Cureus

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Abstract

CyberKnife Radiosurgery for Benign Tumors

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Categories: Neurosurgery, Radiation Oncology
Keywords: stereotactic radiosurgery, benign tumor, intracranial tumor, cyberknife, meningioma

How to cite this abstract
Conti A (May 10, 2018) CyberKnife Radiosurgery for Benign Tumors. Cureus 10(5): a293

Abstract

Image-guidance for radiosurgical treatment of intracranial tumor has been introduced in clinical practice about 20 years ago. Initially, this was an attempt to deliver radiations to tumors with high precision without the necessity of a stereotactic frame invasively applied to the patient head. However, the introduction of CyberKnife has many and more relevant merits. Actually, with the Cyberknife, image-guidance for radiotherapy has reached new standards, much more advanced than previously conceived. Actually, after the Cyberknife the concept of stereotactic radiosurgery could be applied to the extracranial pathology. Initially to the spine, then to any other district in the body. For the intracranial pathology, the Cyberknife has another merit: the absence of a frame provided the opportunity to deliver the radiation dose in a limited number of sessions (generally 3-5 fractions). This multisession radiosurgery has yet the same efficacy of single fraction radiosurgery, being far better tolerated by the normal tissues around the tumor. This means that larger tumors or tumor in direct contact with critical structures, such as the optic apparatus or the brainstem, could be treated effectively and safely with this technique. Actually, this has remarkably expanded the opportunity of the radiosurgery treatment for brain tumors.

Benign tumors of the skull base, which represents usually a category of challenging tumors, are particularly suitable for this treatment. Long-term results of their treatment are now available. These results demonstrate how tumor control for acoustic Schwannomas or meningiomas is extremely satisfactory and not inferior to that of conventional microsurgery, but with an inferior rate of complication and an overall excellent quality of life and compliance to the treatment modality.

Furthermore, the rapid expansion of availability of neuroimaging is changing the characteristics of tumors at the first diagnosis with many tumors precociously diagnosed and treated when they still have limited size which translated into more patients who will be shifted from the operating room to an outpatient radiosurgery treatment. Further technological advancements are currently ongoing and it is predictable that brain radiosurgery will be the first fully automated surgical procedure in humans. We present our results after 12 years experience with CyberKnife radiosurgery for benign intracranial tumors.

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Published 05/10/2018