

CASE REPORT

Left hemiparesis due to space-occupying lesion in pregnancy

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Article Info	ABSTRACT
Received Apr 21, 2024 Revised May 20, 2024 Accepted May 31, 2024 Published Aug 1, 2024 *Corresponding author: Luminto luminto89@gmail.com Keywords: Left hemiparesis Obstructive hydrocephalus Space occupying lesion (SOL) Brain tumor Pregnancy Maternal health	Objective: The objective of this study was to present the findings from cases of space-occupying lesions (SOL) that were diagnosed late in pregnancy. This case report aimed to highlight the importance of considering space-occupying lesions as a differential diagnosis in instances of hemiparesis during pregnancy, thereby raising clinical awareness and improving diagnostic accuracy. Case Report: A female patient aged 30 years in 34-week pregnancy came with complaints of slurred speech since 3 months before entering the hospital accompanied by weakness in the left limbs since 3 months before admission. The patient felt weak and fell in the bathroom 2 times, at the office and at home. The patient had a history of taking aspilet for 1.5 months due to a misdiagnosis as a stroke in a type B hospital and stopped when she came to the obstetric emergency room at a type A hospital for the first time. Cardiothoracograph examination shows a picture of a silent baby. Computed tomography (CT) scan examination showed a picture of hydrocephalus. Conclusion: To date, it has not been proven that pregnancy triggers brain tumors. However, increased blood supply to the brain during pregnancy may lead to tumor growth. This is also evident in this case where there is an increase in maternal blood volume and subsequent cerebral blood flow, causing an increase in the size of the SOL. On the other hand, there is no evident that brain tumors directly harm the fetus, though fetal hypoxia may occur indirectly due to maternal respiratory failure.

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Highlights:

1. Present a case report detailing the diagnosis and management of a space-occupying lesion identified late in pregnancy.
2. Current studies consistently indicate that the optimal period for tumor removal during pregnancy is the second trimester, balancing maternal and fetal outcomes. This case report contributes to the existing literature by providing a practical reference for managing space-occupying lesions in accordance with the latest evidence.



INTRODUCTION

There are several differential diagnoses of hemiparesis such as hemorrhagic stroke, ischemic stroke and space occupying lesion (SOL). In a systematic review and meta-analysis of 11 studies published between 1990 and January 2017, the incidence of ischemic and hemorrhagic strokes in pregnancy was reported at 30 per 100,000 pregnancies—three times higher than the incidence observed in non-pregnant females aged 15 to 44 years. Specifically, 12.2 per 100,000 pregnancies were affected by ischemic and hemorrhagic strokes. Hemorrhagic stroke during pregnancy has a fatality rate of 13.9% compared to ischemic stroke during pregnancy, which is 3.4%. Intracranial hemorrhage is the leading cause of maternal stroke death, and residual impairment is higher in hemorrhagic stroke (50%) than ischemic stroke (33%) episodes in pregnancy.^{1,2}

Brain tumor prevalence appears to increase significantly during pregnancy; however, precise prevalence data are currently lacking. Pituitary tumors, meningiomas, gliomas, and breast cancer metastases are the most common tumors. Women experience meningiomas at a rate around twice as high as men's. Specifically, intracranial meningiomas are twice as common and intraspinal meningiomas nine times as common in females. Meningiomas also appear to be influenced by sex hormones, as these tumors develop more quickly during pregnancy and during the luteal phase of the menstrual cycle. Pituitary tumors are more common in women, especially during the child-bearing years, and make up around 15% of all primary intracranial neoplasms. The female preponderance of these tumors is due to the increased frequency of prolactinomas in women in the second and third decades. Women account for 78% of all prolactinomas and are affected four times more frequently than men.³

