

Cardiac Radiosurgery for Arrhythmia: Evaluation of Linac and Robotic Radiosurgery Systems

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Abstract

Objectives: Cardiac Radiosurgery is being evaluated as a safe and efficacious treatment for arrhythmia ablation.

Our objective was to evaluate the comparability of gantry and robotic radiosurgery systems by the accepted methods of comparison of DVH, treatment time, CI, etc.

Methods: Patient's cardiologist contoured an ablation lesion set in the left ventricle by using proprietary cardiac treatment contouring software. This plan was delivered to two iterations of a robotic and gantry based systems. The systems varied in terms of collimation, plan technique, energy delivery, dose rate and tracking method. Plans were assessed for PTV coverage, target composite coverage, CI, Dose Gradient, MU, Delivery time and Rx isodose line. Delivery times excluded set-up times. The Target Composite coverage is the ITV with a 5 mm margin for heart movement.

Results: Target Composite Coverage and PTV Coverage were comparable under both platforms. The CI was slightly higher for the robotic platform. MU for the robotic platform (Iris and MLC) was 27671 and 16522 respectively. For the linac (1 Arc and 3 Arc), Mu was 6275 and 6004. Delivery times for the robotic platform were 69 and 35 minutes, compared to the linacs at 7 and 6 minutes (all delivery times excluding set-up times.) Additionally phantom studies were performed and will be presented, again demonstrating comparability.

Conclusions: The feasibility of use of both linac gantry and robotic systems is demonstrated, with the current ablation volumes contoured for this cardiac arrhythmia ablation. This contoured lesion set was shown to be safe and efficacious, and has been delivered. Consideration in the future will importantly be given to selection of the platform that will best accommodate motion and safety considerations for thoracic organs at risk, and nearby coronary and valvular structures.

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Abstract

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