Uniform Scanning Proton Therapy for Prostate Cancer: The ProCure Oklahoma Experience

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INTRODUCTION

Proton therapy (PT) is a method of external beam radiation therapy which can be used for the definitive treatment of prostate cancer (PC). The most common PT delivery method is double scattering (DS), but more recent delivery methods include scanning techniques, both pencil beam scanning (PBS) and uniform scanning (US). US, versus DS, offers sharper lateral penumbra and, in theory, improved rectal and bladder dosimetry. Our center was the 1st in the world to offer an exclusively US backbone for treatment delivery. This report represents the initial outcomes for patients with PC treated at our center who have a minimum of one year follow up.

MATERIALS & METHODS

76 patients with PC consented to the outcomes tracking protocol REG001-09 sponsored by the Proton Collaborative Group (PCG) and met the requirement of a minimum of one year of follow up with completed Expanded Prostate cancer Index Composite (EPIC) surveys. Adverse events were recorded using CTC scoring criteria prospectively on all patients, pre-treatment, during weekly treatment visits, and all follow-ups. The median age of the patient cohort was 65 (range 43 to 84). Patients were treated to a target dose of 79.2 GY (RBE) in 44 daily fractions, unless dose constraints to critical structures (rectum, bladder, or femoral heads) were violated. 35 patients had low risk disease (stage I), 28 patients had intermediate risk disease (stage IIA), and 13 patients had high risk disease (stage IIB), as defined by AJCC 7th edition staging. 11 patients received androgen deprivation therapy (ADT). Patients were asked to complete the Expanded (EPIC) and AUA pre-treatment, at 3 months, 6 months, 12 months, 18 months and 24 months post-treatment. EPIC forms were not collected at the conclusion of RT.

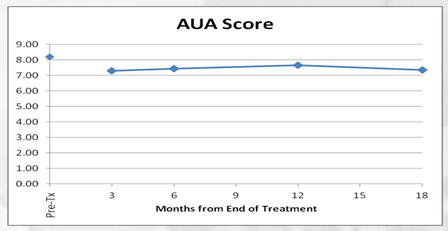
Median	65
Range	43-84
40-49	5
50-59	18
60-69	36
70-79	14
80-89	3

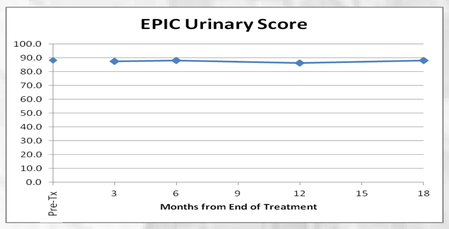
Patient Count	76
With ADT	11
No ADT	65

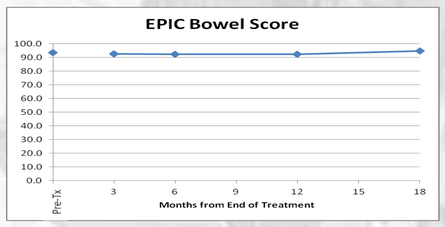
Risk Group	Total	ADT	No ADT
High	13	8	5
Intermediate	28	2	26
Low	35	1	34

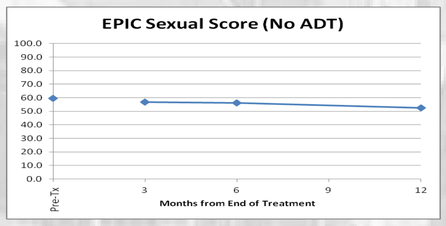
RESULTS

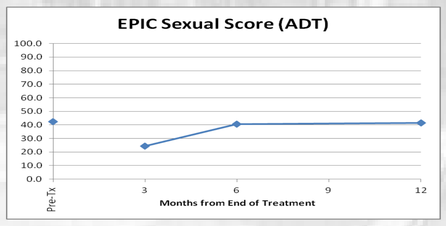
Genitourinary (GU) and gastrointestinal (GI) function appeared to be stable in patients post-treatment starting as early as 3 months post-treatment, as measured by the EPIC scores. There was no decline seen up to 2 years post-RT. There appeared to be a slight decline in sexual score in men who did not receive ADT. There were a small number of men who did receive ADT. After discontinuation of ADT, they did not see a further decline in sexual function at 1 year post-treatment and beyond. By CTC AE 4.0 toxicity scoring criteria, there were no grade 3 or higher events in these 76 patients in any measured domain. The most common grade 1 toxicity was dermatitis, seen in 58/76 patients. Grade 1/2GU urgency was seen in 66/76 patients, of which 49 were grade 1, 17 were grade 2. Diarrhea was seen in 13/76 patients. All diarrhea was grade 1.











CTC AE 4.0 from Baseline to 1 Year post-RT

AE	Grade 1	Grade 2
Agitation	3	
Anxiety	5	
Bone pain		1
Bone pain - HIP	4	
Dermatitis radiation	58	2
Diarrhea	13	
Erectile dysfunction	32	5
Fatique	42	3
Fecal incontinence	3	
Gynecomastia	4	
Hematuria	5	
Hot flashes	8	2
Memory impairment	2	
Proctitis	13	1
Rectal hemorrhage	8	
Urinary frequency	49	17
Urinary incontinence	12	
Urinary retention	37	1
Urinary tract pain	29	1
Urinary urgency	28	2
Sum	**355**	**35**

CONCLUSIONS

Early toxicity results from US PT for PC demonstrates that the use of this modality is well-tolerated. Further follow up continues to be collected and will be reported in future reports.