JULY 12–16
2020 VIRTUAL
JOINT AAPM | COMP MEETING
EASTERN TIME [GMT-4]

The Use of Opposing Conformal Arcs for Palliative Spine Treatments

C. Langmack[1], T. Baig[1], K. Xu[1], and T. Podder[1,2]

[1] University Hospitals Cleveland Medical Center, Cleveland, OH

[2] Case Western Reserve University, Cleveland, OH

University Hospitals Cleveland Medical Center

INTRODUCTION

Sophisticated radiation therapy techniques offer the ability to deliver large amount of radiation to target while sparing the surrounding organs at risk (OARs). However, these sophisticated techniques may not be always available to all patients, particularly to palliative patients. Typical palliative treatment for lesions located in the spine is opposing AP-PA beams. While lesions receive the prescription dose, so does the small bowel. This leads to acute small bowel toxicity. Soyfer et al. in 2013 addressed this issue and suggested the use of 3-fields (LAO, RAO, PA) as opposed to AP-PA beams.

AIM

This study presents opposing conformal arcs as an alternative to further reduce high dose to the OARs.

METHOD

Three patients with lesions in the vertebrae treated in our institution during 2019 -2020 were randomly selected for this study with a prescription of 30Gy in 15fx.

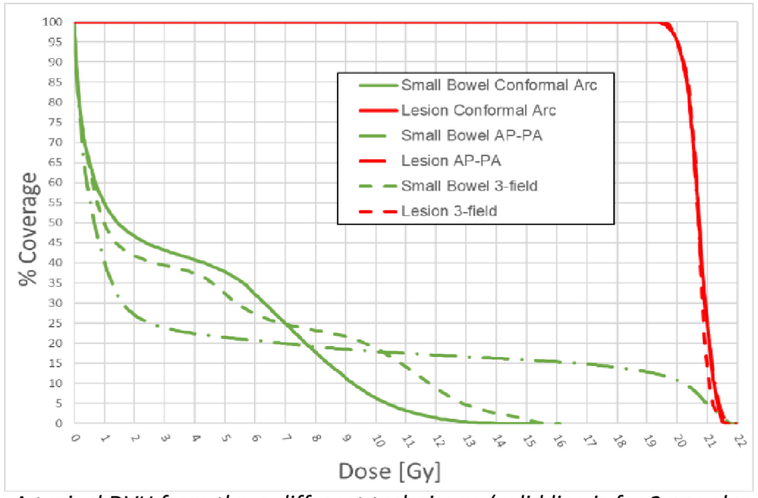
The following plans were generated for the study:

1. An **AP-PA plan** (15 MV AP & PA fields) used for Tx
2. A **3-field plan** (15 MV LAO, RAO & 6 MV PA
3. An **opposing conformal arc** (15 MV AP-arc & 6 MV PA-arc with 178 degrees each).

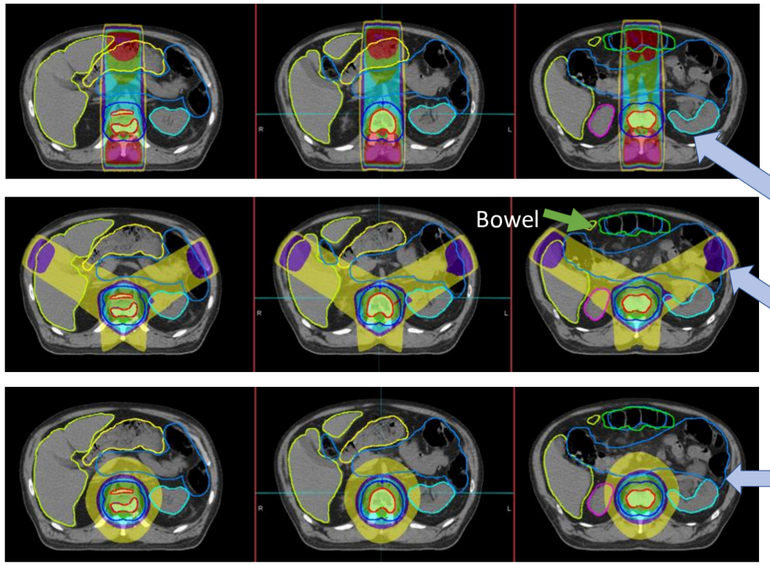
Each plan is normalized such that 95% of the lesion is receiving prescription dose.

Doses to small bowl, particularly the V30, V50, V70 and V90, were recorded and compared among the 3 plans.

RESULTS



A typical DVH from three different techniques (solid line is for 2-arc plan, dash line is for 3-field plan and dash-dotted line is for 2-field plan).



Top panel is an AP-PA plan, the middle panel is a 3-field plan, and the bottom panel is an opposing conformal arc plan.

	AP-PA			3-Field				Opposing Conformal Arcs			
30%	50%	70%	90%	30%	50%	70%	90%	30%	50%	70%	90%
15.1%	12.8%	11.5%	9.8%	19.6%	14.1%	3.1%	0.04%	20.7%	3.0%	0.2%	0.03%

Average percent volume of small bowel receiving a certain isodose percentage averaged for three patient cases.

On average, V70 and V90 of the small bowel in the 3-field plans (3.1%,0.04%) and opposing arc plans (0.2%,0.03%) are remarkably lower than the AP-PA plans (11.5%,9.8%). While V50 is comparable between the 3-field plan (14.1%) and AP-PA plan (12.8%), the opposing arc plan further reduced V50 to 3%. However, V30 of the 3-field plans (19.6%) and opposing arc plans (20.7%) were larger than the AP-PA plans as the trade-off for the decrease high dose volume.

CONCLUSIONS

Our study validated Soyfer et al. conclusion that the 3-field technique is clinically superior to the AP-PA technique. However, the opposing conformal arcs provides an option to further reduce high dose in the small bowel without appreciable additional effort.

REFERENCES

Soyfer, V., Corn, B. W., Shtraus, N., Schifter, D., & Tempelhof, H. (2013). The advantage of 3D conformal treatment of lumbar spine metastases in comparison to traditional PA or AP-PA techniques: Restoring an intermediate niche of therapeutic sophistication. Radiation Oncology, 8(1), 34.

CONTACT INFORMATION

Christian Langmack, Ph.D. *email:* Christian.Langmack@uhhospitals.org