



Gastrointestinal And Genitourinary Toxicity And Quality Of Life

After Post-Prostatectomy Radiation Therapy:

Are Normal Tissue DVH Parameters For Intact Prostate Cancer Applicable?

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INTRODUCTION

Dose volume histogram (DVH)-toxicity relationships have been defined for intact prostate cancer but are relatively unexplored for post-prostatectomy radiation therapy (PPRT). Our goal was to identify DVH parameters related to late gastrointestinal (GI) or genitourinary (GU) toxicity and quality of life (QOL) for men treated with post-op RT. We also evaluated whether intact DVH guidelines would have importance in the post-operative setting.

MATERIALS AND METHODS

96 men treated with PPRT between 2001 and 2010 were identified in a prospectively maintained database, with DVH and toxicity follow-up available. Median age was 60. All men were treated with Intensity-Modulated RT with a median dose of 66 Gy to the prostate bed. 38% received concurrent hormonal therapy (median 4 months). 35% of men were treated to an initial pelvic field.

Late toxicity (>3 months after RT) was defined by CTC criteria v3.0. Patient reported QOL was assessed in 58 men using the EPIC-26 survey at time 0, 2, 6, 12, 18 and 24 months. Global domain scores were generated on a scale of 0-100 (full health). DVH parameters including % of rectum (contoured around the outer wall from ischial tuberosities to sigmoid flexure) and bladder volume (contoured around the outer wall) receiving 70, 65, and 40 Gy were tested for associations with maximal GI and GU toxicity, and QOL by global domain scores and distress at all time points. Toxicity was also evaluated according to whether men met "intact DVH guidelines" of V70, 65, and 40 Gy for <20%, 40%, and 80% to the rectum, and for <30%, 60%, and 80% to the bladder. Median follow-up was 40 months.

RESULTS

The median V70, 65, and 40 Gy to the bladder was 3%, 27%, and 60%, and 2%, 25%, and 60% for the rectum, respectively.

The rates of late Grade 2+ GI and GU toxicity at 2 years were 7 and 13%, respectively. The mean 2-year global urinary incontinence, urinary frequency, and bowel scores were 75, 93, and 94, respectively (Table 2). 5%, 5% and 3% of patients reported moderate or severe distress at 2 years in urinary continence, urinary frequency, and GI function, respectively.

There were no DVH parameters identified which were associated with late grade 2+ toxicity or QOL for any subset domain (Table 3). Patients meeting intact prostate normal tissue planning goals (69%) did not have any statistically different outcomes compared to the overall group (for toxicity or global scores for incontinence, irritability or obstructive symptoms, and GI symptoms).

Table 1. Patient and treatment characteristics (n=96)

	Number
Age (years)	Median 60
T stage	
pT2	30 (31%)
pT3a	50 (52%)
pT3b	16 (17%)
N stage	
pN0	83 (86%)
pN1	5 (5%)
pNx	8 (8%)
Path Gleason score	
2-6	19 (20%)
7	56 (58%)
8-10	21 (22%)
Pre-RT PSA (ng/mL)	Median 6 IQR 5-10
Radiation dose (Gy)	Median 66 IQR 66-68
Whole pelvic RT	34 (35%)
Concurrent ADT	36 (38%)
Duration (mo)	Median 4
Follow-up Time (mo)	Median 40 IQR 26-57

IQR = Interquartile range; ADT = androgen deprivation therapy

Table 2. Patient reported quality of life global health scores (median value) up to two years post-therapy (n=58)

	Baseline	2 mo	6 mo	12 mo	18 mo	24 mo
Urinary incontinence	77 (Mean 72)	74 (Mean 73)	86 (Mean 78)	85 (Mean 78)	73 (Mean 72)	73 (Mean 75)
Irritability/Obstructive Symptoms	94 (Mean 92)	94 (Mean 90)	94 (Mean 93)	94 (Mean 93)	88 (Mean 86)	94 (Mean 93)
Bowel function	100 (Mean 93)	92 (Mean 89)	96 (Mean 92)	96 (Mean 93)	96 (Mean 89)	100 (Mean 94)

Table 3. Bladder and rectal DVH parameter associations with global quality of life scores up to 2 years post-therapy (n=58)

Bladder Parameter	Global Incontinence Score					
	0 mo	2 mo	6 mo	12 mo	18 mo	24 mo
V70 < 15%	p=.526	p=.356	p=.506	p=.303	p=.124	p=.175
V70 < 20%	p=.373	p=.463	p=.967	p=.604	p=.297	p=.628
V40 < 50%	p=.390	p=.173	p=.866	p=.998	p=.732	p=.081
V40 < 60%	p=.294	p=.078	p=.294	p=.446	p=.517	p=.391
V40 < 70%	p=.909	p=.182	p=.314	p=.328	p=.651	p=.414
V40 < 80%	p=.994	p=.254	p=.847	p=.587	p=.579	p=.317

Bladder Parameter	Global Irritability/Obstructive Score					
	0 mo	2 mo	6 mo	12 mo	18 mo	24 mo
V70 < 15%	p=.982	p=.139	p=.285	p=.770	p=.403	p=.286
V70 < 20%	p=.866	p=.933	p=.661	p=.728	p=.850	p=.359
V40 < 50%	p=.287	p=.406	p=.433	p=.981	p=.700	p=.947
V40 < 60%	p=.685	p=.427	p=.485	p=0.328	p=.356	p=.560
V40 < 70%	p=.342	p=.681	p=.071	p=.754	p=.814	p=.626
V40 < 80%	p=.410	p=0.137	p=.675	p=.104	p=.437	p=.410

Rectal Parameter	Global Bowel Score					
	0 mo	2 mo	6 mo	12 mo	18 mo	24 mo
V70 < 15%	p=.969	p=.925	p=.982	p=.717	p=.380	p=.895
V70 < 20%	p=n/a	p=n/a	p=n/a	p=n/a	p=.453	p=.525
V40 < 50%	p=.069	p=.676	p=.443	p=.597	p=.322	p=.897
V40 < 60%	p=.092	p=.318	p=.182	p=.124	p=.743	p=.294
V40 < 70%	p=.113	p=.128	p=.227	p=.293	p=.490	p=.371
V40 < 80%	p=.338	p=.101	p=.259	p=.423	p=.344	p=.189

CONCLUSIONS

No DVH relationships between toxicity or QOL were identified, possibly due to low rates of toxicity in this cohort, variation in bladder and rectal filling, the use of bladder and rectum DVH sparing goals over this time period, or the high average QOL scores at each time point of follow-up. It is reasonable to apply intact prostate cancer DVH guidelines in the absence of any established post-operative relationships.

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