

Case Report

Intracranial Hemorrhage in Pregnancy: Case Report and Review of Literature

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Abstract

Intracranial hemorrhage is a rare, yet potentially devastating event in pregnancy. There is a risk of maternal mortality or morbidity and a significant risk to the unborn child. The risk of haemorrhage increases during the third trimester and is greatest during parturition and the puerperium.

We report a dramatic case of a 33-year-old primigravida 38 weeks by gestation complicated by eclampsia and intracranial hemorrhage with cerebral mass effect. She was managed by an emergency cesarean section and craniotomy but without desirable results, we were able to save the patient, she died on day 2. The publication and discussion of such cases should give a better insight into pre-eclampsia and its life-threatening complications.

Keywords: Intracranial hemorrhage; Eclampsia; Intraparenchymal hemorrhage

Introduction

Cerebrovascular complications of pregnancy are caused by physiological cerebrovascular changes and/or preexisting disease, the intracranial hemorrhage is the deadliest complication, The risk of haemorrhage increases during the third trimester and is greatest during parturition and the puerperium. Incidence of pregnancy-related stroke is approximately 34 strokes per 100,000 deliveries; however, incidence is reported to vary by ethnicity.

Case Report

We report the case of a 33-year-old primigravida 38 weeks by gestation who was admitted to the hospital in an unconscious state. According to her relatives, she had a severe headache without history of fits or trauma in the past and no significant medical history.

On examination, her vitals were: pulse rate: 92/min, blood pressure: 190/110mm Hg, respiratory rate: 19/min, and oxygen saturation (SpO₂): 96%.

The Obstetrical examination finds uterine size corresponding to the period of amenorrhea, fetal heart sounds present, regular @150bpm complete blood count, platelet count, liver and renal function test, uric acid, Lactate Dehydrogenase (LDH) levels, and Electrocardiogram (ECG) were normal.

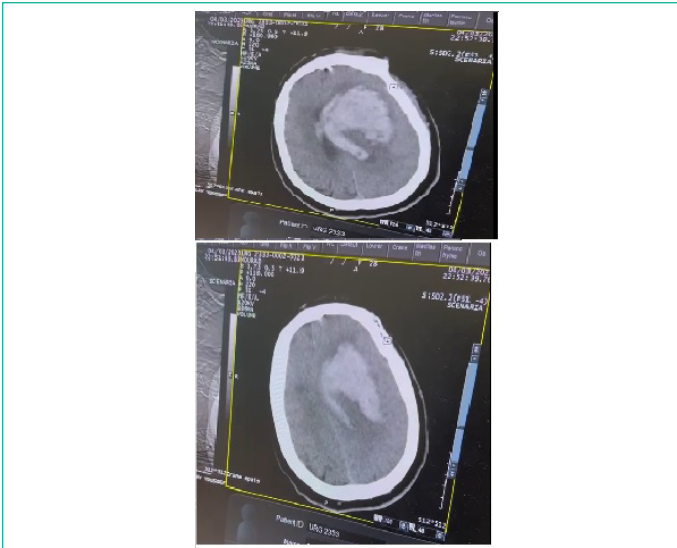
The patient was given intravenous nicardipine for hypertension and magnesium sulphate for convulsions. Her cervical score was unfavorable; she was taken up for an emergency cesarean section after stabilizing the patient. A healthy female baby of 3000g was delivered. Postoperatively, the patient was shifted to ICU for a low Glasgow coma score, a CT angiography (Figure 1) showed the patient was shifted for an urgent craniotomy where a decompressive surgery was done but unfortunately, the prognosis was poor. The patient's death was stated on postpartum day 2.

Discussion

Intracranial Hemorrhage (ICH) is a rare, yet potentially devastating event in pregnancy. There is a risk of maternal mortality or morbidity and a significant risk to the unborn child. The risk of haemorrhage increases during the third trimester and is greatest during parturition and the puerperium [1].

There is a different type of ICH:

– Extradural haemorrhage: there is a Traumatic- skull fracture and injury to the middle meningeal artery. The Primary brain damage is usually minimal and the prognosis is good with timely surgical treatment. The Presentation is usually precipitous with rapidly deteriorating conscious state and urgent op-



erative treatment is mandatory.

- **Subdural haemorrhage:** the haemorrhage is below the dura and it is a result of severe traumatic brain injury, it carries poor prognosis. The epidemiology and the treatment of this injury in pregnancy are not different from the non-pregnant population. The Chronic Subdural haemorrhage is extremely uncommon in pregnancy, as it is a disease usually affecting the elderly.

Several reports in the literature referring to subdural haemorrhage after epidural or spinal anesthesia, presumably due to intracranial cerebrospinal fluid hypovolemia and a low intracranial pressure causing stretching tearing of bridging veins between the cortex and dural venous sinuses. Surgery for chronic SDH can be carried out under local anesthesia, in a pregnant patient. The Aneurysm rupture may present as a spontaneous acute SDH, although this is uncommon.

