

HYPERTENSIVE INTRACRANIAL HAEMORRHAGE IN ADVANCED PREGNANCY: A RARE CLINICAL ENTITY

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Abstract

A young pregnant women in her third trimester presented with loss of consciousness and drowsiness. She was diagnosed with hypertensive brain haemorrhage. Both mother and foetus could be saved with emergency lower segment caesarean section and conservative management for brain haemorrhage. At three months follow-up, the mother showed no neurological deficits. Pregnancy can be an important risk factor for stroke. Post-partum state and peri-partum state, are the commonest phases when intracranial haemorrhage can occur. Brain haemorrhage during these phases cause maternal and foetal mortality. Stroke (infarct and haemorrhage) is a rare entity in pregnancy. Brain haemorrhage may be subdivided into intracranial haemorrhage, subdural haemorrhage and subarachnoid haemorrhage. The risk factors for mother and foetus are obvious. The management may be medical, surgical, endovascular or radiological. The selection of the treatment depends upon the type of haemorrhage, the stage of pregnancy, the maternal and foetal status, associated co-morbidities and vascular findings. Pregnancy should not preclude the investigation and treatment options available. A treatment decision should be taken keeping in mind the maximum benefit to mother and foetus. Brain haemorrhage in pregnancy is a rare presentation with significant mortality and poor prognosis. One needs to be aware of the treatment options available and have no hesitancy in proceeding with the treatment.

Keywords: Intracranial Haemorrhage; Subdural Haemorrhage; Subarachnoid Haemorrhage; Endovascular Treatment; Radiosurgery; Angiography.

Introduction

Pregnancy can be an important risk factor for stroke. The risk factor is higher in pregnant women compared to non-pregnant women. Commonly, post-partum state followed by peri-partum state, are the commonest phases when intracranial haemorrhage can occur. Pregnancy-induced hypertension, sinus thrombosis, aneurysms and arteriovenous malformations are most often associated with these haemorrhages. Brain haemorrhages during these phases are responsible for mortality in women as well as foetus.¹

Case report

This 25-year-old young woman presented with sudden onset of loss of consciousness and was drowsy, and arousal, but slept again quickly. She was highly disoriented while awake and had psychosis. The women also had 36 weeks of pregnancy with no history of raised blood pressure, oedema, seizures, or head-

aches. The blood pressure (180/100 mm Hg) and heart rate (98/minute) were raised.

She was diagnosed with an intraventricular brain haemorrhage on CT investigation of brain (*Figure 1*) with associated hydrocephalus.

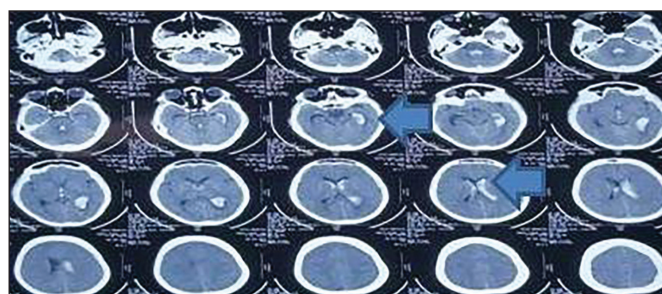


Figure 1. Intracranial haemorrhage with intra-ventricular extension in pregnant women.

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The glucose level was within normal range and CT angiography was normal. Besides mild anaemia and dyslipidaemia, her investigations (renal and liver functions, bleeding profile, Protein C and Protein S, D-Dimer, ANA, ANCA, APLA) were normal. The infant was rescued through urgent lower segment caesarean section (LSCS). For external ventricular drainage and ventriculo-peritoneal shunt, neurosurgery was recommended; however, this was denied since high-risk consent was required. The woman was initiated on conservative treatment (acetazolamide and dexamethasone) for intracerebral haemorrhage (ICH).

After a few days she showed improvement and gradually the brain haemorrhage showed resolution. As her consciousness improved and drowsiness reduced, she had symptoms of headache and vertigo. No limb movement weakness was observed. Over the next few days, she improved further clinically and on radiological testing (*Figure 2*) and could be discharged.

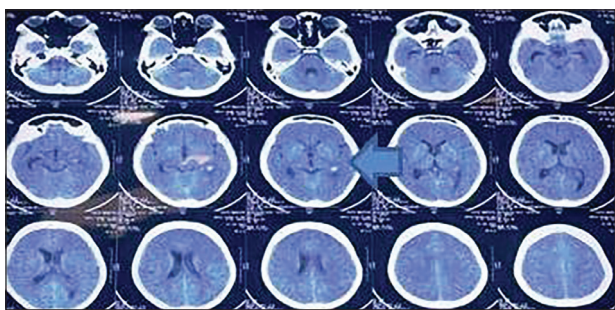


Figure 2. Intracranial haemorrhage with intraventricular extension in pregnant women – resolving.

