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Abstract:

Objective: To elucidate the functional erection rate following prostate stereotactic body radiotherapy (SBRT) and to develop a comprehensive prognostic model of outcomes following treatment.

Patients and Methods: Between 2008 and 2013, 373 consecutive men with localized prostate cancer were treated with SBRT at a single academic institution as part of a prospective clinical trial or prospective registry. Prospective longitudinal patient-reported quality of life (HRQOL) was collected using the Expanded Prostate Cancer Index Composite (EPIC-26). Functional erections were strictly defined as "firm enough for intercourse" per EPIC-26. Detailed comorbidity data were also collected. Logistic regression models were utilized to predict 24 month and 60 month functional erection rates. Observed erection rates post-SBRT were compared with other radiation modalities (external beam radiotherapy (EBRT) and brachytherapy) using prospectively validated models.

Results: Median follow up was 56 months (interquartile-range 37-73); response rate at two years was 84%. For those with functional erections at baseline, 57% and 45% retained function at 24 and 60 months, respectively. On multivariable analysis (MVA) for 24-month erectile function, significant variables included higher baseline sexual HRQOL (adjust odds ratio (AOR) 1.55 per 10 points [95%CI 1.37-1.74], p<0.001) and older age (AOR=0.66 [95%CI 0.43-1.00], p=0.05). At 60 months, baseline HRQOL and age remained associated with erectile function, along with body mass index (AOR 0.45 [95%CI 0.26-0.78], p<0.001). The 24 and 60 month models had excellent discrimination (c-index 0.81 and 0.83, respectively). Erection rates post-SBRT were not statistically different than model predicted rates following EBRT or brachytherapy for the whole cohort and the cohort with baseline erectile function

Conclusions: Intermediate to long-term post-SBRT erectile function results are promising and not significantly different from other radiotherapy modalities. Clinicians can utilize our prognostic model to counsel patients regarding expected erectile function following SBRT.

Introduction

The Prostate Testing for Cancer and Treatment (ProtecT) trial recently reported the outcomes of men with predominantly low-risk prostate cancer randomized to one of three upfront treatment strategies: nerve-sparing radical prostatectomy (RP), conventionally fractionated radiotherapy (EBRT) or active surveillance (AS) (1). Overall survival (OS) was similar between all groups, however approximately 50% of men in the AS arm eventually underwent definitive treatment. For men who do undergo radical treatment, an understanding of its impact on health-related quality of life (HRQOL) is critically important to inform decision making given the equivalent efficacy demonstrated between RP and EBRT (1, 2). Among HRQOL domains, sexual function is most commonly and significantly affected from radical therapy, and sexual function outcomes correlate closely with overall treatment satisfaction (3-5).

Much has changed, however, in the 17 years since the first patient was enrolled on ProtecT. Surgical techniques have evolved (6), and radiotherapeutic advances have allowed for the advent of high dose per fraction, image-guided, ultra-hypofractionated treatment to the prostate, termed stereotactic body radiotherapy (SBRT). Often delivered over 5 treatments,

SBRT is convenient and cost-effective relative to conventional EBRT courses of 8-9 weeks (7, 8), with a promising overall toxicity profile (9-11), that currently is being investigated in numerous randomized trials that have either already reported early results or finished accrual (12, 13).

Concern remains, however, with the delayed effects of SBRT given its high-dose per fraction and mechanism of cellular injury (14). There is little existing data on long-term functional erection outcomes after SBRT, hindering clinical counseling of men considering this therapeutic approach. Prognostic models of functional erections have been developed following treatment with nerve-sparing RP, conventional EBRT, and brachytherapy (15), but notably absent are similar models absent are following SBRT.

To better understand the impact of SBRT on erectile function, herein we report the results of a large prospective study utilizing patient reported outcomes, utilizing a detailed set of comorbidities believed to impact sexual health to develop our models. Furthermore, rates of erectile function are compared across treatment modalities utilizing validated model-predicted rates using other radiation modalities treated at centers of excellence.

Methods and Materials

Patients

Between January 2008 and November 2013, 373 men with localized biopsy-proven prostate adenocarcinoma were consecutively treated with SBRT per an institutional protocol (NCT01766492) or on a prospective registry. Eligible patients included those with cT1c-T2c disease, cN0 Gleason score 6-10, and PSA <50 ng/mL. Patients with prior pelvic radiotherapy or prostate surgery were excluded. Patients were staged per National Comprehensive Cancer Center (NCCN) guidelines; high-risk patients were staged with the addition of a CT of the abdomen and pelvis and a bone scan. Prostate magnetic resonance imaging (MRI) was recommended and routinely used. All patients had baseline prostate-specific antigen (PSA) testing prior to initiation of any therapy.

