GESTATIONAL-ONSET EPILEPSY IN POST-RESECTION MENINGIOMA

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Abstract

Meningioma is the most common type of primary CNS tumors. Seizure after resection of meningioma with no pre-resection seizure history is a rare case. A seizure can be a major cause of morbidity and poor life quality. Seizure in pregnancy is a life-threatening emergency and a challenging situation that risks the mother and fetus. We report an unusual case of gestational-onset epilepsy related to post-resection meningioma. Several factors are associated with gestational-onset epilepsy related to post-resection meningioma. The physiological, structural, metabolic changes and hormonal balance that occur throughout pregnancy can alter the neuronal excitability and the seizure threshold. Gestational-onset epilepsy is unpredictable, requiring a precise diagnosis and proper treatment to reduce both mothers and fetuses' adverse effect. The main goal is to achieve adequate seizure control with minimal harmful effects.

Keywords: Gestational-onset Epilepsy, Meningioma, Resection

Introduction

Meningioma is the most common type of intracranial tumors in adults, and resective surgery is the standard management for meningioma (1). Approximately 12–19% of patients with meningioma without a history of pre-resection seizures may have seizures after resection (2). Seizure is a serious cause of morbidity and decreases quality of life (3). Seizure in gestation is a life-threatening and challenging condition, which is harmful to both mother and fetus (4–6). Gestational-onset epilepsy refers to patients with initial seizure onset during pregnancy with various etiology. Herein, we report a 29-years-old woman at 26-28 weeks of gestation with gestational onset epilepsy related to postoperative meningioma.

Case Presentation

A 29-year-old woman at 26-28 weeks of pregnancy was admitted to the emergency room due to recurrent focal to bilateral motor seizure with tonic form. Her right extremity became stiff for approximately one minute, repeated three times, and she was unconscious between and after the seizure. She did not have any history of seizure and antiseizure drug consumption. She had a history of meningioma resection 1.5 years back, and after the operative procedure, she complained of blurred vision and anosmia. Histopathological examination of the specimen described transitional type meningioma WHO Grade I. After surgery, she did not follow up routinely in the clinic.

On the initial admission examination, her mental status was somnolence with GCS 9/15, BP 110/80 mmHg, RR 20 tpm, HR 90 bpm, and axillary temperature 36.3°C. Neurologic examination showed pupils equally reactive bilaterally with no papilledema. There was no decrease in motor strength, and other examinations were within the normal limit.

A series of tests, brain magnetic resonance imaging (MRI), and encephalography were performed after admission. Laboratory findings showed a hemoglobin concentration of 11.6 g/dL, an increase in white blood cell 26760/mm^3, and normal platelet 231000/mm^3. Blood urea nitrogen and creatinine, liver function, albumin, and serum electrolyte were within the normal range.

Head MRI with contrast demonstrated porencephaly in parietal lobe sinistra, mild communicating hydrocephalus, and 2 mm of subfalcine herniation (Figure 1). Routine electroencephalography 2 weeks after the seizure onset showed a normal result.

Based on these results, we diagnosed the patient with gestational-onset symptomatic epilepsy due to postoperative meningioma and 26-28 weeks of pregnancy. She was treated with oral phenytoin as antiseizure therapy to control the seizure with informed consent to the

