Large parasagittal meningioma in a pregnant woman

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Abstract

Large parasagittal meningioma is rare in pregnant women. In this paper, we report the successful treatment of a pregnant woman with a large parasagittal meningioma. A 35-year-old woman in her 37th week of pregnancy presented with acute consciousness disturbances after experiencing headache and nausea for 2 weeks. We performed a successful cesarean delivery under general anesthesia, and immediately after the delivery, brain computed tomography was performed. The scan revealed a large tumor (8.3 × 6.8 × 7.1 cm³) in the left frontal region, thickening of the adjacent skull base, and perifocal edema. Twenty-four hours after the delivery, the patient underwent imaging studies, namely, magnetic resonance imaging and angiography. The parasagittal meningioma was removed through craniotomy, and the surgical outcome was highly satisfactory. Although meningioma is benign, the tumor mass can expand rapidly during pregnancy. In our patient, an early cesarean section was first performed for a successful delivery, and imaging studies and transarterial embolization of the tumor blood supply were performed prior to the second operation for craniotomy and total tumor excision. A multidisciplinary team was critical for successfully treating this patient.

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1. Introduction

Brain tumors, specifically large intracranial tumors, are rare during pregnancies. The low detection rate is attributable to the reluctance of patients to undergo computed tomography (CT) and other imaging studies during pregnancy. In addition, the common symptoms of pregnancy, such as nausea, vomiting, and lethargy, mimic and thus mask some symptoms and signs of intracranial tumors. However, several intracranial tumors in younger females were discovered during their pregnancies, mostly through nonemergency symptoms and signs.

Reports have demonstrated satisfactory outcomes when such presentations were managed appropriately. In this paper, we present the appropriate decision-making process and cooperative teamwork in the case of a pregnant woman in the third trimester of her pregnancy, in whom a large and highly vascular parasagittal meningioma was detected.

2. Case Report

A 35-year-old 37-week pregnant female (gravida 2, para 1) presented to the emergency department with headache, nausea, vomiting, urinary incontinence, and general malaise. According to the statement of the patient’s husband, the patient had repeatedly experienced vomiting for a month and had previously visited the emergency department twice for medications. However, the patient continued experiencing vomiting, developed general malaise, and became very lethargic. Examinations did not reveal fever, headache, chest pain, abdominal pain, diarrhea, constipation, coffee-ground material, or tarry or bloody stools; however, she experienced mild dizziness. In addition, results of her antenatal examinations were normal. Blood tests for Core blood test/differential count (CBC/DC), electrolyte, and biochemistry revealed no abnormalities.

![Figure 1](image.png)

**Figure 1** Preoperative imaging. (A) Transverse view and (B) sagittal view of brain CT with contrast enhancement revealing a large tumor \((8.3 \times 6.8 \times 7.1 \text{ cm}^3)\) in the left frontal region with mass effect, perifocal edema, thickening of the adjacent skull base, and erosion. (C) T1-weighted contrast enhanced coronal MRI of the brain revealed a large extra-axial well enhanced hypervascular tumor, \(~83 \text{ mm}~\) at the largest dimension, to the left anterior frontal lobe causing perifocal edema, severe mass effect on the adjacent brain parenchyma, ventricles and corpus callosum, midline shift of \(23 \text{ mm}~\) to the right side, and left uncal herniation. Furthermore, hyperostosis of the skull overlying the tumor is noted. (D) A magnetic resonance angiogram revealed a large hypervascular tumor in the left anterior frontal region causing severe mass effect and vascular deviation. CT = computed tomography; MRI = magnetic resonance imaging.
Ultrasound scan assessments confirmed an uncomplicated pregnancy and appropriate fetal movements, and the gestation was normal as well. The patient had no history of alcohol, tobacco, or drug use, and the family history was noncontributory. The patient presented with normal vital signs and no fever. Moreover, the general examination yielded normal results, and the neurological examination revealed a depressed mental status with closed eyes, opening to voice but generally noncooperative. She followed simple commands poorly. The cranial nerve examination result was normal with brisk pupillary reactions to light; however, the patient exhibited consciousness disturbances with anisocoria while preparing for the cesarean section operation.

During preoperative preparations for the cesarean section, the anesthetist noticed anisocoria and suspected a stroke or other organic brain abnormality. A neurosurgeon was consulted, and a differential diagnosis was performed. Blood pressure and heart rate were within the normal ranges, which is atypical of increased intracranial pressure, and bilateral muscle powers were normal. The patient’s consciousness level was E2V2M5-6 according to the Glasgow Coma Scale; therefore, the delivery operation was prioritized and a CT scan was arranged immediately postpartum.

