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Long-term Continence Outcomes in Men Undergoing Radical Prostatectomy for Clinically Localized Prostate Cancer

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Abstract

Background: Urinary incontinence is a common short-term complication of radical prostatectomy (RP). Little is known about the long-term impact of RP on continence.
Objective: To elucidate the long-term progression of continence after RP.
Design, setting, and participants: From October 2000 through September 2012, 1788 men undergoing open RP for clinically localized prostate cancer by a single surgeon at an urban tertiary care center prospectively signed consent to be followed before RP and at 3, 6, 12, 24, 96, and 120 mo after RP. A consecutive sampling method was used and all men were included in this study.
Intervention: Men underwent open RP.
Outcome measurements and statistical analysis: Regression models controlled for preoperative University of California, Los Angeles–Prostate Cancer Index urinary function score (UCLA-PCI-UFS), age, prostate-specific antigen level, Gleason score, stage, nerve-sparing status, race, and marital status were used to evaluate the association of time since RP with two dependent variables: UCLA-PCI-UFS and continence status.
Results and limitation: The mean UCLA-PCI-UFS declined between 2 yr and 8 yr (83.8 vs 81.8; $p = 0.007$) and marginally between 8 yr and 10 yr (81.8 vs 79.6; $p = 0.036$) after RP, whereas continence rate did not significantly change during these intervals. Men $\geq$60 yr old experienced a decline in mean UCLA-PCI-UFS between 2 yr and 8 yr ($p = 0.002$) and a marginal decline in continence rate between 2 yr and 10 yr ($p = 0.047$), whereas these variables did not change significantly in men <60 yr old. These outcomes are for an experienced surgeon, so caution should be exercised in generalizing these results.
Conclusions: Between 2 yr and 10 yr after RP, there were slight decreases in mean UCLA-PCI-UFS and continence rates in this study. Men aged <60 yr had better long-term outcomes. These results provide realistic long-term continence expectations for men undergoing RP.

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1. Introduction

Radical prostatectomy (RP) is a common treatment for prostate cancer, the most common noncutaneous malignancy in men and second-leading cause of death from cancer for men in the United States [1,2]. Stress urinary incontinence is a complication of RP and has a significant negative impact on quality of life and satisfaction following RP [3–5]. Reported rates of incontinence depend on surgical technique, definition, and methodology for assessing continence [6–8]. Continence rates and scores, measured by surveys capturing multiple continence domains, worsen

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immediately after RP and subsequently improve up to 2 yr after RP [6,9–13]. A majority of men recover continence by 3 mo and continence rates exceed 90% by 12 mo [12,13].

There is a paucity of studies characterizing continence beyond 2 yr after RP, and these report inconsistent findings. The literature indicates that after 2 yr, continence rates decline and continence scores stabilize or steadily decline [3,11,14–16]. We have reported that as many as 23% of men experience qualitative improvements in continence from 2 yr to 4 yr after RP [9].

The objective of the present study was to elucidate long-term continence in a cohort of men undergoing RP who were followed prospectively using validated, self-administered questionnaires obtained prior to, and at several times following, RP. We also sought to define the characteristics of men who may be more likely to achieve long-term improvement in continence.

2. Methods

From October 2000 through September 2012, 1836 men underwent open RP by a single surgeon (HL). Of these men, 1788 (97%) signed informed consent to participate in our institutional review board-approved, prospective, longitudinal outcomes study. The University of California, Los Angeles–Prostate Cancer Index urinary function index (UCLA-PCI-UFI) was completed at baseline and at 3, 6, 12, 24, 96, and 120 mo after surgery. The questionnaires were self-administered during scheduled office visits or returned via mail to a data manager whose sole responsibility is maintenance of the outcomes database. The operating surgeon was not involved in data collection, entry, retrieval, and statistical analysis.

The UCLA-PCI-UFI is a validated, self-administered questionnaire that captures five domains of continence: leaking frequency, urinary control, diaper and pad use, dripping problems, and climacturia (Appendix A) [17]. Total scores on the UCLA-PCI-UFI (UCLA-PCI-UFS) and continence status, using a definition of up to one pad daily, were ascertained at all follow-up intervals.

