AbstractID: 5867 Title: Dosimetric Comparison Of Gamma Knife Vs. CyberKnife Radiosurgery For Patients With Tumors Near Optic Apparatus

Purpose: We reviewed our 10-year experience with GK radiosurgery (GKRS) and recent experience with CK radiosurgery (CKRS) for patients with tumors near optic apparatus to make a dosimetric comparison between the two modalities.
Method and Materials: From 1994 to 2004, a total of 186 patients (165 GKRS and 21 CKRS) with tumors near the optic apparatus were treated. The majority of this group included 80 meningiomas and 93 pituitary adenomas. Dosimetric parameters, such as, the conformity index, tumor coverage, the closest distances and the maximum radiation doses to optic apparatus and brainstem were evaluated between the two modalities.
Results: Mean tumor volume was 4.5cm^3 (0.2 to 20.7cm^3) for GKRS and 11.0cm^3 (0.9 to 38.7cm^3) for CKRS. The maximum doses to optic apparatus and brainstem were significantly higher ($p < 0.05$) even though the closest distances to the structures were very similar. For a subgroup of GKRS patients (n=40) with a mean of tumor volume equivalent to that of CKRS, radiation dose to brainstem was virtually comparable. The mean conformity index was1.35 for CKRS, 1.68 for all GKRS patients (n=165) and 1.49 for the subgroup of GKRS (n=40) in favor of CKRS. The mean tumor coverage was 98.4% for CKRS, 96.0% for all GKRS patients, and 90.9% for the subgroup in favor of CKRS also.
Conclusion: CKRS provides excellent radiation conformity and tumor coverage by means of the non-isocentric beam delivery. However, due to the limits of beam access, the dose fall-off for CKRS is less rapid, resulting in higher radiation doses to the critical structures. GKRS is best used for small tumors located at least 2mm from the visual pathways. CKRS can be used but is not limited to tumors abutting the optic apparatus or for tumors greater than 3 millimeters in size. This is accomplished via dose fractionation.