

Prostate Stereotactic Radiotherapy with and without a rectal spacer: effects on dosimetry and early acute toxicity

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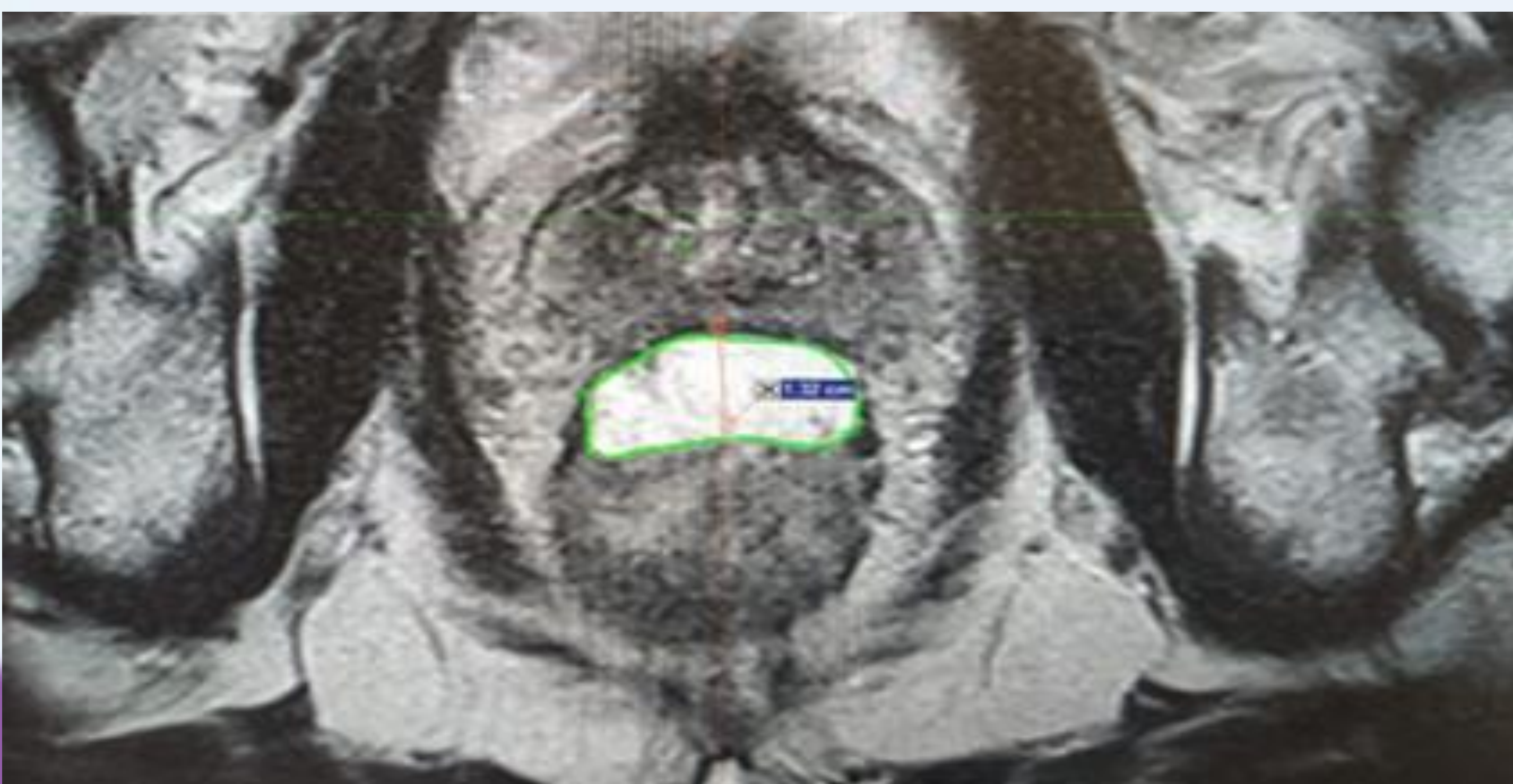
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Background and Purpose:

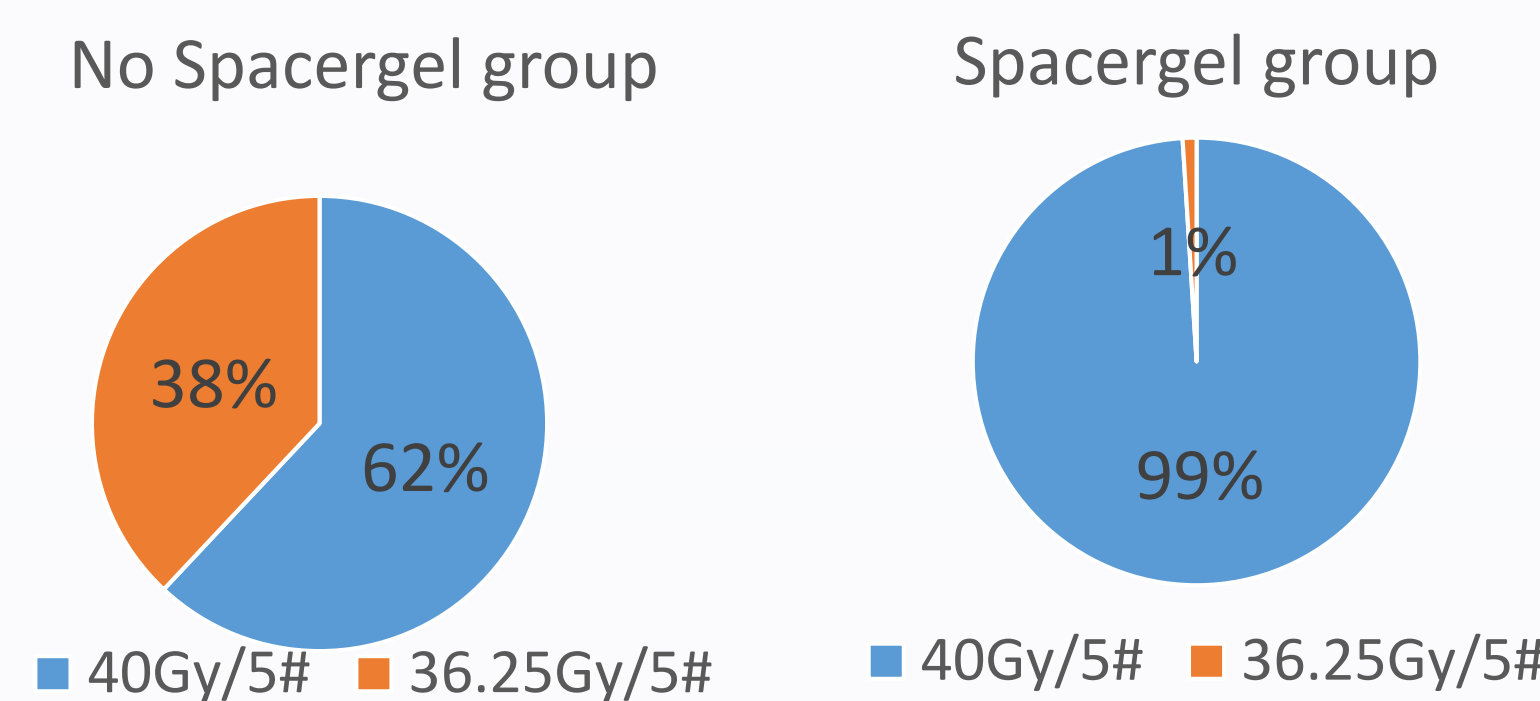
- Rectal spacer hydrogel helps reduce rectal toxicities in prostate cancer patients treated with Intensity modulated radiotherapy (IMRT).¹
- With dose escalation in SABR prostate, we see higher acute rectal toxicity with high dose schedule.²
- This study aims to determine the effect of Spacer gel on rectal dose and early toxicity in the setting of prostate stereotactic ablative radiotherapy (SABR).

Material and Methods:

- Patients enrolled on a prospective, province-wide prostate SABR registry, who completed their 6-8 weeks post-treatment follow-up, were included in the analysis.
- Dosimetric data was extracted from the treatment plans.
- Baseline parameters, dosimetry and toxicity at 6-8 weeks were compared between those with (n=68) and without (n=89) a rectal spacer. Rectal and bladder dose metrics were ranked to determine percentile values.
- RTOG/SOMA Gastro-intestinal (GI) & Genitourinary (GU) toxicities at baseline & 6-8 weeks (post-SABR) analyzed.
- Statistical analysis was done using Student's t, Fisher's exact test or linear regression where appropriate.