- **Subarachnoid haemorrhage:** The first reported case of subarachnoid haemorrhage in pregnancy was in 1899. In pregnancy it occurs in is 0.01 to 0.03 % and its more commonly seen in 90% of pregnancy, 2% during delivery and 8% during puerperium.

Higher frequencies of Subarachnoid haemorrhage are associated with advancing gestation, suggesting that hemodynamic or other physiological changes in pregnancy do influence the rate of aneurysmal growth or rupture.

One-third of patients present in a poor neurological grade with coma or depressed consciousness. Those patients who present with a preserved level of consciousness typically describe sudden onset of severe headache invariably associated with vomiting.

Focal neurological deficits may be present, especially if there is associated intracerebral haemorrhage. The initial symptoms may be similar to eclampsia or preeclampsia.

ICH occurs in 6 per 100,000 deliveries and cause 12% of maternal deaths. The Maximum risk is in the postpartum period, Advanced maternal age, obesity, Preexisting hypertension, Preeclampsia, superimposed preeclampsia and Gestational Hypertension are the commonest risk factor, for example Women who have had preeclampsia have two times the risk of stroke and four times the risk of high blood pressure later in life.

Patients with Diabetes, Migraine with aura, Heart disease, Atrial fibrillation, depression and emotional stress, Coagulop-

athy, Tobacco abuse are more likely to exposed to the risk of stroke because pregnancy is a risk factor it can cause a severe thrombotic microangiopathy and that as a result can cause brain ischemia and hemorrhage. Whether hypercoagulable state and vessel wall changes associated with pregnancy may play a role in the occurrence of these otherwise unexplained ischemic strokes remains unknown.

Pregnancy and labour are hyperdynamic states. The Blood volume increases in early pregnancy and plateaus at 32 weeks, it is increased by 50% above the nonpregnant state by the end of pregnancy. Meta-analysis suggests that plasma volume increases by 6% in the first trimester, by 29% at the end of the second trimester, and 48% near term.

The Cardiac output increases by 30-50% in the first 24 weeks of pregnancy, systemic vascular tone falls and blood pressure decreases. During the first stage of labour, cardiac output increases by 50%, the mean arterial pressure increases up to 20% during uterine contractions. By 24h after delivery, all haemodynamic variables are returned to the prelabour baseline.

Pregnancy increases the likelihood of cerebral infarction to about 13 times the rate expected outside of pregnancy. In most, it is uncertain whether pregnancy is coincidental or plays a role in the occurrence of stroke. Postpartum is associated with a high risk of ICH because of the Large decrease in blood volume, the rapid changes in hormonal status that follow a live birth or stillbirth and perhaps by means of hemodynamic, coagulative, or vessel-wall changes.

The clinical presentation depends on the cause; the most common presenting symptoms are sudden Collapse, Unconscious state, severe headache, vomiting, seizures, Breathing difficulty, Restless and altered sensorium. arteriovenous malformation and aneurysm are the most common causes with 41% of cases, arteriovenous malformation is the chief cause of intracerebral haemorrhage in pregnancy with a prevalence of 15-18 per 100,000. The Maternal mortality rate after AVM haemorrhage is 28%. The risk of haemorrhage from a previously unruptured AVM in pregnant women is estimated at 3.5% against 3.1% in non-pregnant women of child-bearing age, suggesting that pregnancy is not a significant risk factor for haemorrhage. The risk of further haemorrhage is 27%, which is higher than the rebleeding rate in non-pregnant patients. In a survey of Neurosurgical Institutes across in Japan (2) during 2-year focused on haemorrhagic stroke occurring in pregnancy, delivery, and puerperium, 97 haemorrhagic strokes were associated with pregnancy. A pre-existing cerebrovascular disease responsible for haemorrhage was detected in 54 cases (55.7%), among which 47 lesions (87.0%) had been undiagnosed before stroke onset. The detection rate before the 32nd week of gestation was significantly higher than that after the 32nd week (90.0% versus 53.3%, P=.0017).

Arteriovenous Malformations (AVMs) were the most frequent cerebrovascular diseases causing intracranial haemorrhage, occurring at 1.8 times the frequency of ruptured aneurysms during pregnancy. Poor outcomes, including 10 deaths, were seen in 36.1% of the cases despite aggressive treatment. Therefore, for appropriate treatment close examination for cerebral vascular lesions is essential when a pregnancy-associated hemorrhagic stroke is encountered preeclampsia is seen in 20%, preeclampsia associated complications include: eclampsia, intracranial hemorrhage, cerebral edema, encephalopathy, visual disturbance usually transient, ischemia including isch-

emic stroke, vascular thrombosis.