All patients were required to have baseline patient-reported health related quality of life (HRQOL) data which consisted of the Expanded Prostate Cancer Index Composite (EPIC)-26 (16). Additional prospective sexual health inventory data were collected including the

International Index of Erectile Function short version (IIEF-5, also known as Sexual Health Inventory for Men (SHIM)) (17).

Treatment

Image-guided prostate SBRT was delivered using Cyberknife (Accuray, Sunnyvale CA). SBRT treatment planning and delivery have been previously described (18). Pretreatment CT and MRI registration were utilized for volume delineation. The CT included the prostate and the proximal seminal vesicles. The PTV equaled the CTV expanded 3 mm posteriorly and 5 mm in all other dimensions. Patients were treated with 35-36.25 Gy in 5 fractions (SBRT). Radiation was delivered every other day to a prescription isodose line of 75-80% with target coverage goal of $\geq$ 95%. The penile bulb (PB) was contoured with a dose-volume histogram (DVH) goal of less than 25% receiving 29.5 Gy. Individual erectile structures, such as internal pudendal arteries, neurovascular bundles or nerve plexus, were not specifically contoured or avoided. Imaged-guidance was utilized using paired, orthogonal x-rays. Target position was verified every one to two minutes with a minimum of three adequately separated, non-overlapping fiducials.

Beyond the 373 in the current cohort, 24 additional patients were treated during the study period with neoadjuvant androgen deprivation therapy (ADT), consisting of 3-6 months of an LHRH agonist. However, only 4/24 patients receiving ADT had baseline functional erections, limiting meaningful analysis. As such, these patients receiving ADT were not included in the present study.

Erectile function definition

As advocated by the National Cancer Institute (NCI) Prostate Cancer Working Group, we report patient reported sexual outcomes longitudinally (19). The EPIC sexual function domain is a composite score of 0 to 100 comprised of five questions related to sexual function and one question related to sexual bother; higher values represent improved HRQOL. “Functional erection” was the primary metric used in our study, and was strictly defined as the patient reported answer of having erections “firm enough for intercourse” in the past four weeks irrespective of using sexual aids on question 9 on the EPIC-26, in accordance with the NIH definition of erectile function (20). Given SHIM scores were also collected, we also report a comparison of functional erections defined by SHIM $\geq$ 16 with those defined by EPIC.

Covariables

Age and pretreatment EPIC sexual function domain HRQOL were analyzed as continuous variables or as a binary variable when specified. Additional patient related variables thought to be related to erectile function were analyzed including baseline sexual medications, partner status, body mass index (BMI), diabetes (DM), hypertension (HTN), coronary artery disease (CAD), major depression, and pretreatment testosterone. Tumor related variables included prostate specific antigen (PSA, ng/ml), T-stage, and Gleason score. Treatment related variables included prescribed SBRT dose < 36.25 or ≥ 36.25.

Treatment Modality Comparisons

To compare rates of erectile function preservation following SBRT with other radiation modalities (EBRT and brachytherapy), our individual patient clinical characteristics were entered into validated models that have been shown to predict 24-month post-treatment erectile function for both EBRT and brachytherapy (15). These models were generated from the Prostate Cancer Outcomes and Satisfaction with Treatment Quality Assessment (PROSTQA) multicenter cohort, and validated in a Cancer of the Prostate Strategic Urologic Research Endeavor (CaPSURE) cohort.

Statistical Analysis

To explore differences in patients who were lost to follow up (**eTable 1**), logistic regression was utilized to predict missing data at 24 and 60 months based on a decline in sexual HRQOL in the first 12 months and the second 12 months of follow up. Patients with decline in sexual function were more likely to have data collection at 24 months, suggesting no selection bias due to poor follow-up of those with significant HRQOL declines. Furthermore, analyses of missing patients at 60 months revealed no other relationships with sexual function decline. Thus, missing data was assumed to be missing at random and imputation was not performed.

Univariable and multivariable logistical regression analysis (UVA and MVA, respectively) was performed to generate models of predictors of functional erections over time. The primary endpoint was at 24 months, consistent with prior analysis of other radiation modalities (15). Additional models were generated to predict function at 60 months. All patients

were included in the modelling, including those without baseline erectile function, as 10-15% of patients who report no function at baseline regain function at later time points. Odds ratios (OR), adjusted ORs (AOR), and 95% confidence intervals (CI) are reported. For the logistic regression model to predict functional erections, 95% Wald CIs were calculated from the estimated covariance matrix. C-indices were calculated to determine discriminatory performance of the model. Age was included in all MVA models, given known association with sexual function. Variables with $p<0.1$ on UVA, plus comorbidities known to be associated with sexual function (diabetes, hypertension, coronary artery disease, and major depression), were tested in MVA model. Stepwise backward elimination was utilized; two-sided P values of <0.05 were considered statistically significant. Statistical analyses were performed using SAS version 9.3.

