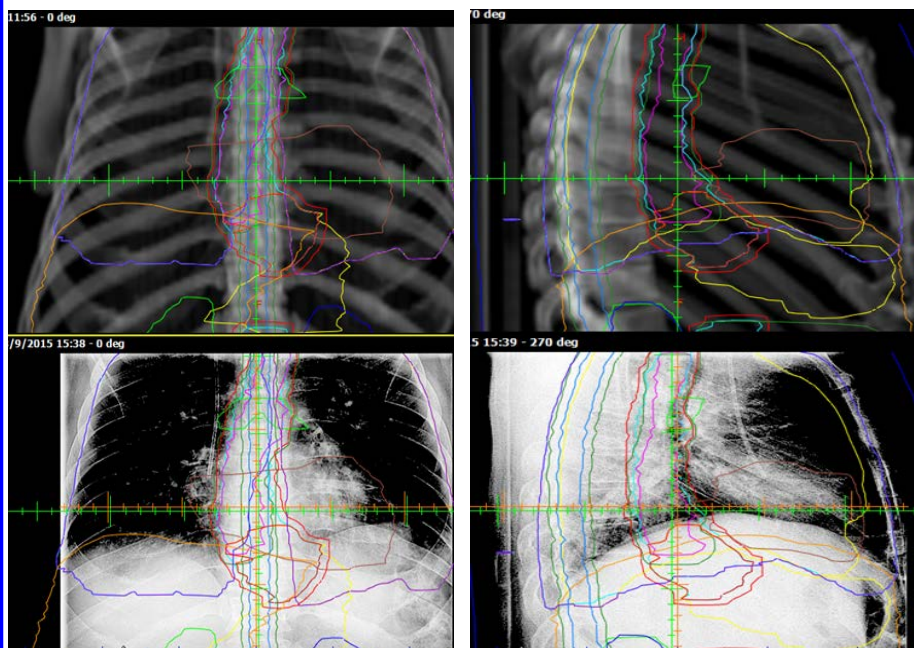


Introduction

Treatment plan isocenter can be setup during simulation (**SIM-Iso**). No shifts are needed on the day of treatment, however this requires physician's presence. Another approach utilizes a pre-mark set while the isocenter is setup at the time of planning with known shifts from the pre-mark (**PLAN-Iso**). For this approach physician presence is not required in this case. There are pros and cons to using either approach but one way of comparing these two is to evaluate which leads to a better setup on the day of treatment. This was the purpose of our work.

Materials and Methods

This was a retrospective study based on two sets of previously treated patients, one with isocenter based on SIM-Iso and the other based on PLAN-Iso. For each patient, we analyzed the first port films acquired after the therapist's setup. By comparing the port films with the expected reference DRR, we calculated the residual setup error based on each technique.



The figure above shows orthogonal kV projection images acquired to verify setup. It should be emphasized that this is the first image pair acquired immediately following initial setup by the Therapists. By comparing the acquired images with the reference DRR, we were then able to compute the residual setup error as shown by the couch shift parameters on the left. This was done for every patient studied

Image	Treatment	Difference		
Couch Vrt	11.5	11.2	-0.3	cm
Couch Lng	134.7	135.0	+0.3	cm
Couch Lat	0.3	0.1	-0.2	cm
Source Rtn	359.9	359.9	0.0	deg
Source Rtn	270.0	220.0	-50.0	deg
Coll Rtn	0.0	90.0	+90.0	deg

Results

Patient	SIM - ISO			Patient	PLAN - ISO		
	SI (cm)	AP (cm)	LR (cm)		SI (cm)	AP (cm)	LR (cm)
p1	0.30	0.00	0.40	p16	0.50	0.40	0.00
p2	0.30	0.30	0.30	p17	0.30	0.30	0.20
p3	0.00	0.00	0.00	p18	0.00	0.00	0.00
p4	0.00	0.00	0.00	p19	0.30	0.00	0.40
p5	0.10	0.50	0.10	p20	0.00	0.00	0.30
p6	0.40	0.40	0.20	p21	0.00	0.30	0.10
p7	1.40	0.40	0.30	p22	0.00	0.30	0.00
p8	0.30	0.30	0.00	p23	0.50	0.50	0.00
p9	0.40	0.30	0.00	p24	0.10	1.30	0.20
p10	0.10	0.20	0.10	p25	0.70	0.40	0.00
p11	0.60	0.00	0.00	p26	0.40	1.20	0.60
p12	0.20	0.30	0.10	p27	0.60	0.20	0.00
p13	0.10	0.00	0.70	p28	0.70	0.60	0.20
p14	0.40	0.40	0.00	p29	0.20	0.70	0.30
p15	0.60	0.30	0.10	p30	0.00	0.40	0.50

A total of 30 treatment deliveries were analyzed, 15 for each technique. For the SIM-Iso category, the average residual setup error was 0.35 ± 0.34 cm, range (0.00 – 1.40cm) in SI, 0.23 ± 0.17 cm, range (0.00 – 0.50cm) in AP, and 0.15 ± 0.19 cm, range (0.00 – 0.70cm) in LR direction. The corresponding average residual setup error for the PLAN-Iso category were 0.29 ± 0.26 cm, range (0.00 – 0.70cm) in SI, 0.44 ± 0.38 cm, range (0.00 – 1.30cm) in AP, and 0.19 ± 0.19 cm, range (0.00 – 0.60cm) in LR direction.

Conclusion

The study shows that the residual errors in both techniques are very comparable. This means that one could take advantage of the PLAN-Iso approach that does not require physician's presence with the satisfaction that the shift information would be correctly interpreted and implemented during delivery. This is only a preliminary study. More patients need to be analyzed before any final conclusions can be made.