Intracranial space occupying lesion (SOL) is a substantial physical lesion within the intracranial space that can cause progressive neurological disorders. Intracranial SOL can be in the form of cerebral contusions, hematomas, infarctions, abscesses, and tumors that grow in the intracranial space. SOL in the intracranial space can increase intracranial pressure. Symptoms or clinical manifestations of SOL arise based on the site of predilection. Hemiparesis that arises as a manifestation of SOL that occupies cranial space is related to the corticospinal tract which allows the right cerebral hemisphere to innervate most of the functions of the left side of the body and vice versa.^{4,5}

SOL during pregnancy poses a number of difficulties for neurosurgeons, obstetricians, and anesthesiologists,

including difficulties in diagnosing the condition and difficulties in perioperative management since it necessitates careful planning to balance mother and fetal well-being. This requires modifying neuroanesthesia and obstetric practices which often have competing clinical goals of achieving optimal safety for the mother and fetus.⁶

The aim of this study was to report the findings of a case of space occupying lesions that were diagnosed lately in pregnancy so that this case report was expected to provide awareness not to exclude space occupying lesions as one of the differential diagnoses if hemiparesis is found during pregnancy. In addition, how to manage cases of space occupying lesions that arise during pregnancy, consisting of treatment options for the first trimester, second trimester and also third trimester.

This report also discussed evidence that installing a VP shunt in patients can improve the patient's clinical condition. As has been recognized, installing a VP shunt is to reduce the intracranial pressure. The shunt allows some fluid to drain from the brain to a different part of the body. By reducing some of the symptoms it may make the patient feel better.

CASE REPORT

The patient was referred from a type B hospital. She was 30 years old with G1P0A0 34 weeks pregnancy, visited the obstetric emergency room at a type A hospital on April 8 2023 and complained of a left hemiparesis which began with a tingling sensation 3 months before admission to the hospital. The patient also complained of slurred speech and blurry vision. All these complaints had never been felt by patients before. The patient's family also never had complaints. The patient had regular sleep patterns, did not have history of smoking or drinking alcohol and taking any long-term medication/drugs. The patient had a history of taking aspilet for 1.5 months due to a misdiagnosis as a stroke at a type B hospital and stopped when she came to the obstetric emergency room at a type A hospital for the first time. The patient had a history of falling twice, at the patient's home bathroom and also at the patient's office bathroom. Based on the results of the physical examination, the patient appeared mildly ill with sound consciousness. On motor examination, the patient experienced decreased muscle tone and decreased motor function in the left limb. After the CTG examination, there was a picture of a silent baby so this could not be assessed ([Figure 1](#)).

