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Prostate Cancer

Oncologic Outcomes at 10 Years Following Robotic Radical Prostatectomy

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Abstract

Background: Reports on long-term oncologic outcomes for patients who undergo robot-assisted radical prostatectomy (RARP) are scant, as for radical prostatectomy covering only the contemporary prostate-specific antigen (PSA) era.
Objective: To evaluate cancer control in men who underwent RARP at least 10 yr ago.
Design, setting, and participants: From 2001 to 2003, we followed 483 consecutive men with localized prostate cancer who underwent RARP at a high-volume tertiary center.
Intervention: RARP as first-line therapy.
Outcome measurements and statistical analysis: We calculated biochemical recurrence –free survival (BCRFS), metastasis-free survival (MFS), and cancer-specific survival (CSS). Actuarial rates were estimated via Kaplan-Meier. Cox proportional hazards models were used to identify variables predictive of biochemical recurrence (BCR), receipt of salvage therapy, and metastases.
Results and limitations: There were 108 patients with BCR at a median follow-up of 121 mo (interquartile range: 97–132). Actuarial BCRFS, MFS, and CSS rates at 10 yr were 73.1%, 97.5%, and 98.8%, respectively. On multivariable analysis, D'Amico risk groups or pathologic Gleason grade, stage, and margins were the strongest predictors of BCR depending on whether preoperative or postoperative variables were considered. The value of the detectable PSAs together with disease severity were independent predictors of receipt of salvage therapy, together with a persistent PSA for metastases.
Conclusions: In contemporary patients with localized prostate cancer, RARP confers effective 10-yr cancer control. Disease severity and PSA measurements can be used to guide more personalized and cost-effective postoperative surveillance regimens.
Patient summary: Robot-assisted radical prostatectomy confers effective 10-yr cancer control for men with localized disease, similar to the open approach. Recurrence is best predicted by postoperative disease severity. Persistent disease signals the risk of progression likely requiring early salvage treatment; lower postoperative risk warrants protracted surveillance beyond 5 yr from surgery, and those with higher risk may require follow-up beyond 10 yr.

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1. Introduction

Robot-assisted radical prostatectomy (RARP) is a relatively new procedure; the first structured program began in 2000 [1,2]. Reports on oncologic long-term follow-up at or extending beyond 5 yr are limited for this modality [3] with only three cohorts [4–6] covering that time frame. The 5-yr biochemical recurrence–free survival (BCRFS) rate from these cohorts ranges between 84% and 87%, and the cancer-specific survival (CSS) rate ranges between 98% and 99%. Limited long-term follow-up exclusively in the contemporary prostate-specific antigen (PSA) era is also restricted to laparoscopy or open approaches. Only five cohorts [7–11] have published 10-yr biochemical recurrence (BCR), three for open prostatectomy [7–9] that report BCRFS rates ranging between 39% and 93%, depending on factors such as stage, Gleason score, or surgical margins, and two for laparoscopy [10,11] that document overall BCRFS rates of 76% and 71%, respectively.

Patients from the early years at our center have achieved 10 yr of follow-up. The purpose of this study is to report on our single-center long-term oncologic outcomes as well as on the predictors of such outcomes.

2. Material and methods

2.1. Patient selection, assessment, treatment, and follow-up

Between September 2001 and August 2003, 505 consecutive men underwent RARP as the initial treatment for clinically localized prostate cancer (PCa) at our institution using the techniques described by Menon et al. [2,12,13] and were eligible for a minimum 10-yr follow-up. Of these men, 4 had disease extending to the pelvic lymph nodes (PLNs), 1 had no residual disease, 11 no PSA information, and 6 were lost to follow-up in <6 mo and were excluded, leaving 483 men for analysis. RARP was performed by one of two surgeons (M.M., 354 patients [73%] or J.O.P., 129 patients [27%]).

Details about assessment, treatment, and follow-up protocols for these patients can be found in Menon et al. [4]. Briefly, all patients had a minimum six-core biopsy, with cores reviewed by a reference pathologist. Standard pelvic lymphadenectomy was performed only when the probability of lymph node metastasis was >1% as determined by a genetic adaptive neural network [14]. Prostatectomy specimens were examined according to the Stanford protocol [15]. Follow-up data were collected from a series of sources (dedicated database, electronic medical records, medical claims, death certificates, communication with patients, and referring physicians) to achieve a high level of retention. Patients were surveyed quarterly during the first year, semiannually during the second year, and annually thereafter. Patients with positive surgical margins were managed in a salvage setting. The study protocol was approved by the institutional review board of Henry Ford Hospital.

2.2. Outcome measures and statistical analyses

BCRFS, receipt of salvage therapy, incidence of distant metastases, and cancer death were selected as outcome

Table 1 – Clinical and pathologic features of cohort (n = 483)

Characteristics		
Continuous		Mean (SD)
Patient age, yr		59.9 (±6.9)
BMI		27.8 (±3.6)
Prostate weight, g		46.2 (±17.4)
Percent tumor volume		19.0% (±12.7)
		Median (IQR)
Follow-up length, mo (all)		121.2 (96.9–132.1)
Without recurrence		120.9 (88.5–132.1)
Preoperative PSA, ng/ml		5.2 (4.3–7.2)
PLN dissected (n = 214)		3 (2–5)
Categorical	**No.**	**%**
Race/ethnicity		
White	382	79.1
Black	75	15.5
Other	20	4.1
Unknown	6	1.3
Biopsy Gleason score		
5 or 6	296	61.3
3 + 4	132	27.3
4 + 3	31	6.4
8–10	24	5.0
Clinical stage		
T1a–c	397	82.2
T2a	53	11.0
T2b	24	5.0
T2c–T3b	9	1.8
Perineural invasion (biopsy)		
Absent	450	93.4
Present	32	6.6
Missing	1	–
Nerve sparing		
Partial	418	77.6
Prostatic fascia sparing*	87	16.1
Wide excision	34	6.3
Pathologic Gleason score		
6	200	41.4
3 + 4	186	38.5
4 + 3	50	10.4
8–10	47	9.7
Pathologic stage		
pT2a–pT2b	72	14.9
pT2c	322	66.7
pT3a	64	13.2
pT3b–pT4	25	5.2
Margins†		
Negative	343	71.0
Positive	140	29.0
Perineural invasion‡		
Absent	240	49.9
Present	241	50.1
Missing	2	–
Angiolymphatic invasion‡		
Absent	475	98.8
Present	6	1.2
Missing	2	–
Procedure year		
2001	46	9.5
2002	252	52.2
2003	185	38.3

BMI = body mass index; IQR = interquartile range; SD = standard deviation. PLN = pelvic lymph nodes; PSA = prostate-specific antigen.
* Unilateral or bilateral.
† pT2: 75/394 = 19.0%; pT3–pT4: 65/89 = 73.0%.
‡ On final pathology.

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