Resection of cerebral gangliogliomas causing drug-resistant epilepsy: short- and long-term outcomes using intraoperative MRI and neuronavigation.


Abstract

OBJECT Cerebral gangliogliomas (GGs) are highly associated with intractable epilepsy. Incomplete resection due to proximity to eloquent brain regions or misinterpretation of the resection amount is a strong negative predictor for local tumor recurrence and persisting seizures. A potential method for dealing with this obstacle could be the application of intraoperative high-field MRI (iopMRI) combined with neuronavigation.

METHODS Sixty-nine patients (31 female, 38 male; median age 28.5 ± 15.4 years) suffering from cerebral GGs were included in this retrospective study. Five patients received surgery twice in the observation period. In 48 of the 69 patients, 1.5-T iopMRI combined with neuronavigational guidance was used. Lesions close to eloquent brain areas were resected with the implementation of preoperative diffusion tensor imaging tractography and blood oxygenation level-dependent functional MRI (15 patients).

RESULTS Overall, complete resection was accomplished in 60 of 69 surgical procedures (87%). Two patients underwent biopsy only, and in 7 patients, subtotal resection was accomplished because of proximity to critical brain areas. Excluding the 2 biopsies, complete resection using neuronavigation/iopMRI was documented in 33 of 46 cases (72%) by intraoperative imaging. Remnant tumor mass was identified intraoperatively in 13 of 46 patients (28%). After intraoperative second-look surgery, the authors improved the total resection rate by 9 patients (up to 91% [42 of 46]). Of 21 patients undergoing conventional surgery, 14 (67%) had complete resection without the use of iopMRI. Regarding epilepsy outcome, 42 of 60 patients with seizures (70%) became completely seizure free (Engel Class I A) after a median follow-up time of 55.5 ± 36.2 months. Neurological deficits were found temporarily in 1 (1.4%) patient and permanently in 4 (5.8%) patients. CONCLUSIONS Using iopMRI combined with neuronavigation in cerebral GG surgery, the authors raised the rate of complete resection in this series by 19%. Given the fact that total resection is a strong predictor of long-term seizure control, this technique may contribute to improved seizure outcome and reduced neurological morbidity.

KEYWORDS: AED = antiepileptic drug; ECoG = electrocorticography; GG = ganglioglioma; GTR = gross-total resection; MEG = magnetoencephalography; intraoperative high-field MRI; iopMRI = intraoperative high-field MRI; seizure control; surgery; surgical complications; tumor-related epilepsy

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