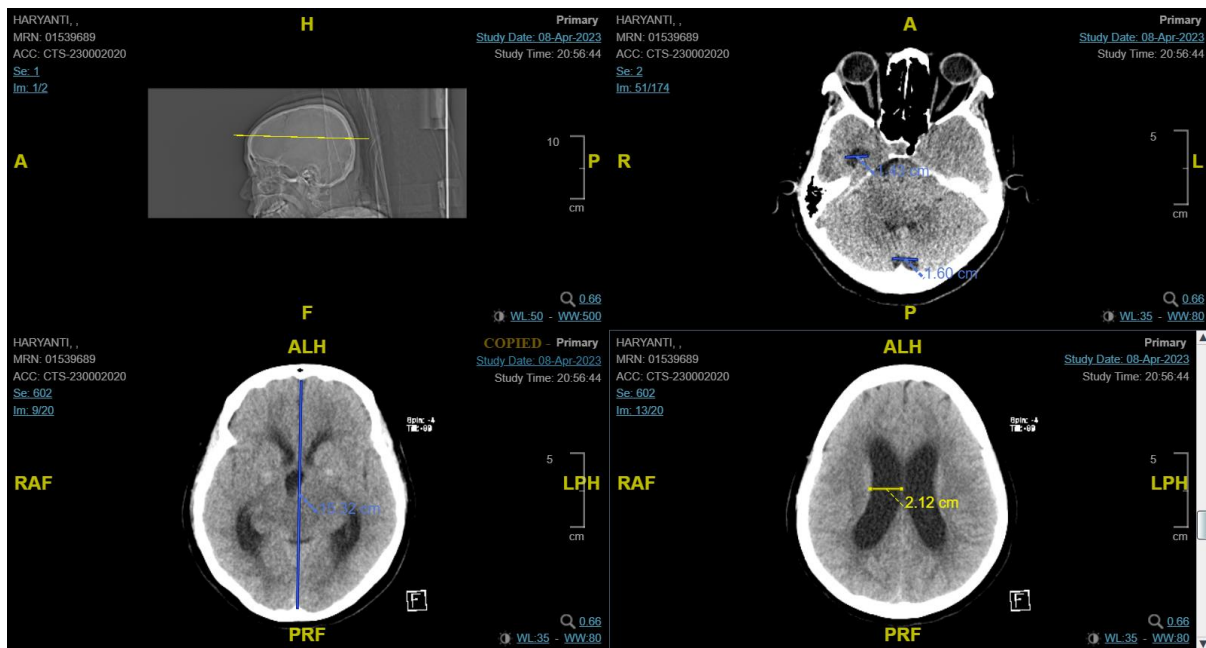


Figure 1. Computed tomography scan results taken on April 8, 2023.

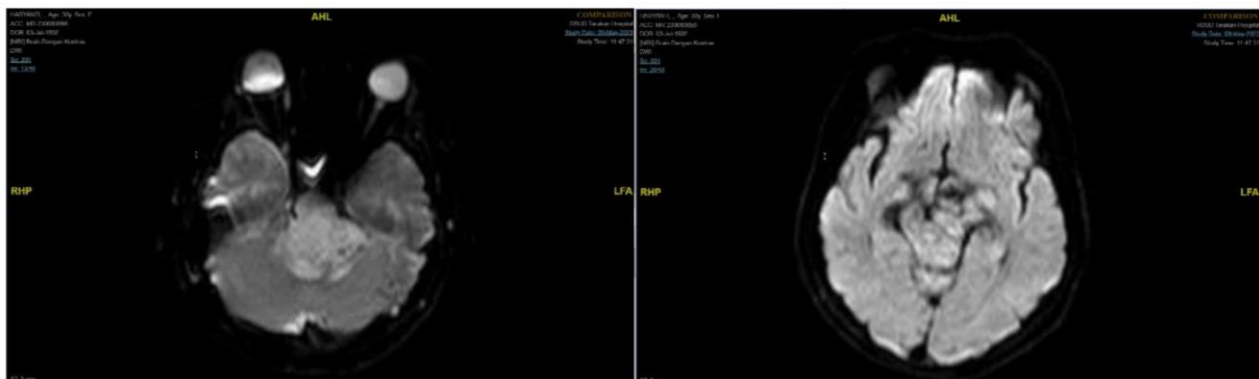


Figure 2. Magnetic resonance imaging results taken on May 9, 2023.

CT scan examination showed that there was a profile of hydrocephalus in the patient. The results of the CT scan showed that there was SOL in the anterior fossa of the right hemisphere, a mild shift to the left, and widening of the midline structure.

MRI showed that there was an hyperintensive lesion in the left CPA region that pressed the III ventricle and the bilateral lateral ventricle. Both the orbits, the paranasal sinuses, and the mastoids did not seem to differ. The bones seemed crumbling (Figure 2).

However, CT scan cannot accurately diagnose lesions in the posterior fossa and spine, and also has a lower resolution than magnetic resonance imaging (MRI). The MRI to this patient was challenging because it was performed after delivery, so that there were safety precautions for both the mother and the baby, in addition to higher cost than the CT scan.

The differential diagnosis of this patient was hemorrhagic stroke and infarction stroke. As might be predicted, the area of the brain injured by an insult determined the symptoms of a stroke. It is possible to experience speech and vision problems, numbness, and

also weakness. Furthermore, alterations in mental state may indicate hemorrhagic as well as ischemic infarctions. Although there are not many strokes among women of childbearing age generally, pregnant women and those who have recently given birth are more vulnerable because of a variety of factors that affect the body's coagulation and circulatory hemodynamics.

