RADIOGRAPHIC APPEARANCES OF BRAIN TUMORS IN CHILDHOOD AFTER STEREOTACTIC RADIATION

by: Gil Lederman, M.D.

Stereotactic radiosurgery offers great appeal for many with brain tumors because of its precision treatment to tumors while limiting radiation deposited in normal, healthy tissues.

This is especially true for children who have growing brains and for who limited field radiation should minimize untoward effects of standard radiation. This technique is presently available for adults.

It is well known that radiation to the healthy brain offers little attraction. Radiation to normal tissues increases the potential for side effects without great benefit.

In a recent paper by Bakardjiev et al, appearing in **CANCER**, imaging results for childhood tumors after stereotactic radiation was reported.

As the authors noted, "Late radiation injury is considered to be the major dose limiting complication of brain radiation." Diminished amounts and volumes of radiation to the surrounding brain should offer great appeal to all those with brain tumors. Evaluation of radiographic images especially images of magnetic resonance imaging (MRI), are important to evaluate in this new era.

Sometimes, radiation effects may mimic tumor progression. It is important to distinguish the two since radiation effects would not indicate need for anti-cancer treatment while progressive tumors certainly would dictate further evaluation.

Reported were 28 patients with low grade astrocytomas treated between 1992 and 1994 with stereotactic radiation. These astrocytomas are slow growing tumors that commence within the brain itself. The patient ages ranged from two to 22 years with a median of 10. Tumors were centrally located in 21 patients and peripherally in seven.

The diagnosis was neurofibromatosis in five. Twenty-six patients had biopsy or resection. Two were felt to have optic gliomas. Twenty-three patients were part of a study that required biopsy of brain tumors or presumed optic gliomas.

Collimator or beam sizes ranged from 32.5 to 50 millimeters, with doses prescribed at the 95% line for most patients. The Gill-Thomas-Cosman relocatable head frame was used in 23 patients. The Gill-Thomas-Cosman head frame was pioneered in the United States by our physicians at Radiosurgery New York where it remains in routine use.

Daily radiation doses ranged from 180 to 200 Centigray - for a total of 27 to 31 treatments. Follow-up ranged from five to 32 months, with imaging (including MRI studies) done three to 26 months after treatment. Fifteen or 54% of patients had a reduction in tumor size of 50% and four patients had a decrease of 25%. One patient had a complete response to treatment ten months after therapy. Fifteen patients had normal or stable neurologic evaluation. The remaining 12 patients or 43% had an increase of imaging size by a variety of parameters. Of these 12 patients, four had no new symptoms associated with imaging changes and six had stable symptoms. One patient progressed with diffuse disease despite control or containment of the treated tumor.

Tumors treated were often those felt difficult to resect and included areas such as the brain stem or motor cortex.

As the authors note, "Radiation therapy is the standard treatment for unresectable or residual low-grade astrocytomas in adults. Management of these tumors in children is more controversial because of the differences in biologic behavior and because of the late effects of radiation in the young child. Irradiation is frequently used for recurrence or for symptomatic residual disease. Several retrospective studies in largely adult series have shown a ten year survival of 35 to 41% for patients treated with irradiation after subtotal resection compared with 11 to 19% for patients with surgery alone."

The authors note that there are radiographic changes on MRI studies which occur approximately one year after treatment and decrease within six to nine months. These symptoms are often asymptomatic and require no further therapy.

Thus, analysis of stereotactic radiosurgery continues to document the efficacy as well as safety. Data collected continues to show the benefits of sophisticated radiation.

Our multi-disciplinary panel of physicians includes radiation oncologists, medical oncologists, surgical oncologists, neurosurgeons, neurosurgical researchers, neuroradiologists, neuropathologists and others. Only a multi-disciplinary panel can produce expertise from a variety of fields to make recommendation for the best possible outcome.

I am often asked if radiosurgery is safe for children. I try to explain that radiosurgery attempts to minimize harm by decreasing radiation exposure to healthy tissues. Nothing is absolute. Yet, more protection is generally helpful – children and adults.

The principles of radiosurgery will one day come into play in centers around the world. Just in the last two weeks, I have spoken in Italy, United Kingdom and United States. People and patients worldwide seek the same thing – effective therapy and decreased or absent side effects. That is a goal we are seeking at Radiosurgery New York.