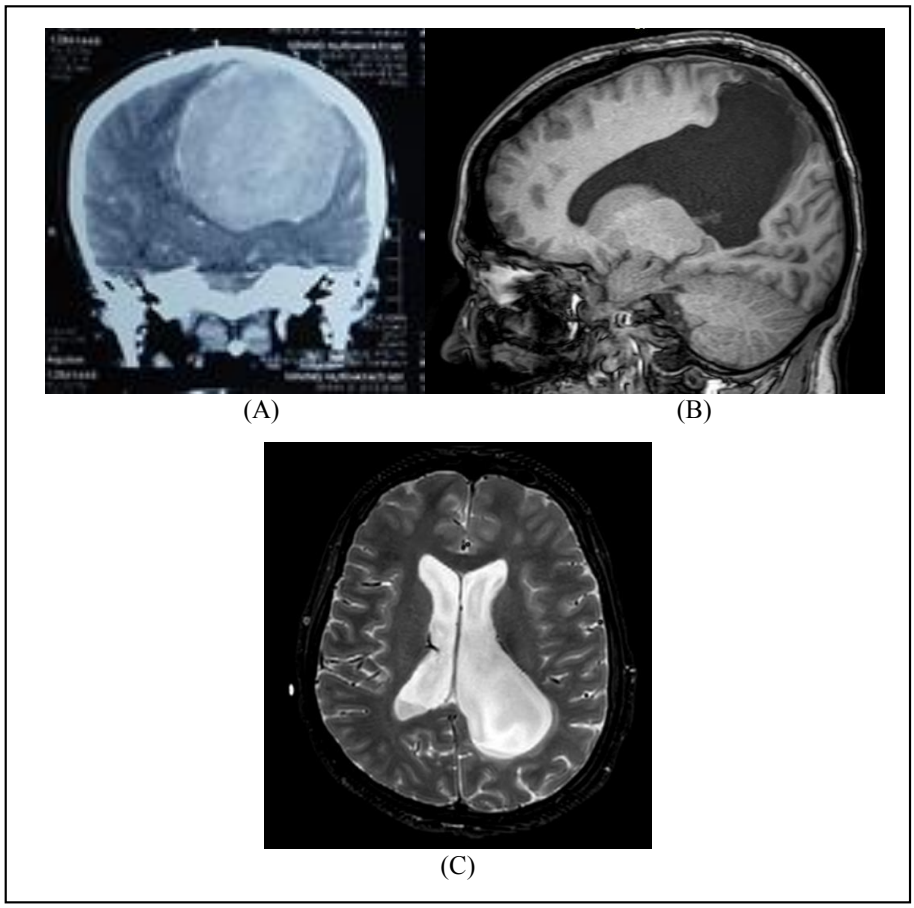

Figure 1: (A) Head CT scan showed extra-axial meningioma. (B, C) T1/T2 Weighted MRI showed porencephaly, hydrocephalus, and midline shift after meningioma resection.

medication. The patient showed good compliance with the drug. The seizure was well managed, and both mother and baby were healthy in her last visit to the clinic.

Discussion

This report discusses several points about gestational-onset epilepsy related to post-resection meningioma without preoperative seizure history, and also the management and therapy for seizure in pregnancy with a history of meningioma.

Epilepsy in meningioma is a significant cause of morbidity, with onset before or after resection. The incidence of seizure in postoperative meningioma is around 12-19%. A seizure is considered an important cause of decreased quality of life. Seizure in postoperative meningioma can occurs in the early phase, defined by initial seizure occurs one week after the operative procedure, or late phase defined by initial seizure occurs more than one week after the operative procedure. In our case, the patient had the first seizure onset more than one year after surgery. Hwang *et al*. conclude that most patients had their first late postresection seizures in two years, and about half of patients had their late postresection seizures in a year after resection (7).

Several factors contribute to the occurrence of postoperative epilepsy, including younger age, higher grading of WHO, tumor sites and convex shape of the lesion, midline shift, peritumoral edema, higher Simpson grade, multiple meningiomas, absence of postresection improvement of pre-resection neurological deficit, epileptic discharge on encephalography recording, tumor development, pre-resection epilepsy, the expanse of tumor removal, major surgical complications, hydrocephalus, re-craniotomy, and symptomatic intracranial hemorrhage (1, 8–10). In this case, we suggest that the size and tumor location, neurological deficits after surgery, hydrocephalus, and porencephaly are essential factors contributing to the late onset post-resection epilepsy.

Correlation between seizure frequency and tumor size in postoperative seizure was reported in previous studies. A tumor with a larger diameter of more than 45.5 mm, develops postoperative seizure 4.2 times more frequently compared to a tumor with a diameter of less than 45.5 mm. An increase in the size of the tumor can develop local pressure, leading to compression in the cortical area and suggests an epileptogenicity factor (7). Tumor location is associated with postoperative seizure, especially in convexity meningioma and supratentorial places, mainly parietal. Parietal lobes tumors are more susceptible to the

progression of new-onset postresection epilepsy (1, 7–9). In our case, the patient had a considerable mass located in the convexity area and compressed lobes area, and this condition is suspected to be an epileptogenicity factor. After resection, there were porencephaly, hydrocephalus, and midline shift showed by imaging evaluation, contributing to postoperative seizure incidence.

Seizure in gestation is a life-threatening and serious emergency that can be a significant etiology of maternal and fetal morbidity (4–6). This report presents an unusual case of a 29-year-old woman who had her first seizure during pregnancy. Generally, seizures in pregnancy are mostly caused by three conditions. The first is the exacerbation of uncontrolled pre-existing seizures, primarily epilepsy, as the most frequent etiology. The second is the new-onset seizures related to non-pregnancy problems, and the third is conditions related to pregnancy, mainly the eclampsia (4, 5). New-onset seizures in pregnancy are unpredictable and need a precise diagnosis and comprehensive treatment (4).

The risk of new-onset epilepsy in pregnancy is quite low, around 2.1-10%, but requires precise diagnosis and treatment to decrease adverse effects to both mothers and fetuses (4, 11). In women who have a first seizure during pregnancy, they are mostly diagnosed with focal seizures (11). Another study concludes that women with focal epilepsy have an increased frequency of seizures during pregnancy (12, 13). New-onset epilepsy in pregnancy mostly occurs in the second and third trimester of pregnancy, decreasing the fetus's adverse effect. First seizure during the first trimester can increase the incidence of pregnancy complications (4).