The patient was discharged after 15 days on antibiotics, antiepileptic medicines, antihypertensive medicines, angioedema measures and other supportive care. These were gradually tapered on OPD basis except antihypertensives. On OPD follow-up at three months she had no weakness or slurred speech. Her follow-up CT scan was normal (*Figure 3*).

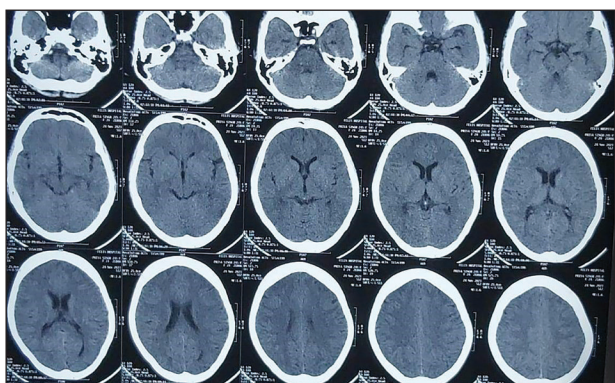


Figure 3. Intracranial haemorrhage with intraventricular extension in the pregnant women- completely resolved at three months.

Discussion

Haemorrhagic stroke accounts for one-third to one-half of strokes in young adults of age group 20 and 44 years. Pregnancy, a gender-specific risk factor, plays a prominent role in women. A stroke in pregnancy, whether ischemic or a haemorrhagic, albeit rare, can have severely devastating prognosis and long-term disabilities, for both the mother and the child, when present. Only 9 to 26 per 1,00,000 pregnancies and deliveries are complicated by stroke. Brain haemorrhage contributes to 35-60% of these patients. The risk of stroke rise in pregnancy and can stay high up to at least six to 12 weeks of postpartum period. The haemorrhage can be intraparenchymal haemorrhage, extradural haemorrhage, subdural haemorrhage, and subarachnoid haemorrhage. The aetiologies and comorbidities in young women are different in pregnancy and post-partum state. Stroke in pregnancy and post-partum state represent a unique pathophysiological entity.¹⁻⁴

ICH is a common brain haemorrhage. Vascular anomalies e.g. arterio-venous malformation, coagulopathy, hypertension, preeclampsia/eclampsia (25-45% cases) are the most common causes of intracranial haemorrhage.^{2,3} Blood pressure needs good control while maintaining the placental perfusion. Caesarean section is preferred for foetal well-being but vaginal delivery is not completely excluded. Those brain haemorrhages with no aetiology detected are known as 'spontaneous haemorrhage'.³

Extradural haemorrhage is commonly caused by trauma. Skull fracture and middle meningeal artery rupture are common associated features.³ It is an important cause of fatality. The obvious risk to maternal and associated foetal life can be considerable.^{3,5}

Acute subdural haemorrhage is commonly caused by traumatic brain injury or aneurysmal rupture. Chronic subdural haemorrhage is uncommon in pregnancy. However, there are reports where this has been a result of spinal or epidural anaesthesia. Subarachnoid haemorrhage may occur in pregnancy at a possible frequency of 0.01-0.03%. The risk can increase with advancing age of gestation. The clinical presentation most commonly remains poor neurological sensorium, severe headache and vomiting. CT scan remains the investigation of choice in acute conditions even though one might be tempted towards MRI in view of pregnancy. If the illness has had a prolonged course, MRI may be preferred. A CT angiography or a Digital subtraction angiography (DSA) may be needed to rule out aneurysms. Endovascular and surgical treatment options are available for treatment of subdural haemorrhage. One needs to remember that arterial spasm can lead to ischaemic deficits. Because of the risk of radiation, patients and family should always be counselled when taking up for the scans.³

The pregnant females have a physiology that differs from the non-gravid women. Volume and location of bleeding are probably the most important prognostic factors of intracranial haemorrhage in pregnancy. Maternal presentation, maternal age, gestational age and foetal status also play a crucial role in determining the outcome.²

Pathophysiology of Stroke and ICH in Pregnancy^{2,3}

The pregnant females have a physiology that differs from the non-gravid women as mentioned below

- a. Hyper-coagulable state
- b. Increased fluid volume: The blood volume gradually increases by 50% of normal till about 32 weeks.
- c. Cardiac output: Increases by 30-50% till 24 weeks of gestation
- d. Vascular remodelling: Vascular tone falls and the blood pressure decreases. The mean arterial pressure increases up to 20% during uterine contractions.
- e. Blood-brain barrier (BBB): It maintains the internal milieu of the brain. The transition of water into the brain is maintained thereby avoiding cerebral oedema. The alteration in the BBB permeability in pregnancy, if blood pressure is raised, can cause cerebral oedema. Cerebral autoregulation may be attributed towards a decrease in cerebral blood flow by almost 20 % in pregnant ladies.

