

UPDATE IN RADIOSURGERY FOR TREATMENT OF MENINGIOMAS

by Gil Lederman

Data is emerging for a variety of diseases showing stereotactic radiosurgery being potentially beneficial for the treatment of both benign and malignant brain tumors.

Because stereotactic radiosurgery is non-surgical and in our hands non-invasive, using sophisticated pencil thin radiation beams that attack abnormalities essentially anywhere in the brain from thousands of different angles - high doses of radiation are administered to the disease while the normal brain receives a minimal dose of radiation.

Multiple scientific papers have already shown stereotactic radiosurgery's benefit for treatment of meningiomas. Meningiomas are, in general, benign tumors of the brain's covering surface that are observed to occur more frequently in women than men by a rate of five to one.

In contrast to the non-invasive radiosurgery are surgical procedures. A recent paper by Dolenc describing microsurgical open resection of tumors of the cavernous sinus area yield a mortality rate as high as 6%. This means that one out of sixteen patients did not survive the surgical procedure. Similarly, new defects of cranial nerve function - the nerves that come off the brain to control movement and sensation of the face and other areas range from 19% to 86% after open surgery.

Also, open surgical complications include leakage of spinal fluid and infection. Other complications occurred in nearly one-third of patients. Total excision using surgery was only possible in about two-thirds of patients. Because of the marked limitations of surgery and the multiple complications, new methods have been developed to treat tumors such as deep-seated meningiomas avoiding invasive surgery and all its acute morbidity and potential mortality.

Recently reported by Duma et al were thirty-four patients with meningiomas located in the delicate cavernous sinus area treated with stereotactic radiosurgery.

Most of the patients had previously undergone between one and five prior surgical operations for an attempted removal that was unsuccessful. Six of the thirty-four patients had diagnostic radiographic studies for meningioma and received radiosurgery avoiding any open invasive surgical intervention.

Treatment technique involved an earlier form of stereotactic radiosurgery that required pins into the skull and allowed for only a single radiosurgery treatment. Because of this technique, one patient had a dural laceration and a small proportion of patients had either nausea, vomiting or headaches that were self-resolved.

New equipment avoids the pins in the skull and places the head ring - a method for precisely localizing the tumor - using a bite and occipital block held in place with Velcro straps.

Furthermore, because of this sophisticated new technique treatments can be fractionated. This means precise radiation can be given to a localized area repeatedly in large but smaller than a previously administered single fraction dose. This should help prevent adverse normal tissue radiation effects.

Evaluation of the 34 patients treated with stereotactic radiosurgery showed that no patient had worsened. Sixty seven percent were stable and 24% "gradually improved after radiosurgery."

Interestingly enough, the authors noted that "three had improved oculomotor nerve function; three had improved facial sensation; and two patients had both." Thus, neurologic improvement occurred in a significant proportion after this non-invasive technique.

Furthermore the authors noted that "no patient had evidence of tumor growth after radiosurgery (tumor control rate of 100%). Nineteen patients' tumors (56%) regressed. Tumor regression became evident an average of 1.2 years after radiosurgery."

What is important about this analysis is that radiosurgery can be performed in a highly sensitive area of the head with minimal ill effect and high control rate of the meningioma - noted to be 100%.

The authors stated, "radiosurgery was associated with three additional short and long term benefits: 1 - reduced length of hospital stay (less than 36 hours); 2 - reduced patient costs; and, 3 - the patients return to their pre-radiosurgery functional status within five days. These factors warrant additional analysis of the long term value of radiosurgery as an alternative to microsurgery."

Thus, meningiomas of this sensitive area join meningiomas of other areas of the brain as a potential successful target for radiosurgery. Tumors as diverse as metastases, acoustic neuromas and primary brain tumors are treated using stereotactic radiosurgery. Innovative techniques such as a removable relocatable head frame avoid the intervention and complications with which the prior pinned head frame had been associated. Similarly, fractionation of stereotactic radiosurgery is well tolerated and should minimize radiation irritation to the normal surrounding healthy brain.

Thus, for meningiomas as well as other brain tumors, stereotactic radiation offers the avoidance of surgical intervention. Here is reported a high control rate - 100% in this study for the treatment of meningiomas.

Continued follow-up using fractionated stereotactic radiosurgery shows high control rates. Many patients choose to be treated with fractionated stereotactic radiosurgery for newly diagnosed meningiomas as they are reluctant to undergo radiosurgery, have tumors in locations where surgery would be incomplete and, therefore require subsequent treatment or have had surgery in the past and now present with recurrent tumors.

Fractionated stereotactic radiosurgery allows doses to be placed to the location of the tumor while minimizing radiation to the healthy normal tissue. This approach is highly appealing and in general well-tolerated.