

Feasibility and Outcome of Robotic Radiosurgery for Spinal Ependymomas

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Abstract

Objectives: Spinal ependymomas are rare intramedullary tumors, which are removed with microsurgery. Depending on the resection as well as the grading patients might develop recurrent or distant spinal ependymomas, sometimes in multiple locations with metastasis-like growth patterns.

In cases of recurrent tumor growth, due to previous radiotherapy or multiple lesions with limited surgical options robotic radiosurgery (RRS) might be an effective, less invasive or even last remaining treatment option.

Methods: Throughout a 6-year period, 7 patients with 26 spinal ependymomas underwent 21 treatment sessions, using the CyberKnife radiosurgery system (Accuray Inc., CA), and were followed for at least 12 months clinically and with MRI controls.

Results: 4 patients were treated once in only one location (two WHO grade II, two WHO grade III), but 3 patients had multiple lesions and repeated treatments (all anaplastic ependymomas WHO grade III). Between 2011 and 2016 a total of 21 RRS sessions have been performed. All patients but one have had conventionally fractionated radiotherapy. The tumor volume was 0,55 ccm (mean, range 0,15 ccm – 9,8 ccm) and the median tumor dose was 14 Gy (minimum 10 Gy, maximum 16 Gy) prescribed to the surrounding 70 % isodose line. One patient received a hypofractionated therapy with 24 Gy in three fractions of 8 Gy every 24 hours because of tumor volume. With regard to local tumor control all 26 lesions showed tumor regression or a stable tumor size at last follow-up. However, two patients with grade III ependymoma developed new spinal as well as intracranial lesions. One patient died due to tumor progression of distant lesions and one patient died due to pneumonia. Apart from one patient, who developed severe neurological deterioration due to distant tumor progression, no adverse radiation effects like myelopathy, motor or sensory deficits could be noticed.

Conclusions: Open microsurgery remains the treatment of choice for spinal ependymomas. In case of incomplete removal, recurrent growth or new lesions after extensive therapy, robotic radiosurgery might be a feasible and effective treatment option for spinal ependymomas, even after conventional radiotherapy. In our small series of highly selected cases radiosurgery was effective with regard to local control, which can mean cure in recurrent low grade, and good palliation in anaplastic ependymomas.

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