Results

Baseline and treatment characteristics

Median follow up was 56 months (interquartile-range (IQR) 37-73). The median age was 69 years old (IQR 64-73) and 124 (33%), 233 (63%), and 16 (4%) were low, intermediate, and high risk by NCCN, respectively. Detailed pre-treatment comorbidities are listed in **Table 1**. Baseline EPIC sexual function domain HRQOL was available for all 373 patients. Three hundred twelve patients had EPIC follow up at 24 months (84% of eligible patients, **eTable1**), and response rates did not vary between those with or without baseline erectile function.

Longitudinal Sexual HRQOL and Functional Erection Outcomes

Median baseline HRQOL was 56 (IQR 29-82). Baseline global sexual HRQOL was equally split between 182 men (49%) with higher baseline function (HRQOL 60-100) and 191 men (50%) with poor function (HRQOL < 60) (**eTable 2)**. At 24 and 60 months post-SBRT, 107/312 (34%) and 44/170 (26%) reported functional erections, respectively (**Figure 1A**). One hundred eighty-four men (49%) had functional erections at baseline and 89/157 (57%) and 39/87 (45%) retained function at 24 and 60 months, respectively (**Figure 1B)**. **Figures 1C** and **1D** demonstrate the decline of erectile function over time by age, with older men (≥65 years old) having a more continual decline of erectile function over time compared to younger men who appear to reach a plateau.

Baseline SHIM scores were available for 372/373 patients (99%); 182 (49%) had a baseline SHIM ≥ 16 which decreased to 107/311 (34%) and 51/167 (30%) at 24 and 60 months respectively. Using this SHIM definition, erectile function rates were nearly identical to those estimated by EPIC (**eFigure 1**).

Predictors of Functional Erections

On UVA, the following factors were associated with decreased erectile function at 24 months: older age, lower pretreatment sexual HRQOL, and T stage (all $p \leq 0.01$), **Table 2).** Older age and lower pretreatment sexual HRQOL (both $p<0.001$) remained associated with decreased function at 60 months, in addition to increased BMI ($p=0.005$), diabetes ($p=0.039$), and hypertension ($p=0.025$). On MVA, higher baseline sexual HRQOL was associated with improved function erection rates both at 24 months (adjusted odds ratio (AOR) 1.55 per 10 point increase [95%CI 1.37-1.74, $p<0.001$] and 60 months (AOR 1.54 per 10 point increase [95%CI 1.27-1.87, $p<0.001$]. Older age was associated with decreased function at both 24 and 60 months. At 60 months, BMI was the only comorbidity independently associated with a significant decline in functional erections on MVA (AOR 0.45 (95% CI 0.26-0.78, $p<0.001$).

Table 3 demonstrates the results from our MVA model-predicted functional erection rate at 24 months post-SBRT (C-index 0.81 [95%CI 0.76-0.86]) and 60 months post-SBRT (C-index 0.83 [95%CI 0.79-0.88]). The model predictions ranged from <10% (95%CI 4 – 12%) for a 70 year old man with baseline HRQOL of 25 to 80% (95%CI 68 – 87%) for a 60 year old with baseline HRQOL of 100. Similar ranges are seen at 60 months, with BMI further informing predicted rates. As seen in Table 3, a decrease in BMI of 5 points increases predicted 5 year functional erection rates by 10-20 percentage points.

Treatment Modality Comparison

Three hundred and twelve patients had follow up at 24 months. Using prior prospectively validated models of 24-month functional erections after EBRT and brachytherapy (15), model predicted rates for this cohort of men were 37% (95%CI 33-40%) with EBRT and 32% (95%CI 28-35%) with brachytherapy. The rate of actual functional erections post-SBRT was 34% (95% CI 29-40%), a rate not statistically significantly different than EBRT ($p=0.31$) or brachytherapy

(p=0.30) (**Table 4**). In men with baseline erectile function, a similar lack of difference across modalities was noted.

Discussion

Erectile dysfunction following treatment for localized prostate cancer is a common side effect and a major patient concern (3). In a large cohort, broadly representative of those diagnosed with prostate cancer, we report intermediate- and long-term functional erection outcomes following high dose-per fraction treatment with prostate SBRT. Questionnaire response rates were robust over time (24 months: 84%), and there was substantial follow up out to 60 months, with no evidence of selection bias in those lost to follow up. For those with baseline erectile function, 57% and 45% retained erectile function at 24- and 60-months respectively.

These results are consistent with several smaller, previously reported SBRT series using similar strict EPIC-based criteria. For example, in a Stanford phase II trial of 32 patients receiving prostate SBRT, 62% of men reported erections firm enough for intercourse at baseline which declined to 29% at 50 months (21). Others have comparable findings utilizing different patient reported sexual outcome measures. The HYPO-RT-PC non-inferiority trial randomized men to a seven fraction regimen of SBRT versus standard EBRT, and recently reported preliminary results in abstract form. Using the Prostate Cancer Symptom Scale (22), two-year "potency" was 34% and unchanged compared to EBRT, comparable to our results (13).

