AbstractID: 14146 Title: When is Fixed Field IMRT Superior to VMAT?

Purpose: Volume Metric Arc Therapy (VMAT) has received considerable attention due to its ability to provide improved plan quality and delivery efficiency relative to fixed field IMRT. However, due to the limitation of leaf motion and number of control points, the VMAT plan is not always better than fixed field IMRT. This work investigated the cases that IMRT is superior to VMAT on plan quality.

Material and Methods: The fixed field IMRT and VMAT plans are produced using CMS XiO and Pinnacle^3 SmartArc, respectively. The RT doses are exported to a third party software where the dose volume histogram (DVH) and isodose lines are compared.

Results: Fifty clinical cases are investigated. The treatment sites include head-and-neck, partial-brain, lung, pancreas, prostate and pelvis. Three out of total 50 cases show that the IMRT plan quality is better than that of VMAT. The first case is a partial brain. Both IMRT and VMAT plans have similar target coverage. However, the IMRT plan has lower mean doses to the whole brain, which can be attributed to fewer gantry angles used in IMRT. The second case is a mesothelioma, in which large and sharp shrink between target contours are found. The IMRT plan is better on the target conformality. It is more difficult for the VMAT plan to create sharp shrink of isodose line to follow the target contour. The third case is a pelvis case in which again sharp corner exists in target contours. IMRT is superior on the target conformality.

Conclusion: Though for most cases, the VMAT plans are better than fixed field IMRT, there are some situations where IMRT can provide better comformality and lower dose to the volume not included in the organ in risks list.

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