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Review Article

Brain Tumors and Epilepsy

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Abstract
Seizures are frequent in patients with brain tumors, and patient quality of life can be influenced significantly by epilepsy. Between all tumor types, seizures are mainly observed with glioneuronal tumors (70–80%), particularly in cases with frontotemporal or insular location. Besides, seizures are commonly seen in patients with glioma, and the highest rates of epilepsy (60–75%) are seen in cases with low-grade gliomas situated in superficial cortical or insular area. Additionally, seizure is experienced in nearly 20–50% of cases with meningioma and 20–35% of patients with brain metastases. Around 60–90% of tumors will be seizure-free following tumor removal, with most favorable results seen in cases with glioneuronal tumors. Gross total resection, earlier surgical therapy, and absence of generalized seizures are main forecaster of a positive seizure outcome. Physicians should not prescribe enzyme-inducing anticonvulsants since simultaneous chemotherapy usually consist a critical part of glioma therapy.

Keywords: Brain tumor; Seizure; Glioneural tumors; Glioma

Introduction

Seizures are frequent in patients with brain tumors, and patient quality of life can be influenced significantly by epilepsy. It may cause neurocognitive disturbances and considerable morbidity may result from seizures themselves or medication side-effects. Tumor type and location of the tumors have significant role in occurrence of seizure. Treatment strategies have pivotal role in response rate to therapeutic approaches. Furthermore, seizures may herald radiologic manifestations of malignant tumor conversion.

Tumor Type

Different kinds of brain tumors can cause epilepsy, but it is most commonly observed in individuals with low grade intrinsic tumors. Among all brain tumors, glioneuronal tumors (seizure is seen in 75% of cases, and usually located in temporal lobe), consisting of gangliogliomas and Dysembryo-plastic Neuroepithelial Tumors (DNETs), most probably present with seizure [1,2,3]. Across cases with glioma, the maximum rates of epilepsy are experienced in individuals with low grade gliomas [4]. Seizure is most commonly seen in slow growing and smaller lesions in comparison with larger, rapidly growing tumors. Potential reasons include the preference of high-grade gliomas for brain white matter, the likelihood that rapid growth might prohibit epileptogenesis development, and the reality that many cases with malignant lesions expire before epilepsy develops [5]. IDH1 mutant low-grade gliomas are associated with increased incidence of seizure as initial clinical symptom, frontal-lobe tumor location, and longer survival. Occurrence of seizures in cases with glioma may improve overall survival [6].

Some researchers have reported a lower frequency of seizures in primary glioblastomas than those having converted from known lower-grade glioma. Longer overall survival is seen in patients with high grade glioma and seizures compared to those without seizures across both univariate and multivariate analyses [7] Whereas seizures at the time of glioma diagnosis are associated with an improved survival, seizure reappearance after treatment herald a poor prognosis, probably due to the correlation between tumor regrowth and recurrent epilepsy [8, 9].

Although epilepsy is most frequent with intrinsic, intra-axial brain tumors, Seizure occurs in more than one-quarter of individuals with brain metastases or extra-axial meningiomas during their disease course. Probability of seizure occurrence increases in convexity-based meningiomas and lesions with marked peritumoral edema [10].

Even though seizures occur in %67 of individuals with melanoma (possibly due to the tendency for intracranial hemorrhage in this tumor type), only 16% of patients with breast cancer, 21% of cases with gastrointestinal metastases, and 29% of patients with lung cancer are associated with seizure [11].

Tumor location

Tumors located in superficial cortical regions are most probably to be coupled with seizure. Additionally, seizure frequency raise in lesions centered in the temporal lobe, frontal lobe, or insula (possibly due to natural epileptogenicity of structures in the mesial temporal lobe that contributes to seizure generation in this area [12]. have explained that dual pathology – including gliosis, hippocampal sclerosis, and cortical dysgenesis – may further impel epilepto-genesis in tumor-associated tempo-

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ral-lobe epilepsy. Epilepsy is more commonly reported in cases with multifocal lesions than in those with a solitary tumor [13].

Treatment

Despite the fact that oncologic control is classically the main goal in the surgical management of brain tumors, accomplishing seizure freedom is also an important target in cases with relentless epilepsy to improve quality of life [14,15]. This is particularly true in patients with low-grade tumors, who possibly survive several years or decades.

Studies show that greater extent of resection, early surgical intervention, shorter duration of epilepsy, absence of generalized seizures, better control of seizures with Antiepileptic Drugs (AEDs) and localized electroencephalogram and less severe seizure profile are prognostic factors of favorable seizure and oncologic control in tumor surgery [16].

Epilepsy is less frequent in meningioma cases than those with intra-axial intrinsic brain lesions and worse seizure outcomes were observed in patients with parasagittal or sphenoid wing tumors in comparison with those in other regions, nevertheless, a clear correlation between tumor site and treatment results has not been obviously proven. Better results is more frequently seen in patients with less peritumoral edema [17,18].

Although it is obvious that seizure control in tumor surgery is more effective after gross total resection then partial laminectomy, dual pathology should be considered in ictogenesis by temporal-lobe tumors. Hence seizure may continue in spite of gross total resection of the tumor due to cortical dysgenesis, gliosis, and hippocampal sclerosis. It is the reason that several authors have recommended wider resection in temporal-lobe tumoral cases, explaining that the addition of anterior temporal corticectomy and amygdalohippocampectomy improve seizure control over gross total resection alone [19- 21].

Degree of resection in low-grade temporal-lobe tumor was additionally evaluated in a meta-analysis consisting of 1181 patients across 41 studies. Seizure freedom achieved in 43% of patients with subtotal laminectomy, 79% of individuals with gross total laminectomy, and 87% with laminectomy in addition to hippocampectomy and/or anterior temporal corticectomy [4]. The advantage of extensive resection over gross total laminectomy alone was superior in individuals with mesial temporal tumors than patients with a lateral temporal lesion. As a result, it is probable that a more extensive tailored removal may cause better seizure control in tumor-related temporal-lobe epilepsy surgery, but further study is necessary, and prospective data would be helpful.

Conclusion

Around 60–90% of tumors will be seizure-free following tumor removal, with most favorable results seen in cases with glioneuronal tumors. Gross total resection, earlier surgical therapy, and absence of generalized seizures are main forecaster of a positive seizure outcome. Physicians should not prescribe enzyme-inducing anticonvulsants since simultaneous chemotherapy usually consist a critical part of glioma therapy.

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