With and without contrast brain CT scans revealed a large tumor (8.3 × 6.8 × 7.1 cm³) in the left frontal region with mass effect, thickening of the adjacent skull base, and perifocal edema (Figures 1A and 1B). After the CT examination, the patient was transferred to the neurosurgical intensive care unit without extubation of the endotracheal tube. The patient was observed over a 2-day recovery period, and her imaging workup was completed. Magnetic resonance imaging (MRI) revealed a large hypervascular parasagittal meningioma (Figures 1C and 1D). Subsequently, a cerebral angiogram was performed, followed by transarterial embolization to decrease the blood supply to the tumor. After completing the imaging studies, a craniotomy was arranged to remove the parasagittal meningioma. The patient received an intravenous infusion of 100 g of mannitol and 10 mg of decadron to manage the tumor-induced increased intracranial pressure and vasogenic edema. A wide, standard, cross-midline, left craniotomy was performed to provide an adequate surgical field for dissection. The parasagittal hypervascular tumor was identified, and its attachments to both the dura and the falx were determined. A peritumoral plane was identified after the debulking procedure on the central tumor mass, and the tumor was carefully dissected. No vessels supplying blood to the brain parenchyma were sacrificed. Substantial blood loss was noted from the location of the tumor attachments to the superior sagittal sinus. Vital signs were maintained stable. The pathological reports of the fresh frozen tumor confirmed meningioma. A gross total resection of the tumor was performed. The tumor had invaded the adjacent skull base; hence, instead of returning the original bone graft to the craniotomy site, it was sent to the pathology department for investigation. Bone cement was used for cranioplasty. Subsequently, the patient was then admitted to the neurosurgical intensive care unit for close postoperative observations. The pathology reports confirmed a meningothelial meningioma characterized by proliferation of neoplastic cells in a syncytial pattern, Figure 2 (A) Hematoxylin and eosin stained images of a tumor section at 200× magnification. Microscopically, sections showed meningothelial meningioma characterized by neoplastic cell proliferation in a syncytial pattern, displaying meningothelial appearance with whorled or lobulated architecture, round to oval nuclei with dispersed chromatin, inconspicuous nucleoli, and eosinophilic cytoplasm. The mitotic activity was infrequent (<4/10 high-power fields). (B) Immunohistochemical stained images for the progesterone receptor revealed diffuse strong positive immunoreactivity. (C) Immunohistochemical stained images revealed Ki-67 index of <4% (only focal immunoreactivity).
displaying meningothelial appearance with whorled or lobulated architecture, round to oval nuclei with dispersed chromatin, inconspicuous nucleioli, and eosinophilic cytoplasm. The mitotic activity was infrequent (<4/10 high-power fields; Figure 2A). The overlying bone was directly involved with the tumor. Immunohistochemical study for the progesterone receptor demonstrated diffused strong positive immunoreactivity (Figure 2B). The immunohistochemical study revealed a Ki-67 index of <4% (only focal immunoreactivity; Figure 2C). The patient showed complete neurological recovery and no adverse side effects or complications.

3. Discussion

We present a case of a large parasagittal meningioma manifesting as a neurologic crisis during late pregnancy. Brain CT scans confirmed the diagnosis immediately after a cesarean section operation. A craniotomy for total excision of the tumor was performed 2 days after the cesarean operation, followed by MRI and angiography of the tumor. Excellent outcomes were obtained for both the mother and the infant.

Diagnosing brain tumors in pregnant women is difficult because the tumor-associated symptoms, including nausea, vomiting, general malaise, and urinary incontinence, are usually nonspecific and are observed among pregnant women with an enlarged gravid uterus.2,3 The effects of brain tumors are often masked by the coexisting intrauterine gestation; thus, the pathological symptoms of tumor compression are considered common physiological changes during pregnancy.4 However, the possibility of neurological or other disorders should be considered in patients with excessive and persistent symptoms accompanied with disturbances in consciousness. The principle of "do no harm" must be upheld in treating brain tumors during a pregnancy.2,5 Safety of both the fetus and the mother should be of paramount concern. If the mother’s condition is stable, delivery of the healthy fetus should be the first priority during the late third trimester, when the fetal lungs are close to maturing. The risk of maternal death is higher in such cases compared with nonpregnant females undergoing similar surgeries.

Both estrogen and progesterone and their receptors promote meningioma growth.1 Meningioma may exhibit an accelerated growth during the second half of the pregnancy and may result in clinical symptoms and signs either prior to or soon after the delivery.2 One report described a pregnant woman with confusion and auditory hallucinations 1 day after a cesarean delivery; she was diagnosed with meningioma on the basis of a CT scan analysis and was successfully treated with medications and surgical interventions.3 The aforementioned study concluded that completing a systematic neurological examination is essential, specifically for women in their third trimesters presenting with atypical psychiatric symptoms, and imaging studies should be completed to rule out intracranial lesions.3

In addition, although vomiting and nausea are common during the first trimester of a pregnancy, most women are affected by these symptoms in the 5th—7th week of their pregnancies; these symptoms generally cease around the 15th—16th week.4 Our patient experienced these symptoms excessively throughout the term of her pregnancy. However, having experienced similar symptoms during her first pregnancy, she and her family considered these symptoms normal.

Generally, the appropriate treatment course for such patients is to first confirm the presence of a brain tumor through CT prior to the cesarean section operation, followed by an emergent craniotomy for removing the brain tumor. In our case, we obtained normal values for bilateral muscle power, blood pressure, and heart rate, which are atypical signs of increased intracranial pressure; these atypical presentations made diagnosing the intracranial tumor difficult. However, the anesthetist noticed anisocoria. Therefore, the delivery was prioritized because of the short duration of a typical cesarean section (<30 minutes). A CT scan was arranged immediately postpartum; it revealed a large brain tumor in the left frontal parasagittal area. The problems faced by the neurosurgery team included potential diffuse intravascular coagulopathy and postpartum hemorrhage together with the inevitable intraoperative blood loss caused by the craniotomy for tumor removal. MRI and cerebral angiography revealed the hypervascular nature of the tumor and its location across the midline and encroaching on the superior sagittal sinus, suggesting a parasagittal meningioma. An immediate surgery could not be performed because of the potential diffuse intravascular coagulopathy and postpartum hemorrhage, the expected operation time, and the complex nature of the surgery, including the duration of the general anesthesia, possible postoperative complications, hyperostosis of the skull bone and its invasion, and destruction of the tumor.

In summary, correct diagnosis, careful preoperative preparations, appropriate timing, and meticulous surgical techniques are critical for successfully managing such patients.

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