The patient underwent a caesarean section operation and then a VP shunt was placed for the indication and prevent worst obstructive hydrocephalus. After the action was taken, the hemiparesis complaints reduced and postoperatively it was continued with the installation of a ventilator for indications of respiratory failure and physiotherapy rehabilitation was carried out by the patient with walking exercises. Recommendations for a diet rich in protein and vitamins, including egg whites, free-range chicken, vegetables, and fruits, were implemented. On April 17, 2023, the patient regained the ability to walk, though gait was unsteady, and discharge was deemed appropriate. By April 28, 2023, the left-sided hemiparesis had shown improvement, although mild hemiparesis and tingling persisted in the patient's left upper and lower legs. Speech articulation remained somewhat impaired.

DISCUSSION

During pregnancy, the hormone human chorionic gonadotropin is produced which can increase the levels of vascular endothelial growth factor (VEGF) which functions as a factor for the formation of new blood vessels in the fetus. During pregnancy, an increase in VEGF is associated with an increase in blood supply to various organs of the body, one of which is the brain. According to research conducted by Yust-Kazt et al, there is an increase in blood volume in the mother. This increases the blood supply to the brain as well as the size of brain tumors. Until now, it has not been proven that pregnancy can cause brain tumors. However, there is evidence that there is an increase in the size of brain tumors in pregnancy due to the increased blood supply to the brain, and vice versa. At this time, it has not been proven that brain tumors can cause harm to the fetus. The mechanism that may occur is indirect fetal deterioration, the mechanism of respiratory failure which causes fetal hypoxia.⁷⁻⁹

The most common brain tumor in the cerebellopontine angle (CPA) is the vestibular schwannoma, which accounts for 75-85% of brain tumors. In pregnancy, the incidence of this tumor is 2.0-3.2 per 100,000 women. The CPA is a triangular space in the posterior cranial fossa that borders the tentorium superiorly, the brainstem posteromedially, and the posterolateral

portion of the temporal bone. These tumors mostly occur at the age of 40-60 years. Other tumors that can grow in CPA are meningioma, epidermoid, lipoma, arachnoid cyst, glomus tumor, and choroid plexus tumor. Although the exact cause of these tumors is not yet known, one theory links the presence of these tumors with the addition of the progesterone receptor.^{10,11}

It is yet unknown what causes faster tumor growth during pregnancy. There are two dominant theories, though. First, the expansion of blood vessels during pregnancy as a result of the increased blood volume causes an increase in tumor size. Second, progesterone and estrogen receptors' direct hormonal effects on the body's receptors mediate tumor growth. The levels of estrogen receptor expression and patient age, sex, or tumor size were not clearly correlated in a study of 16 vestibular schwannoma. Nevertheless, it was concluded that antiestrogen therapy might prove to be an effective treatment option given that it has been linked to decreased proliferation and increased apoptosis.^{12,13}

The left hemiparesis in the patient in this case was suspected by the presence of suspected vestibular schwannoma SOL in the left cerebral hemisphere which then inhibited the corticospinal tract so that it could inhibit motor control which could then result in left hemiparesis of the body. On the CT scan imaging, an isodense image was found on the left CPA which then pressed the IV ventricle and lateral ventricles. On MRI there was a hyperintense solid mass in the CPA region of the left cerebral hemisphere. The presence of SOL can cause pressure on the lateral ventricles and bilateral IV ventricles which can give a picture of hydrocephalus in the brain. The patient underwent a VP shunt.