Our MVA of erectile function post-SBRT identified several patient-related factors associated with functional erections. Better baseline HRQOL was strongly associated with functional erections at 24 and 60 post-treatment, consistent with findings with EBRT and brachytherapy (15, 23). Older men at baseline were more likely to experience decline in the rate of functional erections, similar to the decline experienced in older men without prostate cancer (24, 25), as well as those men treated with RP and brachytherapy (15). At 60 months, increasing BMI was also associated with greater likelihood of functional erection decline, similar to those treated with brachytherapy (15). Interestingly, while our UVA identified diabetes and hypertension as associated with declines in 60 month erectile function, these comorbidities were no longer significant after including age, baseline sexual function, and body mass index. Age,

HRQOL and BMI are key confounders to keep in mind in any treatment modality comparison, and they likely capture several other underlying comorbid contributions to sexual health such as diabetes and hypertension.

Our sexual function outcomes following SBRT appear to be comparable to EBRT and brachytherapy based on validated prediction models. These prediction models are advantageous as they were generated from treatments at centers of excellence, were externally validated, and allow for patient level treatment modality comparison. Some may fairly criticize that these models were based on patients treated with older, 3D conformal radiation treatment techniques. Fortunately, recent efforts have provided important insight regarding sexual quality of life outcomes with modern intensity-modulated radiotherapy treatment (IMRT) (26, 27). Barocas et al utilized the same EPIC based quality of life instrument reported in our study, and importantly, >80% were treated with IMRT. Age and baseline sexual HRQOL was similar between the EBRT group in the Barocas study and the present study: mean age of 68 vs 69 and mean baseline sexual HRQOL of 52 versus 55, respectively. The percentage of men with baseline erectile function who retained function at 3 years was strikingly similar between the group treated with predominantly IMRT in the Barocas study and the present study treated with SBRT (56% versus 55%, respectively). Interestingly, despite younger age (mean: 62 years) and better baseline sexual HRQOL (mean: 65), the erectile function preservation in those treated with nerve-sparing radical prostatectomy was 46%, approximately 10 percentage points lower than either radiation treatment modality.

Prospective comparisons are needed to confirm these findings. The PACE trial, a phase III study, will directly compare modalities by randomizing operable men to SBRT or RP, and non-operable candidates to SBRT or EBRT (12). Our findings lend reassurance and support for the ongoing PACE trial whose results will be able to potentially validate our model as they are collecting similar EPIC-26 data. An additional trial comparing moderate hypofractionation to SBRT is in process through the NRG.

Several additional limitations of this study are worth discussion. No single assessment likely captures post-treatment sexual function both clearly and comprehensively. Beyond the validated EPIC-26 inventory, we also reported results from the commonly utilized IIEF-5 (SHIM) inventory with similar results using a ≥16 cutoff. Further validation of our model should

be pursued given the patients were treated at a single institution. In addition, only the penile bulb was identified as an avoidance structure in our study. Radiation injury and erectile function is known to be complex (28), and vessel-sparing techniques have shown to be of promise, and no effort was made to spare these structures (29). Further, while our study included baseline sexual aid utilization, the impact of continued or new sexual aid use on erectile function was limited in the current study given the nature of EPIC-26. Finally, unlike conventionally fractionated EBRT, where the benefit of ADT on clinically meaningful outcomes has been established in multiple Phase III trials (30, 31), the benefit of ADT in patients treated with SBRT is uncertain as no randomized control trials have been performed to date. Given the associated decline in sexual function with ADT administration, further studies should be pursued to understand the added clinical benefit of hormonal therapy in this setting.

In conclusion, long-term erectile function in men treated with prostate SBRT is promising. We provide a practical, clinically relevant model to estimate probability of functional erections to help guide physician and patient shared decision making. Pretreatment age, baseline sexual domain HRQOL, and body mass index are powerful predictors of long term erectile function.

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Figure Legends

Figure 1 represents unadjusted proportions of patients reporting functional erections at each follow up for the whole cohort (Panel A), those with baseline erectile function (Panel B), the whole cohort dichotomized by age 65 (Panel C), and those with baseline erectile function dichotomized by age 65 (Panel D).

