AbstractID: 6790 Title: Radiosurgery With Gamma Knife (GK) or Linac Based Micro-MLC (MMLC) For Irregular Targets: Evaluation Based on Complication and Control Probabilities

Purpose:
To investigate the relative efficacy of treating irregular AVM targets with either multi-isocenter Gamma Knife (GK) radiosurgery or micro Multi Leaf Collimator (mMLC) Linac radiosurgery, on the basis of Normal Tissue Complication Probability (NTCP) and Tumor Control Probability (TCP), calculated for representative test cases.

Methods and Materials:
Ten AVM cases, previously treated with mMLC, were selected to cover a range of sizes and shapes. Target and normal brain volumes were contoured on CT transverse slices for each case. Plans were developed using the two treatment delivery techniques for each case, with the objective of encompassing the target as closely as possible with a prescription isodose line, and minimizing dose to normal tissue, within the constraints of current clinical practice. Dose Volume Histograms (DVH's) were calculated for the target and for normal brain, and these histograms were used to calculate NTCP and TCP values for each plan. The dose prescription for each plan was adjusted to give a TCP value of 0.5 which allowed an unbiased comparison on the basis of the NTCP values.

Results and Conclusions:
The two methods of treatment and dose prescription produced similar complication probabilities. The mMLC technique was better able to conform to targets which changed appreciably from one slice to the next, whereas the GK technique gained some advantage from the higher dose within the target volume and the lower dose to normal tissue.