When a vestibular schwannoma is detected or becomes worse during pregnancy, there may be competing risks and advantages for both the mother and the fetus. The best course of action for both the mother and the fetus is close monitoring, followed by delivery and tumor removal. The second-best course of action is to give birth to the child if it is sufficiently late in the third trimester, then quickly remove the tumor. The possibility of increasing intracranial pressure during phase 2 of vaginal birth makes cesarean delivery the recommended option. Several authors have reported cases of spontaneous vaginal delivery before tumor resection, but the risks remain uncertain.^{11,14-16}

Due to the effects of general anesthesia, undergoing surgery in the first trimester poses the fetus with the greatest risk, because it will cause contraction of the womb. Therefore, the chance of spontaneous abortion is significantly decreased if surgery can be scheduled until

after the first trimester. If mass effect causes obstructive hydrocephalus, a VP shunt can be implanted to delay primary surgery until late in the pregnancy. A VP shunt enables sustained cerebrospinal fluid (CSF) drainage and requires far less time during anesthesia and surgery than tumor excision does. Despite best efforts, surgical resection during pregnancy is sometimes necessary.^{11,17,18}

If a tumor needs to be removed when a woman is pregnant, the second trimester is the optimum period for both the mother and the fetus because general anesthesia surgery is safer at this time for both of them. A VP shunt can be implanted to postpone tumor excision until after delivery if hydrocephalus is present. Primary resection, however, should be strongly considered if it is early in the second trimester and there is concern that the patient may need tumor removal while pregnant.^{11,17-20}

Women are mostly at risk from surgery during the last trimester of pregnancy. This risk is likely due to hemodilution, decreased functional residual respiratory capacity, increased oxygen consumption which predisposes to hypoxemia, and swelling of the airway capillary veins. If obstructive hydrocephalus is present, a VP shunt may be placed to delay tumor resection until after delivery. The risk to the mother and fetus is lower if the tumor is removed surgically after the baby is delivered if it is discovered too late in the pregnancy. Appropriate therapy is critical when there is a large symptomatic tumor associated with elevated intracranial pressure and hydrocephalus. According to a case report in Scotland, a large acoustic neuroma was successfully removed during the third trimester without endangering the woman or fetus. The optimal strategy is CSF drainage prior to emergency cesarean delivery, immediately followed by tumor resection. To allow for the recovery of hemodynamic stability, resection might be postponed for a few days to a week. However, a case report in India described a case where a cesarean delivery was followed immediately by surgical resection, and both mother and baby recovered smoothly.¹¹

The strength of this study is that reporting a case of "late diagnosed" space occupying lesion in pregnancy makes us aware and increases our awareness of hemiparesis complaints so that we can include space occupying lesion as one of the differential diagnoses, and this case report provides overview on the management of patients with space occupying lesion during pregnancy. The limitation of this study was, as this was a case report, it did not study the risk factors for space occupying lesion in pregnancy and it did not

study whether pregnancy can trigger space occupying lesion.

CONCLUSION

The left hemiparesis in the patient was suspected by the presence of SOL in the left cerebral hemisphere which then blocked the corticospinal tract so that it inhibited motor control which resulted in weakness in left body movements. On CT scan imaging it was not clear where the lesion was in the cerebral hemispheres, but the location of the lesion can be estimated, namely in the primary motor cortex and primary somatosensory cortex. It was also suspected that SOL in the patient also pressed the facial nerve (CN VII), which innervates the majority of the face. Lesions to these cranial nerves can cause symptoms like Bell's Palsy. Until now, it has not been proven that pregnancy can trigger a brain tumor. However, there is evidence that there is an increase in the size of brain tumors in pregnancy due to increased blood supply to the brain. Evidence that SOL can affect pregnancy was supported by an increase in blood volume in the mother's body followed by an increase in blood supply to the brain, causing an increase in tumor size. Likewise, it is currently not proven that brain tumors can cause harm to the fetus. The mechanism that may occur is indirect fetal deterioration, namely the mechanism of respiratory failure which causes fetal hypoxia.

DISCLOSURES

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Conflict of interest

The authors declare that they have no conflict of interest regarding the publication of this case report.

Patient consent for publication

Written informed consent for the case to be published (including CT scan results images, MRI results images, case history, and data) was obtained from the patient for publication of this case report.

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Author contribution

All authors have contributed to all processes in this research, including preparation, data gathering and analysis, drafting and approval for publication of this manuscript.

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