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Table 1: Patient Cohort

PATIENT CHARACTERISTICS		
Age (years)		
Median (IQR)	69	(64, 73)
Body Mass Index		
Median (IQR)	28	(25, 31)
<30	256	69%
>30	111	30%
>40	6	2%
Partner Status		
Not married	94	25%
Married	278	75%
Diabetes		
Absent	295	79%
Present	77	21%
Hypertension		
Absent	112	30%
Present	260	70%
Coronary Artery Disease		
Absent	307	83%
Present	65	17%
Major Depression		
Absent	343	92%
Present	28	8%
Pretreat Testosterone		
Median (IQR)	320	(234, 437)
Baseline Sexual Medications		
No	223	62%
Yes	139	38%
TUMOR AND TREATMENT CHARACTERISTICS	n	%
T-Stage		
T1c-T2a	321	86%
T2b-c	51	14%
T3	1	0%
Grade Group (Gleason)		
1 (6)	165	44%
2 (3+4)	147	39%
3 (4+3)	53	14%

4 (4+4)	8	2%
5 (9 or 10)	1	0%
Pretreat PSA		
Median (IQR)	6	(5, 9)
≤ 10	308	83%
>10 - 20	58	16%
>20	7	2%
Risk Group		
Low	124	33%
Favorable Intermediate Risk	140	38%
Unfavorable Intermediate Risk	93	25%
High Risk	16	4%
SBRT Dose		
< 36.25	132	35%
≥ 36.25	241	65%

* Risk group adapted from National Comprehensive Cancer Network (NCCN) and the Zumsteg/Spratt risk classification. Low: T1-T2a, Gleason ≤ 6, PSA <10; Favorable Intermediate: Gleason ≤ 6 with one intermediate risk factor OR Gleason 3+4 as only factor; Unfavorable intermediate: Gleason 4+3 OR multiple intermediate risk factors; High Risk: T3 OR Gleason 8-10 OR PSA >20

Table 2: Univariable and Multivariable Models of Functional Erections at 24 and 60 months

	Univariable Analysis								Multivariable Analysis							
	24 Months (n = 312)				60 months (n = 170)				24 Months (n = 312)				60 months (n = 170)			
	OR	95% CI		p value	OR	95% CI		p value	AOR	95% CI		p value	AOR	95% CI		p value
Patient Factors																
Age (per 10 years)	0.44	0.30	0.64	<0.001	0.32	0.18	0.57	<0.001	0.66	0.43	1.00	0.05	0.34	0.16	0.72	0.004
Pretreat HRQOL (per 10 points)	1.58	1.41	1.79	<0.001	1.63	1.36	1.95	<0.001	1.55	1.37	1.74	<0.001	1.54	1.27	1.87	<0.001
BMI (per 5 points)	0.95	0.91	1.01	0.15	0.50	0.31	0.82	0.005					0.45	0.26	0.78	<0.001
Partner Status	1.037	0.60	1.80	0.90	0.87	0.40	1.89	0.73								
Diabetes	0.76	0.42	1.39	0.37	0.27	0.08	0.93	0.039								
Hypertension	0.62	0.38	1.02	0.06	0.44	0.22	0.90	0.025								
Coronary Artery Disease	0.75	0.38	1.47	0.40	0.27	0.06	1.20	0.09								
Major Depression	0.43	0.16	1.17	0.10	-	-	-	-								
Baseline sexual medication use	0.78	0.47	1.29	0.33	1.11	0.55	2.23	0.78								
Pretreatment Testosterone	1.00	0.998	1.001	0.73	1.00	0.997	1.002	0.68								
Tumor and Treatment Factors																
T-Stage Group *	0.33	0.14	0.76	0.01	0.72	0.25	2.07	0.54								
Gleason Group **	0.84	0.62	1.14	0.25	0.67	0.41	1.09	0.11								
PSA < 4 vs PSA ≥ 4	1.56	0.07	3.63	0.30	1.05	0.36	3.09	0.92								
SBRT Dose	1.14	0.69	1.87	0.61	0.88	0.34	2.28	0.79								

* T1-T2a, T2b-2c, T3

** (1), Gleason 6, (2) 3+4, (3) 4+3, (4) 8, (5) 9-10

Note: At 60 month time point, no patients had major depression and erectile function, thus estimates using logistic regression are not valid.

Abbreviations: HRQOL, health related quality of life; SBRT, stereotactic body radiotherapy; OR, odds ratio; AOR, adjusted odds ratio; CI, confidence interval; mo, month.

Table 3: Model Estimated Probability of Patient Reported Erectile Function following treatment with SBRT at 24 months and 60 months

	Predicted 24 month Functional Erections (95% CI)			
	Baseline HRQOL score			
Age (years)	100	75	50	25
60	79% (68-87)	56% (45-66)	30% (21-41)	13% (7-23)
70	72% (60-81)	46% (38-54)	22% (17-29)	9% (5-14)

	Parameter Estimate (S.E.)	OR	95% CI	*Wald χ2* P Value
Intercept	-0.53 (1.57)			0.74
Age †	-0.42 (0.21)	0.66	(0.43-1.00)	0.05
HRQOL ‡	0.43 (0.06)	1.55	(1.37-1.75)	<0.001
AUC	0.81		(0.76-0.86)	