Two multiple regression models were used to evaluate the association of time since RP with UCLA-PCI-UFS and continence status. The first was a generalized, linear model, where the dependent variable was total UCLA-PCI-UFS, specified in continuous terms. The second model was a logistic regression in which the dependent variable was continence status (1 = continent, 0 = incontinent). In both models, there was one observation per patient per follow-up period, for a total of up to six observations (3, 6, 12, 24, 96, and 120 mo). Key independent variables of interest were dummies for each follow-up period (6, 12, 24, 96, and 120 mo; reference: 3 mo). Both models controlled for preoperative UCLA-PCI-UFS, age (continuous, in years), preoperative prostate-specific antigen (PSA) level (continuous, in nanograms per milliliter), Gleason score ($\leq$6, 3 + 4, 4 + 3, 7 [unspecified], $\geq$8, missing), stage (T2a, T2b, T2c, T3a, T3b, T3c, other, or missing), type of nerve-sparing surgery (bilateral, unilateral, none, missing), race (white, black, Hispanic, Asian, other, missing), and marital status (married, single, widowed, divorced or separated, other, or missing). *Missing* categories allowed us to include the minority (generally <1%) of respondents who only completed a portion of the survey (Table 1). Standard errors were clustered by individual. We also included a random effect for each man to represent other distinguishing characteristics not controlled for by our independent covariates.

In men who responded at both baseline and 3 mo, McNemar's and paired sample *t* tests were used to assess whether the proportion of continent men or mean UCLA-PCI-UFS, respectively, differed significantly between these assessments.

Table 1 – Characteristics of 1788 men undergoing radical prostatectomy for prostate cancer

Characteristic	Men, no. (%) (*N* = 1788)
Age, yr, mean ± SEM	58.9 ± 0.17
Race	
Black	72 (4)
Asian	36 (2)
White	1608 (90)
Hispanic	29 (2)
Other	28 (2)
No response	15 (1)
Marital status	
Divorced	73 (4)
Married	1537 (86)
Separated	16 (1)
Single	113 (6)
Widowed	27 (2)
No response	22 (1)
PSA level, ng/ml, mean ± SEM	6.27 ± 0.128
Pathologic Gleason score	
0–6	867 (48)
7	791 (43)
8–10	114 (6)
Missing	16 (1)
Pathologic stage	
0–2	1352 (76)
3–4	420 (23)
Missing	16 (1)
Nerve-sparing status	
Bilateral	1405 (79)
Unilateral	270 (15)
None or blank	149 (8)
Preoperative UCLA-PCI-UFS, mean ± SEM	97.3 ± 0.17

SEM = standard error of the mean; PSA = prostate-specific antigen; UCLA-PCI-UFS = University of California, Los Angeles–Prostate Cancer Index urinary function score.

Finally, when evaluating outcomes, we were concerned about potential bias, in that men with good or bad outcomes may have been more likely to respond. Therefore, we performed chi-square and paired *t* tests comparing mean preoperative UCLA-PCI-UFS between respondents and nonrespondents at years 2, 8, and 10 and comparing mean 2-yr UCLA-PCI-UFS between respondents and nonrespondents at years 8 and 10.

Analyses were conducted in SPSS v.19.0.0.1 (IBM Corp., Armonk, NY, USA) and STATA/SE v.12.0 (StataCorp LP, College Station, TX, USA). Differences were deemed to be significant at a two-sided $p < 0.05$.

3. Results

Of the 1788 men who consented to participate in the study (Table 1), a total of 98%, 99%, 95%, 90%, 84%, 53%, and 43% completed the UCLA-PCI-UFI at baseline and 3, 6, 12, 24, 96, and 120 mo, respectively. There was no significant difference in age, race, marital status, nerve-sparing status, preoperative PSA level, or preoperative UCLA-PCI-UFS between men who did and did not complete the outcome assessment at 10 yr (data not shown). In addition, no significant differences among groups were found when comparing mean preoperative UCLA-PCI-UFS or mean 2-yr UCLA-PCI-UFS between respondents and nonrespondents at years 8 and 10 ($p = 0.17–0.87$; data not shown).

Adjusted time-dependent mean UCLA-PCI-UFS for all men worsened between baseline and 3 mo (97.4 vs 68.2;