6.35)	0.081	0.57 (0.25–1.33)	0.194
Employed	1.33 (0.60–2.98)	0.483	1.22 (0.60–2.47)	0.940
Complication	0.68 (0.33–1.39)	0.289	1.02 (0.54–1.93)	0.940
RALP vs RRP	0.22 (0.10–0.53)	<0.001	3.02 (1.50–6.07)	0.002
Secondary XRT	3.88 (0.90–16.8)	0.069	0.50 (0.14–1.76)	0.284
Secondary HT	3.60 (0.58–22.3)	0.169	0.45 (0.09–2.30)	0.335
Length of follow-up	0.63 (0.41–0.98)	0.039	1.63 (1.13–2.36)	0.009
Urinary domain	2.70 (1.60–4.54)	<0.001	0.58 (0.37–0.91)	0.017
Sexual domain	1.33 (0.76–2.31)	0.318	0.91 (0.58–1.45)	0.704
Bowel domain	1.18 (0.86–1.61)	0.304	0.73 (0.55–0.97)	0.028
Hormonal domain	2.01 (1.30–3.12)	0.002	0.67 (0.45–0.98)	0.041

OR, odds ratio; CI, confidence interval; RRP, retropubic radical prostatectomy; RALP, robot-assisited laparoscopic prostatectomy; XRT, external-beam radiation therapy; HT, hormonal therapy.

* Multivariate logistic regression analysis, adjusted for pathological stage (T2 vs T3), prostatectomy Gleason score (<7, 7, or >7), and preoperative PSA (logarithmically transformed).

research in more diverse patient populations is needed to specifically address the concerns of African American patients and to thus increase their satisfaction with all treatments and surgical therapies in particular.

Of interest is our finding that longer follow-up was independently associated with satisfaction and regret. This implies patients tend to regret their treatment choice more if poor HRQoL persists over a longer period of time. This agrees with previously reported data, showing that within 1–3 yr after RP, 83% of incontinent patients would choose surgery again, whereas >5 yr after RP almost 50% of incontinent patients would choose another treatment if they had the choice [23].

Our study has several limitations. Although the response rate of 61% is comparable to other similar studies [11,12], nonresponders tended to be younger and included more African Americans than responders. Therefore, a certain self-selection bias is present. However, we did not find any differences in the known patient characteristics between African American responders and nonresponders. We surmise that not responding to an invitation to complete a survey is a strong indication for dissatisfaction and regret. Therefore it is likely that we underestimated the level of dissatisfaction and regret in this study, specifically in African Americans.

In addition, more questions on satisfaction and regret would have provided more reliability than a single question for each. However, Clark et al have previously validated the regret item we used, and only 2 of 148 patients who were classified as not regretful by our item were categorized as regretful by a second item [15].

The cross-sectional nature of this study neither allows for the assessment of satisfaction and regret at specified time points after RP nor for evaluations of change from baseline HRQoL. In this context, it is important to mention that RALP patients had significantly shorter follow-up than RRP patients. However, length of follow-up was included in our multivariate models in order to account for the effect of this variable on the reporting of satisfaction and regret, and the sensitivity analyses including only patients with at least 18 mo of follow-up showed similar results. Nevertheless, further prospective research is warranted to confirm our findings.

Despite these limitations, we think that our findings are robust. We adjusted the multivariate models for PSA level, stage, and Gleason grade in order to account for baseline differences between treatment groups. In addition, whether the analysis was limited to patients with at least 18 mo of follow-up or to patients with organ-confined disease with Gleason score 2–7, and whether logistic regression models or proportional odds models were employed, we consistently found significantly higher levels of dissatisfaction and regret in patients who underwent RALP versus RRP. Nevertheless, due to the cross-sectional nature of this study, these results are to be interpreted as hypothesis-generat-

ing and have to be validated in future prospective studies.

5. Conclusions

Sociodemographic variables and disease-specific, health-related quality of life were important variables associated with satisfaction and regret. Patients who underwent RALP were more likely to be regretful and dissatisfied possibly because of high expectations of a new procedure. We suggest that urologists carefully portray the risks and benefits of new technologies during preoperative counseling to minimize regret and maximize satisfaction.

Author contributions: Judd W. Moul had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Schroeck, Krupski, Sun.
Acquisition of data: Schroeck, Sun, Tewari.
Analysis and interpretation of data: Schroeck, Krupski, Sun, Albala, Price, Polascik, Tewari, Moul.
Drafting of the manuscript: Schroeck, Krupski, Sun.
Critical revision of the manuscript for important intellectual content: Schroeck, Krupski, Sun, Albala, Price, Polascik, Robertson, Tewari, Moul.
Statistical analysis: Schroeck.
Obtaining funding: Sun, Robertson, Moul.
Administrative, technical, or material support: Sun, Robertson, Moul.
Supervision: Moul.
Other (specify): None.