Pregnancy is involved with many physiological, endocrine, and psychology changes, hence decreasing the seizure threshold (14). Structural and metabolic alteration including hemorrhagic stroke, ischemic stroke, cerebral tumor, cerebral venous sinus thrombosis, hydrocephalus, hypoglycemia, infection, acute intermittent porphyria, posterior reversible encephalopathy syndrome, thrombotic thrombocytopenic purpura, amniotic fluid embolism, reversible cerebral vasoconstriction syndrome, and air embolism might lead to new-onset seizures in pregnancy. The new-onset seizure that occurs during pregnancy is often associated with brain damage (4, 5, 12).

Many physiological changes in pregnancy may enlarge the risk of seizure, particularly in epilepsy. Chronic respiratory alkalosis, stress, anxiety, and sleep loss may decrease the seizure threshold. Variations in ovarian hormones, metabolic alteration, and antiseizure drugs levels in the blood may also impact the seizure pattern during pregnancy (15). Studies conclude that hormones progesterone and estrogen can influence seizures. Generally, estrogen reduces the seizure threshold, and progesterone increases it (16).

Gestational-onset epilepsy causes more complications of pregnancy. Besides, the frequency of several complications is significantly higher in the cases with epilepsy compared to those without epilepsy (16). The seizure disrupts the circulation of the placental and leads to hypoxia and bradycardia in the fetus. Furthermore, traumatic injury to the mother, injury to the fetus, placental abruption, and abortion are feasible. Women with epilepsy in pregnancy have lower Apgar scores than normal (11). The frequency of cesarean section may also increase after seizure during pregnancy, which is associated with worry seizures provoked by delivery, high-risk labor, and prevent mother and fetal death (11, 16).

Seizure management requires a balance between fetal well-being and maternal health. Focal seizures without affecting the consciousness have the least effect on the fetus. Focal seizures with impaired awareness and responsiveness may lead to changes in the serum electrolytes, oxygenation, and blood pressure, which would be harmful to the fetus. Moreover, the immature brain is susceptible to abnormal conditions (11).

The primary goal in pregnant women with epilepsy is to achieve adequate seizure control with the least negative effects of antiseizure drugs to the fetus (12). Antiseizure drug was a problem for gestational onset epilepsy patients. Antiseizure drugs therapy is maintained during pregnancy to avoid adverse effects to the mother and fetus, despite the increased risk of congenital malformation, intrauterine growth retardation, dysmorphic syndromes, and negative cognitive development (4, 14). In this report, the patient was treated with oral phenytoin 100 mg twice and folic acid supplementation. Phenytoin has good efficacy to be used in pregnancy but with attention to various side effects. We provided informed consent to the patient and families regarding the risks and complications of treatment. The patient was seizure-free after receiving phenytoin, and we continued the treatment to prevent recurring seizures.

Study results about antiseizure drugs in pregnancy were contradictory. Antiseizure drugs choice was based on age, comorbidity, type of seizure, and risk in pregnancy. Several studies suggested the use of carbamazepine, lamotrigine, and levetiracetam as antiseizure drugs in pregnancy. Other studies showed that valproic acid could be one of the options for seizure control in these patients, however this drug should be avoided due to the higher malformation risk and neurodevelopmental disorder than other drugs. Phenytoin has good efficacy to be used in pregnancy but with attention. Its common side effects are fetal hydantoin syndrome and other malformations, but these side effects did not differ significantly compared to carbamazepine and lamotrigine. The decrease in plasma antiseizure drug level during pregnancy is one of the triggering factors for recurring seizures. That plasma drug level monitoring is therefore essential to prevent recurring seizures. In general, monotherapy with the minimal adequate and effective dose would be the best management strategy (12, 17, 18).

Folic acid supplementation has a protective role in preventing neural tube defects. For prevention, 5 mg folic acid daily is recommended for all women who are

taking antiseizure drugs during pregnancy, especially in the first trimester (19). Generally, for the women who are taking antiseizure drugs during pregnancy, monitoring and evaluation should be done to identify the fetal status, especially the estimation of serum a-fetoprotein and ultrasound screening for malformations (16). Antiseizure drugs level monitoring in pregnancy is recommended (17).

Conclusion

Gestational-onset epilepsy related to meningioma surgical resection is a rare case with challenging condition that risks both the mother and fetus's health. The clinical management of gestational-onset epilepsy needs careful attention. Precise diagnosis and adequate treatment were required to save the pregnancy and to reduce morbidity and mortality to both the mother and fetus. The goal of management is to achieve adequate seizure control with least antiseizure drugs exposure to the fetus, and to decrease the risk of structural and neurodevelopmental teratogenic effects. Patients must be educated on potential congenital malformation, neurodevelopmental problems, risk of pregnancy, complications during perinatal and breastfeeding while on antiseizure drugs treatment.

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Competing interests

The authors declare that they have no competing interests.

Informed Consent

Written informed consent was obtained from the patient for the publication.

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