These hemodynamic variables return to normal levels by 24 hours after delivery.

A low incidence of stroke in pregnancy does not allow the creation of standard management guidelines. Most of the care is based on expert opinion. While the basics of management remain constant between pregnant and non-pregnant women, maternal status and gestational age should be taken into consideration.²

A multidisciplinary team is needed for the management of these patients that involves a neurologist, a neurosurgeon, an obstetrician, a paediatrician, a physiotherapist, an intensivist etc. The treatment in these females can be challenging especially due to the restriction of the medications and investigation modalities during the gravid status.²

The assessment of mother and foetus is essential. The maternal hemodynamic status is directly in conjunction with foetal wellbeing. Management of brain haemorrhage before 26 weeks of gestation should focus predominantly on maternal health. Management at or after 34 weeks of gestation needs to address foetal as well as maternal needs. Between 26 and 34 weeks of gestation, management needs to be individualised. A delivery, with a good neonatal setup, may

be considered before the brain surgery. However, delivery may be delayed in significantly preterm foetus if maternal neurological status allows.²

Medical management remains the first line of treatment in the third trimester of pregnancy.² Most of these patients present in the third trimester.² The priority should be controlling the blood pressure (labetolol, methyldopa and long-acting nifedipine) to less than 140/90 and correcting coagulopathies. In view of foetal complications, ACE inhibitors and ARBs should not be prescribed.^{2,7}

While CT head remains the modality of choice in these patients, MRI can be utilized for decision making regarding need of surgery. The imaging confirmation of brain haemorrhage should be followed by an angiography (MRI based-time of flight angiography or CT angiography). Pregnancy should not be regarded as contraindication for angiography. If suitable expertise is available endovascular treatment should be initiated as soon as possible.^{2,7}

In cases of aneurysm, while a ruptured aneurysm should be treated urgently, unruptured cerebral aneurysm can be treated in the post-partum period if the neurological and overall clinical status is stable. In case an arterio-venous malformation is found, the treatment option needs to be individualized. For unruptured arterio-venous malformation, control of blood pressure and treatment of neurological symptoms with or without surgical intervention should be considered. For low-grade symptomatic arterio-venous malformation surgical resection is the treatment of choice. High-grade arterio-venous malformation require endovascular surgery or radiosurgery.⁷

Maternal and foetal safety and outcomes should be considered throughout the management. While the benefits of concurrent caesarian delivery cannot be overemphasized, if the timing of brain haemorrhage corresponds to pre-viable gestational age then treatment should proceed as it would outside of the context of pregnancy to maximize maternal safety and outcomes.⁷

Brain haemorrhage in pregnancy is a rare event but it can cause significant maternal (7 to 10 percent) and foetal morbidity and mortality. Brain death and persistent vegetative state in pregnancy secondary to brain haemorrhage can have not only medical challenges but also ethical and legal challenges. Parturition needs support with severe maternal impairment.³ A good maternal support may lead to a good foetal outcome. It is preferred to attain a gestational age of 32 weeks. However, viable infants can survive from 24 weeks. Therefore, maternal support should be considered when gestational age is more than 10 weeks. Since maternal support is experimental, considering the therapy can have ethical, legal and financial issues.⁶

Conclusion

Brain haemorrhage in pregnancy is a rare presentation. Hence, treatment guidelines are not yet formulated and most of the treatment is based on expert opinion. The prognosis of the patients can be a drastic one with a significant number of patients developing mortality. Therefore, one needs to be aware of the investigation and treatment options available for brain haemorrhage in pregnancy. Management may be medical or surgical, but pregnancy should not preclude treatment. Newer modalities of treatment for aneurysms and other causes of intracranial haemorrhage should be considered when available. Maternal and foetal well-being need to be considered. There are ethical, emotional, legal and financial concerns given foetal and maternal well-being. Therefore, the treatment of these patients should be closely monitored for the best possible outcomes.

Editor's comments

Pregnancy can be an important risk factor for stroke. Post-partum state and peri-partum state, are the commonest phases when intracranial haemorrhage can occur. Brain haemorrhage during these phases usually causes maternal and foetal mortality. Haemorrhage can manifest in various forms such as intracranial, subdural, or subarachnoid, each with its own set of challenges and potential complications. Effective management of such cases requires a multidisciplinary approach involving obstetricians, neurologists, neurosurgeons, and other specialists as needed. Treatment options may include medical management to stabilize the patient, surgical interventions when appropriate, endovascular procedures, or radiological

interventions depending on the specific circumstances of the case. Given the rarity of stroke in pregnancy, much of the management is based on expert opinion and consensus recommendations rather than guideline

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