Financial disclosures: I certify that all conflicts of interest, including specific financial interests and relationships and affiliations relevant to the subject matter or materials discussed in the manuscript (eg, employment/affiliation, grants or funding, consultancies, honoraria, stock ownership or options, expert testimony, royalties, or patents filed, received, or pending), are the following: Dr. David M. Albala is a paid mentor for Intuitive Surgical.

Funding/Support and role of the sponsor: Institutional funding and Duke Urology Committee for Urologic Research, Education, and Development Endowment Fund had a funding and support role in collection of the data and management of the data.

References

[1] McNaughton-Collins M, Walker-Corkery E, Barry MJ. Health-related quality of life, satisfaction, and economic outcome measures in studies of prostate cancer screening and treatment, 1990–2000. J Natl Cancer Inst Monogr 2004; 33:78–101.
[2] Gilbert SM. Reliable measurement in urology: room for improvement. Eur Urol 2007;52:1–2.
[3] Anderson J. Quality of life aspects of treatment options for localized and locally advanced prostate cancer. Eur Urol 2001;40(Suppl 2):24–30.
[4] Pascoe GC. Patient satisfaction in primary health care: a literature review and analysis. Eval Program Plan 1983; 6:185–210.
[5] Connolly T, Reb J. Regret in cancer-related decisions. Health Psychol 2005;24:S29–34.
[6] Clark JA, Bokhour BG, Inui TS, Silliman RA, Talcott JA. Measuring patients' perceptions of the outcomes of treatment for early prostate cancer. Med Care 2003; 41:923–36.
[7] Diefenbach MA, Mohamed NE. Regret of treatment decision and its association with disease-specific quality of life following prostate cancer treatment. Cancer Invest 2007;25:449–57.
[8] Heidenreich A, Aus G, Bolla M, et al. EAU guidelines on prostate cancer. Eur Urol 2008;53:68–80.
[9] Moul JW, Anderson J, Penson DF, Klotz LH, Soloway MS, Schulman CC. Early prostate cancer: prevention, treatment modalities, and quality of life issues. Eur Urol 2003;44:283–93.
[10] O'Rourke ME. Choose wisely: therapeutic decisions and quality of life in patients with prostate cancer. Clin J Oncol Nurs 2007;11:401–8.
[11] Clark JA, Inui TS, Silliman RA, et al. Patients' perceptions of quality of life after treatment for early prostate cancer. J Clin Oncol 2003;21:3777–84.
[12] Hu JC, Kwan L, Saigal CS, Litwin MS. Regret in men treated for localized prostate cancer. J Urol 2003;169:2279–83.
[13] Davison BJ, Goldenberg SL. Decisional regret and quality of life after participating in medical decision-making for early-stage prostate cancer. BJU Int 2003;91:14–7.
[14] Wei JT, Dunn RL, Litwin MS, Sandler HM, Sanda MG. Development and validation of the expanded prostate cancer index composite (EPIC) for comprehensive assessment of health-related quality of life in men with prostate cancer. Urology 2000;56:899–905.
[15] Clark JA, Wray NP, Ashton CM. Living with treatment decisions: regrets and quality of life among men treated for metastatic prostate cancer. J Clin Oncol 2001;19:72–80.
[16] Tseng TY, Kuebler HR, Cancel QV, et al. Prospective health-related quality-of-life assessment in an initial cohort of patients undergoing robotic radical prostatectomy. Urology 2006;68:1061–6.
[17] R-Development-Core-Team. R: a language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing; 2007.
[18] Harrell FE., Design Package (R package version 2.1-1) and Harrell Miscellaneous Package (R package version 3.4-2). 2007.
[19] Llewellyn-Thomas HA, Thiel EC, McGreal MJ. Cancer patients' evaluations of their current health states: the influences of expectations, comparisons, actual health status, and mood. Med Decis Making 1992;12:115–22.
[20] Hu JC, Kwan L, Krupski TL, et al. Determinants of treatment regret in low-income, uninsured men with prostate

cancer. Urology. In press. doi:10.1016/j.urology.2007.11.066.
[21] Carlson ED, Chamberlain RM. The Black–White perception gap and health disparities research. Public Health Nurs 2004;21:372–9.
[22] Saha S, Komaromy M, Koepsell TD, Bindman AB. Patient–physician racial concordance and the perceived quality and use of health care. Arch Intern Med 1999;159:997–1004.
[23] Herr HW. Quality of life in prostate cancer patients. CA Cancer J Clin 1997;47:207–17.