Dose Prescription	No Spacer	Spacer used	Total	p-value
36.25Gy/5#	34	1	35	<0.001
40Gy/5#	55	67	122	
Total	89	68		



(Table 1 & Fig 1):

Difference of dose prescription in two groups

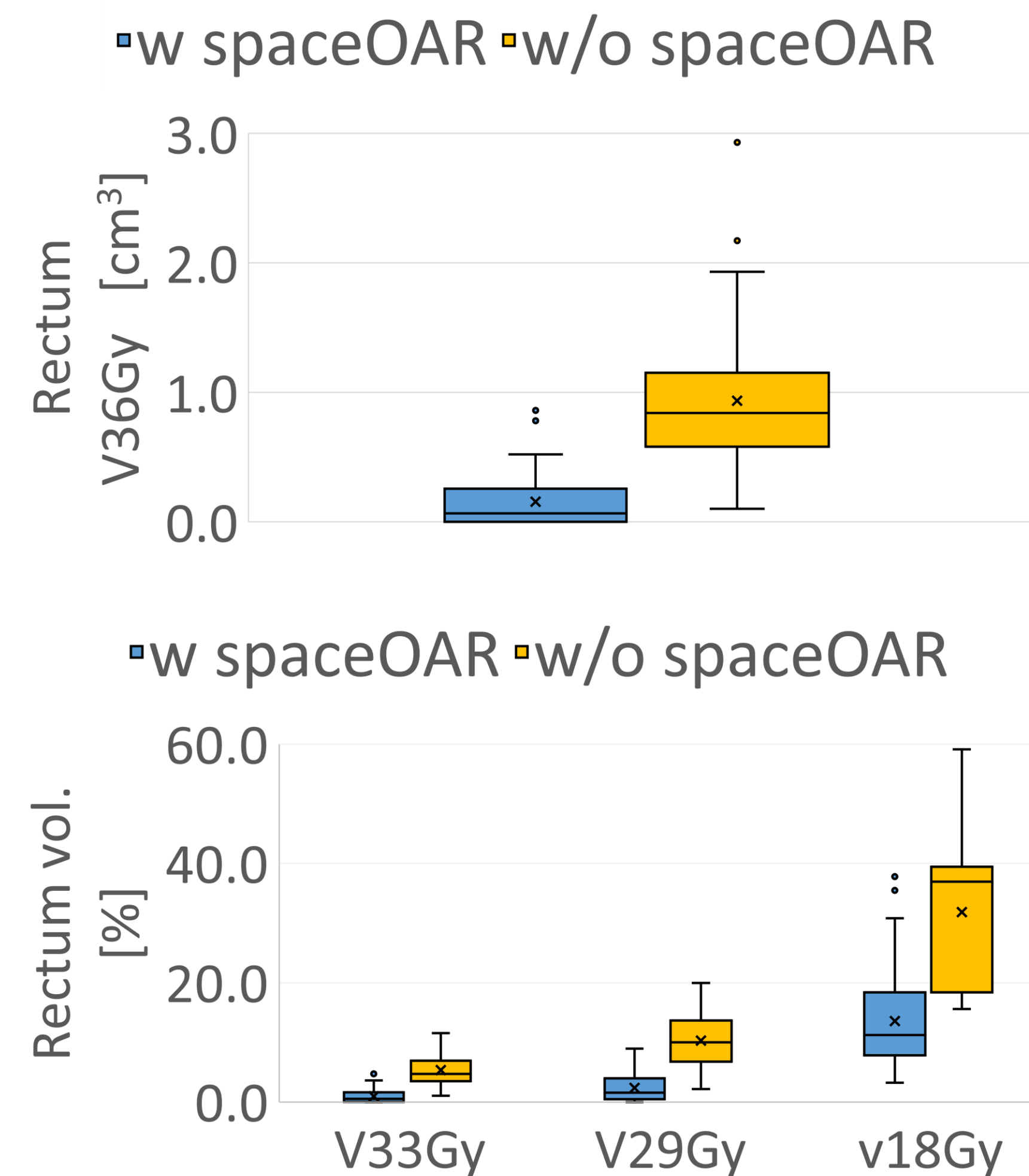


Fig 2: Box plots of Rectal dose metrics

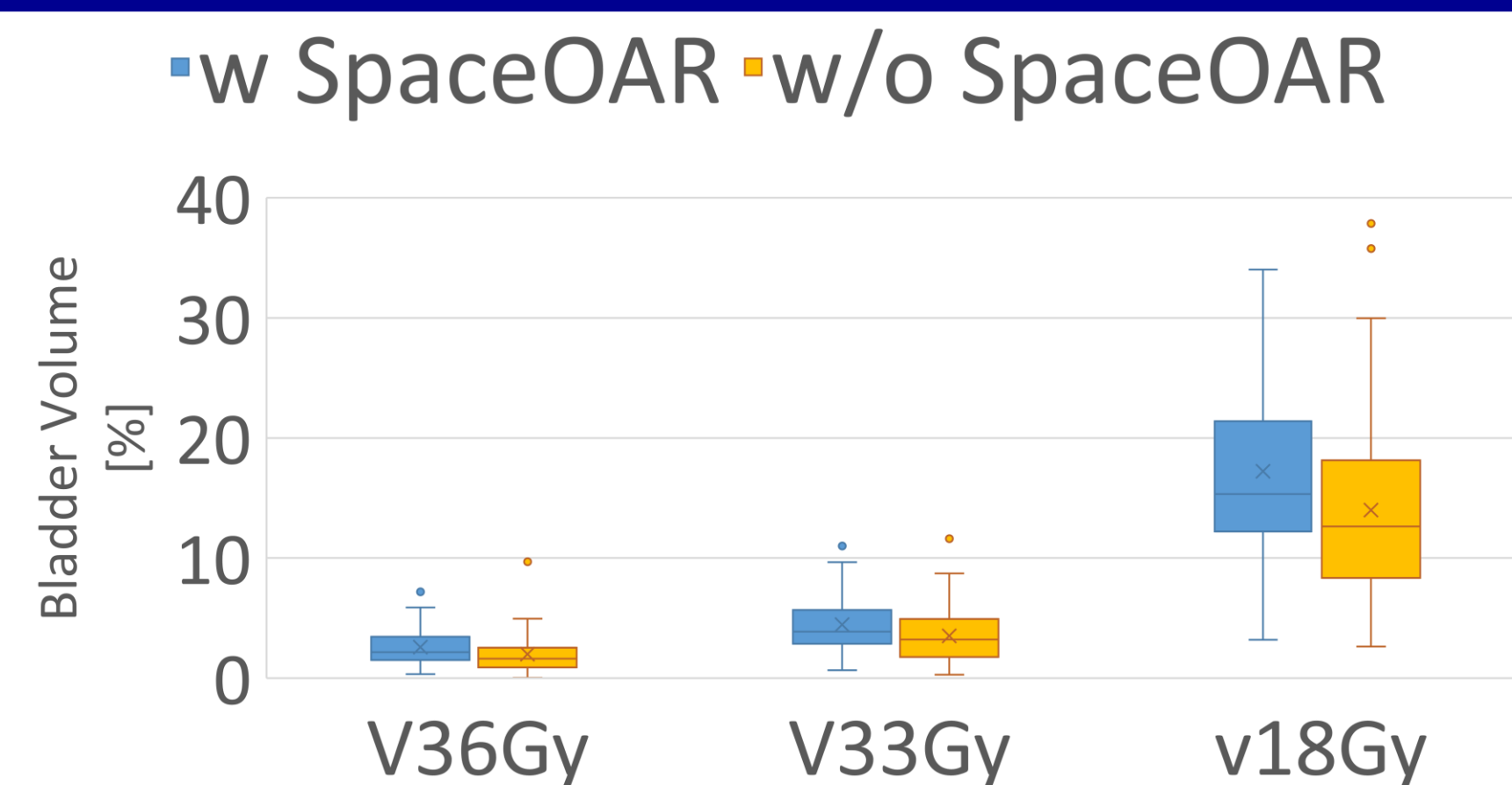


Fig 3: Box plots of Bladder dose metrics

Results:

- Baseline parameters were comparable (Table 2) but there was significant difference with respect to prescribed dose to prostate (Table 1 & Fig 1)

Table 2	No Spacer gel (n=89)	Spacer gel (n=68)	Overall (n=157)	p-value
Age (Years) Mean(SD)	72.9 (10.2)	70.9 (5.52)	72.0 (8.50)	0.12
Risk Group High	15 (16.9%)	16 (23.5%)	31 (19.7%)	0.59
Intermediate	71 (79.8%)	51 (75.0%)	122 (77.7%)	
Low	1 (1.1%)	1 (1.5%)	2 (1.3%)	
Low-burden met	2 (2.2%)	0 (0%)	2 (1.3%)	0.77
Treatment frequency	Every other day 8 (9.0%) Once per week 81 (91.0%)	5 (7.4%) 63 (92.6%)	13 (8.3%) 144 (91.7%)	

- There was differences in bowel preparation. (All spacer patients and 34.8% of non-spacer patients used fleet enema; and 43.8% of non-spacer patients used glycerine suppositories).
- Rectal Dose: Spacergel group had significantly lower rectal V36Gy & V18Gy (Fig2, Table 3).