		Predicted 60 month Functional Erections (95% CI)			
		Baseline HRQOL score			
Age (years)	BMI	100	75	50	25
60	25	85% (70-93)	65% (49-79)	39% (22-60)	18% (6-41)
	30	72% (54-84)	46% (33-60)	23% (12-38)	9% (3-23)
	35	53% (30-75)	28% (14-48)	12% (5-27)	4% (1-14)
70	25	65% (49-79)	39% (31-48)	18% (11-28)	7% (3-16)
	30	46% (30-63)	23% (16-31)	9% (5-15)	3% (1-9)
	35	28% (12-52)	12% (5-24)	4% (1-11)	2% (0-5)

	Parameter Estimate (S.E.)	OR	95% CI	*Wald χ2* P Value
Intercept	-0.10 (1.57)			0.92
Age †	-0.49 (0.21)	0.62	(0.41-0.94)	0.02
HRQOL ‡	0.43 (0.06)	1.54	(1.36-1.73)	<0.01
BMI *	-1.22 (0.55)	0.3	(0.10-0.86)	0.03
AUC	0.83		(0.79-0.88)	

† per 10 year increase

‡ per 10 point increase

* per 5 point increase

Note: Individual model estimated probability of patient reported erectile function at 24 months can be calculated using the inverse logistic function (exp(x)/(1+exp(x)) using the parameter estimates detailed above.

Abbreviations: HRQOL, health related quality of life; ADT, androgen deprivation therapy; CI, confidence interval

Table 4: Comparison of Observed Erectile Function at 24-months following SBRT to Model Predicted Outcomes with Other Radiation Modalities

		Baseline		SBRT			EBRT *			Brachytherapy *		
		Functional Erections		Actual 24 month Functional Erections			Model Predicted 24 month Functional Erections			Model Predicted 24 month Functional Erections		
	Total ** n=	n=	%	n=	%	95% CI	%	95% CI	p-value vs SBRT	%	95% CI	p-value vs SBRT
All Patients	312	157	50%	107	34%	(29-40)	37%	(33-40)	0.31	32%	(28-35)	0.30
Baseline Erectile Function	157	157	100%	89	57%	(50-64)	57%	(54-61)	0.39	54%	(45-64)	0.38

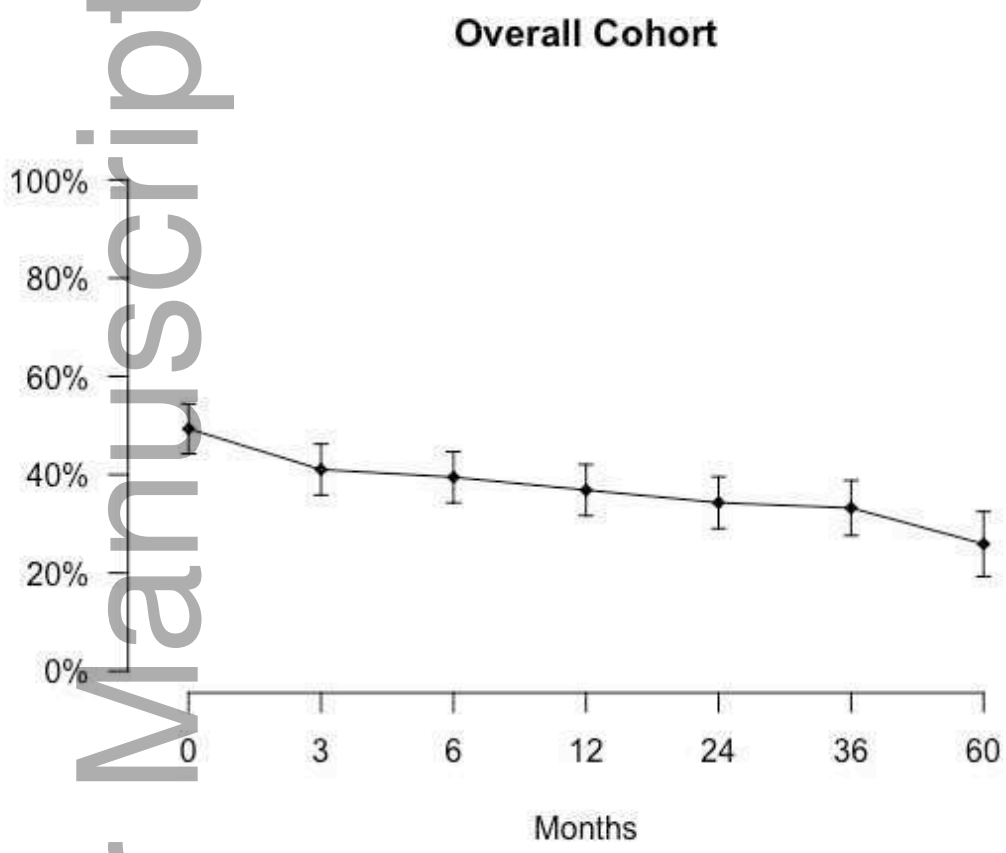
Abbreviations: SBRT, stereotactic body radiotherapy; RP, radical prostatectomy; EBRT, conventional external beam radiotherapy; CI, confidence interval; HRQOL, health related quality of life

* Derived based upon previous validated model of erectile Function following RP and EBRT, respectively (Alemozaffar JAMA 2011). EBRT model includes pretreatment HRQOL, neoadjuvant hormone treatment status (entered as no) and PSA. Brachytherapy model includes pretreatment sexual HRQOL, age, race, and body mass index.

