

1: Neurosurgery. 2005 Jun;56(6):1254-61; discussion 1261-3.

Staged Stereotactic Irradiation for Acoustic Neuroma.

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OBJECTIVE: Stereotactic radiosurgery has proven effective in the treatment of acoustic neuromas. Prior reports using single-stage radiosurgery consistently have shown excellent tumor control, but only up to a 50 to 73% likelihood of maintaining hearing at pretreatment levels. Staged, frame-based radiosurgery using 12-hour interfraction intervals previously has been shown by our group to achieve excellent tumor control while increasing the rate of hearing preservation at 2 years to 77%. The arrival of CyberKnife (Accuray, Inc., Sunnyvale, CA) image-guided radiosurgery now makes it more practical to treat acoustic neuroma with a staged approach. We hypothesize that such factors may further minimize injury of adjacent cranial nerves. In this retrospective study, we report our experience with staged radiosurgery for managing acoustic neuromas.

METHODS: Since 1999, the CyberKnife has been used to treat more than 270 patients with acoustic neuroma at Stanford University. Sixty-one of these patients have now been followed up for a minimum of 36 months and form the basis for the present clinical investigation. Among the treated patients, the mean transverse tumor diameter was 18.5 mm, whereas the total marginal dose was either 18 or 21 Gy using three 6- or 7-Gy fractions. Audiograms and magnetic resonance imaging were obtained at 6-months intervals after treatment for the first 2 years and then annually thereafter.

RESULTS: Of the 61 patients with a minimum of 36 months of follow-up (mean, 48 mo), 74% of patients with serviceable hearing (Gardner-Robinson Class 1-2) maintained serviceable hearing at the last follow-up, and no patient with at least some hearing before treatment lost all hearing on the treated side. Only one treated tumor (2%) progressed after radiosurgery; 29 (48%) of 61 decreased in size and 31 (50%) of the 61 tumors were stable. In no patients did new trigeminal dysfunction develop, nor did any patient experience permanent injury to their facial nerve; two patients experienced transient facial twitching that resolved in 3 to 5 months.

CONCLUSION: Although still preliminary, these results indicate that improved tumor dose homogeneity and a staged treatment regimen may improve hearing preservation in acoustic neuroma patients undergoing stereotactic radiosurgery.

PMID: 15918941 [PubMed - in process]