Table 3	No Spacer (n=89)	Spacer used (n=68)	Overall (n=157)	p-value
Rectum V36Gy (cc)				<0.001
Mean (SD)	0.934 (0.509)	0.155 (0.216)	0.596 (0.562)	
Median [Min, Max]	0.840 [0.100, 2.93]	0.0650 [0, 0.860]	0.510 [0, 2.93]	
Rectum V18Gy (%)				<0.001
Mean (SD)	31.9 (10.8)	13.6 (8.34)	23.9 (13.3)	
Median [Min, Max]	37.0 [15.6, 59.1]	11.2 [3.22, 37.8]	19.3[3.22,59.1]	

- GI toxicities at baseline, post SABR (6-8 weeks) were not significantly different (Table 4)

Table 4	No Spacer gel (n=89)	Spacer gel (n=68)	Total	Significance
GI Toxicity (Grade)				
Baseline: Median [Min, Max]	0 [0, 1.00]	0 [0, 1.00]	0 [0, 1.00]	NS
Post SABR: Median [Min, Max]	0 [0, 2.00]	0 [0, 2.00]	0 [0, 2.00]	NS

- Bladder dose in Spacer gel group (V36Gy, V18Gy) was on relatively higher range (Fig 3). GU toxicity (6-8wks post SABR) was significantly higher in Spacer gel (No Grade 3 toxicity) (Table 5).

Table 5	No Spacer gel (n=89)	Spacer gel (n=68)	Total	Significance
GU Toxicity (Grade)				
Baseline: Median [Min, Max]	0 [0, 2.00]	0 [0, 2.00]	0 [0, 2.00]	NS
Post SABR: Median [Min, Max]	0 [0, 2.00]	0.5 [0, 2.00]	0 [0, 2.00]	0.007

Results (cont.):

Since the dataset was observational, a linear regression (Spacer gel, dose, bowel preparation, and PTV volume as the covariates) was used to adjust for potential confounding variables: Significantly lower RectumV36,V18 in Spacer gel group, 6-8 wks post SABR GI toxicity (\geq Grade 1) was similar (Table 6).

Table 6	Covariate	Reference Category	Coefficient	p-value
Outcome Variable				
Rectum V36Gy	Spacer gel used	Gel not used	-0.852	<0.001
Rectum V18Gy	Spacer gel used	Gel not used	-12.92	<0.001
GI toxicity post SABR (\geq Grade 1)	Spacer gel used	Gel not used	-0.345	0.58

Discussion and Conclusion:

- Spacer gel in prostate SABR significantly reduces rectal dose.
- Despite a much greater proportion of patients in Spacer gel group receiving higher prescribed dose, no difference in early rectal toxicity (6-8 weeks) was observed as compared to non-spacer group: Spacer gel may provide protective effect to the rectum when using higher prescribed dose.
- Comparing to a *dose escalation study*², our spacer gel patients (almost all with 40Gy dose) had far lesser acute rectal toxicity (<2%) in contrast to 11% in that study² with 40Gy dose.

Zelevsky ²	(No Spacer Gel) 32.5Gy/5#	(No Spacer Gel) 35Gy/5#	(No Spacer Gel) 37.5Gy/5#	No Spacer Gel 40Gy/5#	Our results (with Spacer Gel) 99% patients with 40Gy/5#
Prescribed dose					
Acute GI Toxicity Grade 2 (%)	0%	2.9%	2.8%	11.4%	1.47%

- 92% of our study patients had weekly SABR schedule. They might have already reduced acute bowel toxicity³: Spacer gel may be more useful with every other day SABR schedule.
- Spacer gel does not show benefit on GU toxicities (Increased toxicity at 6-8wks is most possibly due to almost all patients receiving higher prescribed dose).
- Longer follow-up can fully evaluate impact on toxicity profile.

References:

- ¹Hamstra DA, et al. Continued Benefit to Rectal Separation for Prostate Radiation Therapy: Final Results of a Phase III Trial. IJROBP.2017 doi: 10.1016/j.ijrobp.2016.12.024.
- ²Zelevsky MJ, et al. Five-Year Outcomes of a Phase 1 Dose-Escalation Study Using Stereotactic Body Radiosurgery for patients with Low-Risk and Intermediate-Risk Prostate Cancer. IJROBP. 2019 doi: 10.1016/j.ijrobp.2018.12.045.
- ³Quon H, et al. Once-weekly versus every-other-day stereotactic body radiotherapy in patients with prostate cancer (PATRIOT): A phase 2 randomized trial. Radiother Oncol.2018. doi.org/10.1016/j.radonc.2018.02.029