** Patients with follow up at 24 month

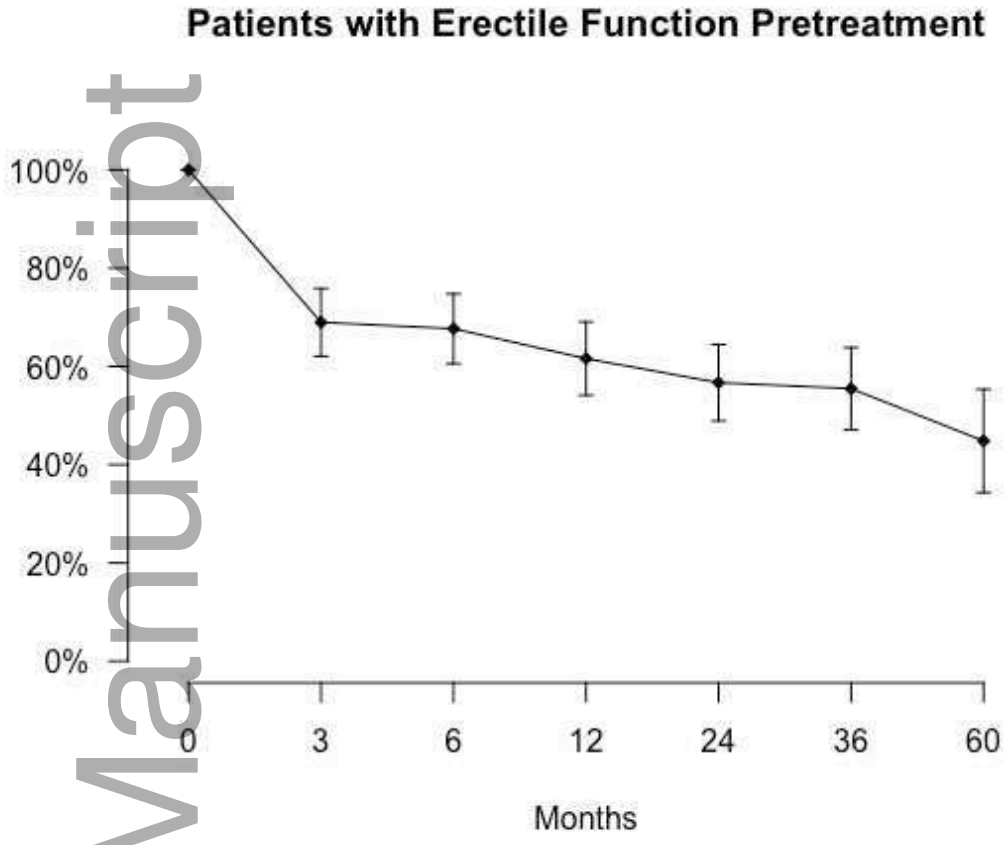
Figure 1:

(A)



