

24 Long term results of proton radiosurgery for AVM's, Meningiomas, and Acoustic Neuromas.

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Abstract

Purpose:

To review the 15 years experience of disease control for arteriovenous malformations, meningiomas, and acoustic neuromas treated with a stereotactic proton beam.

Methods:

A total of 500 patients have been treated to date in the program which started in 1993. Of those 82 suffered from an AVM, 41 had a meningioma, and 63 had an acoustic neuroma. Treatment was administered by means of a fixed horizontal 200 MeV passively scattered proton beam with customized individual beam collimation. A non-invasive stereophotogrammatic patient support and positioning system utilizing the markers on the mask, video cameras, and a computerized adjustable treatment chair, was used. This is a non-invasive stereotactic positioning system making fractionation possible. Treatment planning is done using Voxelpplan, to which a proton Bragg peak dose calculation model was added (Proxelpplan). The beam is available for clinical use twice a week on a Monday and Friday and a large number of patients were treated with 2 or 3 fractions.

Results:

AVM: 66 patients were analyzed: median age 33 years, with a 1.4 – 1 male/female ratio. Median ICRU reference dose 19.7 SFE CGyE (Single Fraction Equivalent-Gray Equivalent) with a mean minimum target dose of 17.2 SFECyE, and a mean volume 19.1 cc (1.7 – 64 cc).Based on a mean follow up time of 6.5 years , obliteration rate for volumes 0 – 25 cc = 61.5 %, and 18% for volumes > 25cc. Clinical improvement was found in 30% of patients and 51% remained clinical stable.

Meningioma: 34 patients were analyzed; median age was 52 years, with a 3-1 fem/male ratio. Median ICRU reference dose was 17.9 SFE CGyE , with a mean minimum target dose of 15 SFECyE, and the median lesion volume 19.4 cc (2.6 – 79.8 cc). Based on a mean follow up time of 6.2 years , disease control (= absence of growth) was achieved in 91% of patients with 55% showing clinical improvement.

Acoustic neuromas: 51 patients were analyzed; mean age was 50 years. Mean ICRU reference dose was 16.1 SFE CGyE, with a mean minimum target dose of 13.3 SFECyE. The mean lesion volume 5.9 cc(0.2-45.7 cc).With a mean follow up time of 6 years , a 98% 5 year local control was observed acoustic neuromas obtained radiological control. Hearing preservation was 42%, and facial nerve preservation 90% at 5 years.

No cases of radiation induced tumors were noted.

Conclusion

Proton radiosurgery was found to be effective and safe. In the light of the fact that most lesions were large in radiosurgical terms, proton beam is a suitable modality for large inoperable lesions requiring radiosurgery.