



Interstitial iodine-125 radiosurgery alone or in combination with microsurgery for pediatric patients with eloquently located low-grade glioma: a pilot study

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Abstract

Purpose The optimal therapeutic management of children with World Health Organization grade I and II gliomas not accessible to complete resection is poorly defined. Radical surgical resection is the first-line treatment for large hemispheric tumors, whereas interstitial iodine-125 radiosurgery (IRS) might be an attractive treatment concept for selected

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patients with small (tumor diameter in the range of 4 cm) and circumscribed tumors in any location of the brain. Precise high-dose application, maximal sparing of surrounding normal tissue, and the absence of long-term complications have been reported to be the hallmark of IRS. Therefore, the therapeutic impact and the risk of IRS alone or in combination with microsurgery (in case of larger tumor volumes) were prospectively examined.

Methods Seven boys and four girls were included (mean age, 6.8 years; range, 11 months to 16 years). IRS (after stereotactic biopsy) was considered to be indicated for circumscribed tumors with a diameter in the range of 4 cm (four cases). For larger tumors, a combined microsurgical/radiosurgical approach was preferred (seven patients). Temporary iodine-125 seeds were used exclusively (tumor dose calculated to the boundary, 54 Gy; dose rate, 10 cGy/h). Tumor location was hypothalamic/suprasellar in four, lobar in three, deep (thalamus and pineal gland) in two, and within the brain stem in two children. Treatment effects of IRS were estimated according to the MacDonald criteria.

Results A complete response after IRS was seen in four patients, and a partial response was seen in seven patients (median follow-up, 31.5 months). There was no perioperative morbidity after microsurgery and/or IRS, and no radiogenic complications occurred during the follow-up period. Five patients experienced an improvement in their deficits, and no deterioration in neurological/endocrine function was seen in any of the patients at the time of last follow-up evaluation.

Conclusion IRS alone or in combination with microsurgery (in the case of larger tumors) is a safe, effective, and minimally invasive treatment strategy for eloquently located pediatric low-grade gliomas and deserves further prospective evaluation.

Keywords Eloquent location - Interstitial radiosurgery - Low-grade glioma - Microsurgery - Pediatric



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