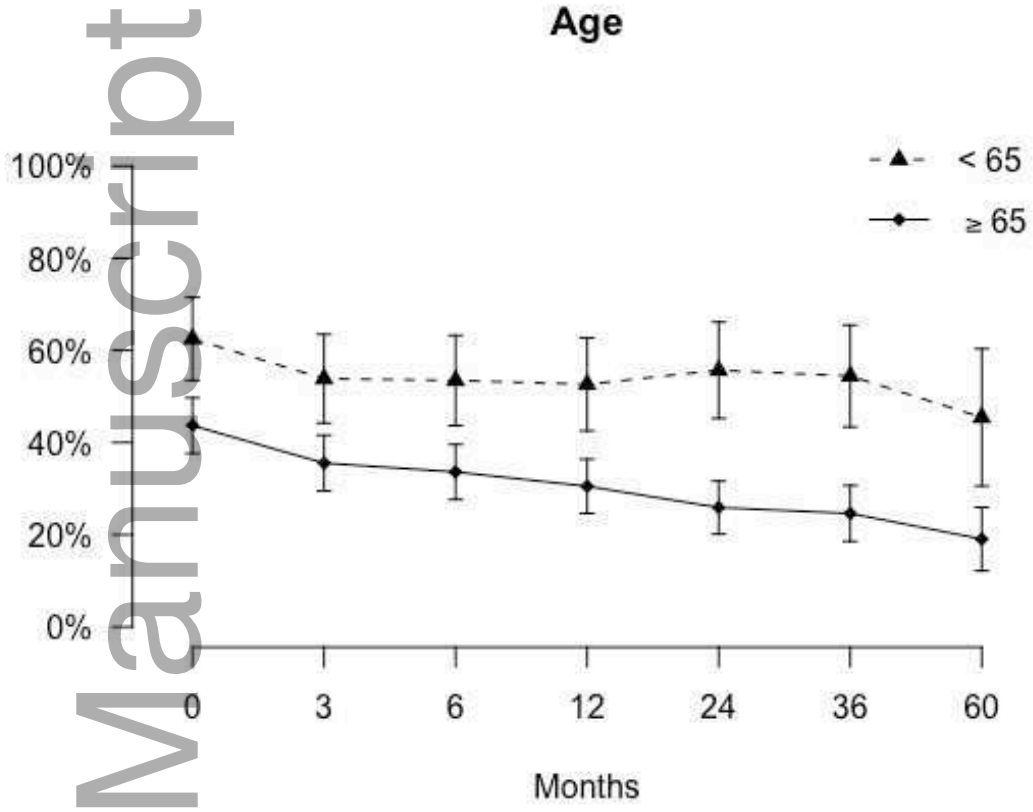
Timepoint	0	3	6	12	24	36	60
n	373	346	342	331	312	274	170

(B)



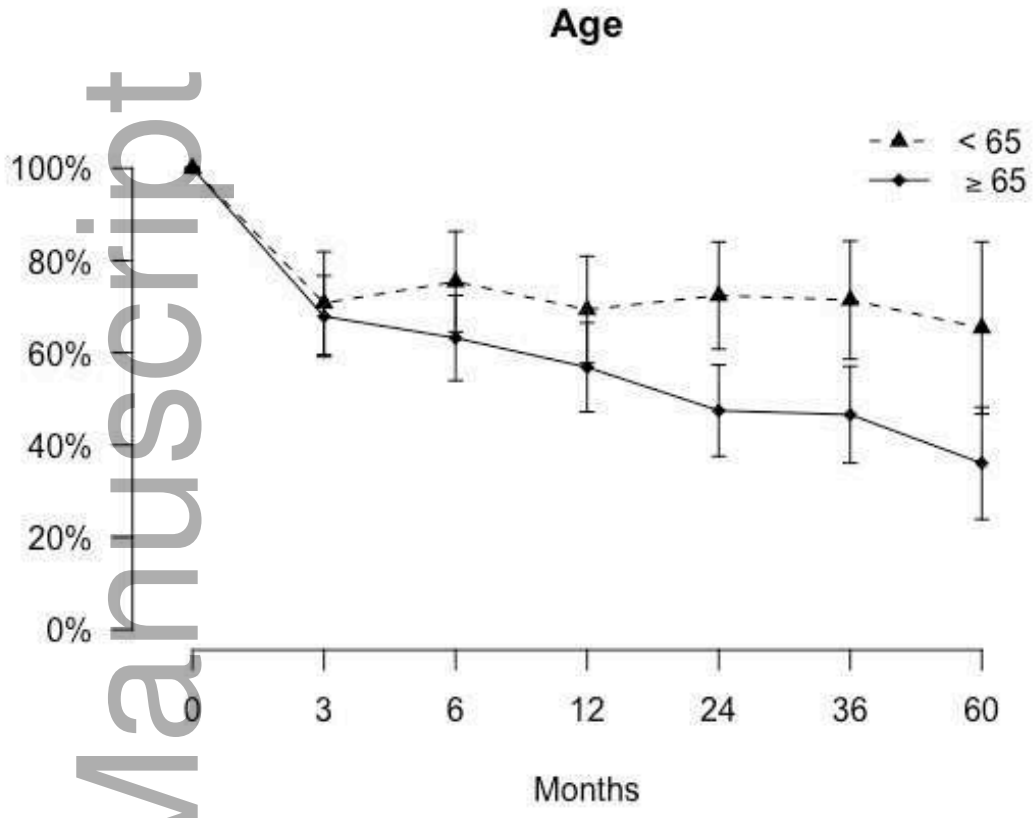
Timepoint	0	3	6	12	24	36	60
n	184	174	167	164	157	137	87

(C)



Timepoint	0	3	6	12	24	36	60
Age < 65	112	104	101	95	88	79	44
Age ≥ 65	261	242	241	236	224	195	126

(D)



N=

Timepoint	0	3	6	12	24	36	60
Age < 65	70	65	61	62	58	49	26
Age ≥ 65	114	109	106	102	99	88	61