Table 1. AAPM TG119 goals and results for 3D-CRT, DMLC, SMLC, and VMAT in this study (cGy)

Photon energy	Structure	Parameters	Dose goals	3D-CRT	IMRT techniques		
					DMLC	SMLC	VMAT
6 MV	PTV	D90	5000	4470	5112	5079	5142
		D99	>4650	3402	4801	4766	4887
	Spinal cord	D20	<5500	5238	5291	5298	5307
		MAX	<4000	4864	3883	3923	3968
	Parotid	$D50_{(Lt)}$	<2000	4311	1989	1919	1730
		$D50_{(Rt)}$	<2000	3970	1955	1894	1738
10 MV	PTV	D90	5000	4310	5093	5134	5145
		D99	>4650	3230	4992	4801	4875
	Spinal cord	D20	<5500	5121	5286	5355	5314
		MAX	<4000	4846	3931	3960	3997
	Parotid	$D50_{(Lt)}$	<2000	4213	1918	1928	1840
		$D50_{(Rt)}$	<2000	3864	1811	1841	1843

$DX_{(X)}$: the amount of dose received by the X% of the volume, Lt: left, Rt: right

Table 2. Monitor units for four radiotherapy techniques and for 6 and 10MV photon energies

Photon energy	3D-CRT	IMRT techniques		
		DMLC	SMLC	VMAT
6 MV	294	1725	1402	638
10 MV	260	1680	1340	570

Table 3. Comparison of peripheral doses for four radiotherapy techniques and for 6 and 10MV photon energies (one fraction in cGy)

Photon energy	Organ site		3D-CRT		IMRT techniques						p value*
					DMLC		SMLC		VMAT		
			Mean	SD	Mean	SD	Mean	SD	Mean	SD	
6 MV	Thyroid		13.36	0.57	15.41	0.39	15.27	0.35	17.86	0.28	0.008
	Breast	right	1.97	0.04	6.28	0.15	5.18	0.16	3.21	0.07	0.002
		left	1.89	0.07	5.64	0.12	4.62	0.10	3.15	0.09	0.002
	Ovary	right	0.39	0.00	2.02	0.02	1.61	0.01	0.76	0.01	0.002
		left	0.40	0.01	2.04	0.05	1.62	0.03	0.76	0.01	0.002
	Testes		0.21	0.00	1.04	0.03	0.82	0.01	0.45	0.01	0.002
10 MV	Thyroid		12.53	0.51	15.21	0.31	14.77	0.84	17.12	0.31	0.009
	Breast	right	2.00	0.10	6.56	0.14	5.44	0.15	3.36	0.20	0.002
		left	2.01	0.07	5.84	0.37	5.00	0.19	3.29	0.10	0.002
	Ovary	right	0.36	0.00	1.97	0.02	1.57	0.04	0.71	0.01	0.002
		left	0.36	0.01	1.99	0.02	1.61	0.02	0.71	0.01	0.002
	Testes		0.23	0.01	1.08	0.02	0.87	0.02	0.46	0.01	0.002

SD: standard deviation, Measurements were repeated five times for all techniques.

* p values were obtained using the Kruskall-Wallis test for the comparison among three techniques of intensity-modulated radiation therapy.

Table 4. Comparison of peripheral doses for VMAT with collimator angles of 30° and 0° (one fraction in cGy)

Photon energy	Organ site		30°		0°		p value*
			Mean	SD	Mean	SD	
6 MV	Thyroid		17.86	0.28	14.89	0.31	0.009
	Breast	right	3.21	0.07	3.25	0.09	0.602
		left	3.15	0.09	3.17	0.1	0.917
	Ovary	right	0.76	0.01	0.90	0.02	0.009
		left	0.76	0.01	0.91	0	0.009
	Testes		0.45	0.01	0.46	0.01	0.347
10 MV	Thyroid		17.12	0.31	13.51	0.22	0.009
	Breast	right	3.36	0.2	3.32	0.24	0.602
		left	3.29	0.1	3.16	0.19	0.117
	Ovary	right	0.71	0.01	0.86	0.02	0.009
		left	0.71	0.01	0.87	0.02	0.009
	Testes		0.46	0.01	0.58	0.21	0.047

SD: standard deviation, Measurements were repeated five times for each.

MU values of the collimator angle 0 ° and 30 ° were equivalent.

* p values were obtained by Mann-Whitney U test.