INTRODUCTION

The right kidney can be subject to high doses in 4-field box 3D-CRT treatment when in close proximity to the PTV at the pancreatic head. While oblique AP/PA and lateral fields can help remove the ipsilateral kidney from the treatment field, the fields are limited by the location of other critical organs such as the spinal cord and contralateral kidney.

VMAT has been shown to reduce dose to kidneys, as well as other organs at risk, compared to other treatment modalities. This study will use avoidance sectors in RapidArc planning to further limit high doses to the right kidney while observing the effect on other organs.

METHODS

10 patients, with right kidneys located near or inside the PTV (mean = 286.97 ± 85.17 cc), were retrospectively selected and planned using full double arc VMAT and VMAT with sector avoidance angles of 30°, 40°, and 50°.

Avoidance angle was determined by placing isocenter at center of PTV and setting gantry to bisect the right kidney.

Prescription to 50.4 Gy with 100% of PTV receiving at least 95% of dose.

RESULTS

Due to low dose (<15 Gy) spillage, a large volume of kidneys and liver received more dose in VMAT plans than 3D-CRT.

V_{20Gy} of the right kidney showed a 28.2%, 34.8%, and 42.7% decrease using 30°, 40°, and 50° sector avoidance angles, respectively, compared with full arc VMAT.

V_{10Gy} of the left kidney increased by 4.1% (30°), 11.8% (40°), and 20.1% (50°) over full arc VMAT.

CONCLUSIONS

Increasing avoidance angles with VMAT provides better overall right kidney sparing while minimally:

- Increasing mean dose of left kidney, cord, and small bowel (within tissue tolerance)
- Decreasing mean dose of the total kidneys and liver
- Decreasing body V_{S}

REFERENCES


2. Vieillot, S.; Azria, D.; Riou, O.; et al. Bilateral kidney preservation by volumetric-modulated arc therapy (RapidArc) compared to conventional radiation therapy (3D-CRT) in pancreatic and bile duct malignancies. *Rad Onc. 6:*147; 2011