Seed Loss Through the Urinary Tract after Prostate Brachytherapy

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Purpose: To evaluate one institution's experience with seed loss through the urinary tract after prostate brachytherapy.

Materials and Methods: Two separate cohorts were analyzed. The early cohort consisted of 994 consecutive patients undergoing prostate brachytherapy (PB) between October 1997 and October 1999. The implant technique utilized a mechanical ultrasound probe and axial imaging with needle measurements for needle placement/seed deposition. The late cohort consists of 800 consecutive patients treated with PB between January 2001 and January 2002. The technique during this time period had evolved to use of sagittal imaging for needle placement/seed deposition and a new electronic ultrasound probe.

All patients were preplanned with a modified peripheral loading technique and implanted with preloaded needles under ultrasound guidance. All patients underwent post implant cystoscopy. Patients from the early cohort but not the late were instructed to strain their urine for one week post implant and return any seeds to our center. Our Physics Seed Accountability Log book documented seed loss as occurring in the Operating Room/cystoscopy (OR), recovery room (RR) or at home. Mean seed loss was compared by cohort (early vs. late), TURP, and type of seed used.

Results: Seed loss through the urinary tract occurred in 29.7% of patients with a mean seed loss of 0.58 seeds per case ± 1.2 (Table 1). Range was 0 –13 seeds per case. Of the patients who lost seeds, 90% had 3 or fewer seeds recovered from the urinary tract. Mean seed loss per patient for the early cohort vs. the late cohort was 0.65 ± 1.29 vs. 0.49 ± 1.06 (p= 0.004); TURP vs. non TURP was 0.9 ± 1.73 vs. 0.55 ± 1.14 (p= 0.001); ^{125}I vs. ^{103}Pd was 0.62 ± 1.26 vs. 0.40 ± 0.79 (p= 0.004).

Conclusion: Seed loss through the urinary tract is a common event after prostate brachytherapy, occurring in 29.7% of patients analyzed. It is even more common in patients with prior TURP. Seed loss per case, however, is negligible and should not affect overall dosimetry except in very rare cases. This study also showed that the majority of seeds were retrieved in the OR; therefore, we continue to recommend routine post implant cystoscopy. We no longer recommend that patients strain their urine at home after documenting a very low rate of seed loss after discharge. Finally, our rate of seed loss through the urinary tract has decreased over time and can be attributed to experience, improved ultrasound technology and use of sagittal imaging.

Table I: Description of Patient Population

	EARLY COHORT 1997-1999	LATE COHORT 2001-2002	ALL PATIENTS
No. of Patients	994	800	1794
Mean # seeds ± SD used per implant	104.22 ± 18.64	95.21 ± 15.01	100.20 ± 17.69
No. of Patients with ^{125}I implant	861	645	1506
No. of ^{125}I seeds implanted	90,392	63,060	153,452
Mean # seeds ± SD used per ^{125}I implant	104.98 ± 18.14	97.77 ±14.17	101.89 ± 16.93
No. of Patients with ^{103}Pd implant	133	155	288
No. of ^{103}Pd seeds implanted	13,203	13,104	26,307
Mean # seeds ± SD used per ^{103}Pd implant	99.27 ± 20.97	84.54 ± 13.70	91.34 ± 18.90
No. of Patients with prior TURP	82	63	145
Mean # seeds ± SD used in TURP patients	103.88 ± 21.23	86.78 ± 16.65	96.45 ± 21.10
Mean # seeds ± SD used in non-TURP patients	104.25 ± 18.40	95.93 ± 14.65	100.53 ± 17.32

Table II. Description of Seed Loss and Retrieval Areas

	SEED RETRIEVAL	EARLY COHORT 1997-1999	LATE COHORT 2001-2002	ALL PATIENTS
Mean % seeds retrieved per patient	Cystoscopy	.58	.47	.53
Total number of seeds		585	358	943
% of Patients with seed loss		29.3%	24.8%	27.3%
Mean % seeds retrieved per patient	Recovery Room	.03	.02	.03
Total number of seeds		32	18	50
% of Patients with seed loss		2.4%	2.1%	2.3%
Mean % seeds retrieved per patient	Home	.03	.02	.03
Total number of seeds		33	18	51
% of Patients with seed loss		2.1%	2.0%	2.1%
Mean % seeds retrieved per patient	Total	.64	.52	.58
Total number of seeds		650	394	1044
% of Patients with seed loss		31.9%	27.0%	29.7%

Table III. Distribution of Seeds Retrieved

EARLY COHORT				LATE COHORT				ALL PATIENTS			
% Seeds retrieved per case	# of Pts	% of Pts	Cum. %	% Seeds retrieved per case	# of Pts	% of Pts	Cum. %	% Seeds retrieved per case	# of Pts	% of Pts	Cum. %
0	677	68.1	68.1	0	583	72.9	72.9	0	1260	70.2	70.2
.001 to .999	84	8.45	76.6	.001 to .999	43	5.38	78.3	.001 to .999	127	7.08	77.3
1.0 to 2.99	183	18.4	95.0	1.0 to 2.99	136	17.0	95.3	1.0 to 2.99	319	17.78	95.1
3.0 to 4.99	33	3.32	98.3	3.0 to 4.99	32	4.0	99.3	3.0 to 4.99	65	3.62	98.7
5.0 to 6.99	11	1.1	99.4	5.0 to 6.99	5	.63	99.9	5.0 to 6.99	16	.89	99.6
7.0 to 8.99	4	.40	99.8	7.0 to 8.99	0	0	99.9	7.0 to 8.99	4	.22	99.8
9.0 to 10.99	2	.20	100.0	9.0 to 10.99	1	.13	100.0	9.0 to 10.99	3	.17	100.0