A variety of types of CNS bleeding in preeclampsia are reported:

- Petechial hemorrhages: without clinically notable bleeding are commonly seen in imaging studies, especially in areas of edema
- Subarachnoid hemorrhage: and bleeding related vascular anomalies reported
- Intracerebral hemorrhage: Intraparenchymal bleeding responsible for the majority of CNS mortality and morbidity.

The Pregnancy and particularly the puerperium are significant risk factors for cerebral venous thrombosis. Pregnant patients with prothrombotic disorders such as protein C or S deficiency are at particular high risk. Caesarean section, hypertension, dehydration, and infections also predispose to thrombosis

Anti-coagulation is the main treatment of cerebral venous thrombosis whether or not there is co-existent intracerebral haemorrhage. Full anti-coagulation is generally safe from 24h postpartum. Both low molecular weight heparin and warfarin are safe during breast-feeding.

Surgical evacuation of large haemorrhages will occasionally be required. An important preventive measure is to ensure adequate hydration in the puerperium.

Another etiology is the Moyamoya disease which is a rare condition characterized by spontaneous gradual occlusion of the arteries in the circle of Willis. Perforating arteries dilate in response to the chronic ischaemia and rupture of these enlarged fragile vessels is a cause of intracerebral haemorrhage in young adults.

There are several case studies of ICH during pregnancy in patients with Moyamoya disease. Other etiologies include, Moya moya disease, Cavernous angioma, Cerebral venous sinus thrombosis and Tumor while others are unknown or Spontaneous. The overall goal in the Management during pregnancy is to minimize the risk of re-bleeding. Vessel imaging (time-of-flight MR Angiography, CT Angiography, catheter angiography) is preferred to guide further management decisions; Pregnancy should not be regarded as a contraindication for angiography and endovascular treatment of a vascular cause for hemorrhage.

For unruptured cerebral aneurysm, an MRI without contrast (with time-of-flight MR angiography) is reasonable to define the lesion.

Ruptured aneurysm should be treated urgently based on the best available option for the patient regardless of her pregnancy status. The choice of coils or clip is depending on condition. The Efforts to reduce hypertension to a target of less than 140/90mmHg, if clinically indicated, are reasonable. The treatment requires an urgent interdisciplinary approach including neurosurgeon and/or endovascular interventionalist, neurologist and physicians with expertise in maternal-fetal medicine whenever possible.

Maternal safety and outcomes should be considered throughout all discussions of management and may require treatment decisions that potentially compromise the pregnancy or the fetus.

If the timing corresponds with a viable gestational age, where neonatal outcomes are considered favourable, an interdisciplinary team including, for example, neurosurgery and/or neurointerventionalists, maternal-fetal medicine, obstetrics, neonatology, neurology, anesthesia, and obstetrical medicine where available may consider the benefits of a concurrent Caesarean delivery.

If the timing corresponds to a pre-viable gestational age, treatment should proceed as it would outside of the context of pregnancy in order to maximize maternal safety and outcomes.

Expedite delivery by caesarean section in order to avoid Valsalva manoeuvres and transient blood pressure surges that may lead to further haemorrhage. Where AVM rupture occurs at an advanced gestational stage (prompt delivery) the AVM can then be treated along conventional lines:

Vaginal delivery is not precluded after an AVM resection, although fragile vessels in the brain at the resection margin may remain at higher risk of haemorrhage in the first few weeks after an AVM has been removed.

Conclusion

Because of the gravity, the mortality and the therapeutic difficulties, prevention is essential, recognize and optimally treat hypertension, Diagnose preeclampsia and establish seizure prophylaxis, recognize and appropriately treat coagulopathy screening for warning neurological signs, immediate evaluation by neurologist and Imaging are primordial.

References

1. Jennifer R Meeks, Arvind B Bambhroliya, Katie M Alex, Sunil A Sheth, Sean I Savitz, et al. Association of Primary Intracerebral Hemorrhage With Pregnancy and the Postpartum Period. *JAMA Netw Open*. 2020; 3: e202769.
2. Jun C Takahashi, Koji Iihara, Akira Ishii, Eiju Watanabe, Tomoaki Ikeda, et al. Pregnancy-associated Intracranial Hemorrhage: Results of a Survey of Neurosurgical Institutes across Japan. *Journal of stroke and cerebrovascular disease*. 2014; 23: E65-E71.
3. Marilyn J Cipolla. Cerebrovascular Function in Pregnancy and Eclampsia, *American heart association journals. Hypertension*. 2007; 50: 14–24.
4. Mas J-L, Lamy C. Stroke in pregnancy and the postpartum period. In: Ginsberg MD, Bogousslavsky J, eds. *Cerebrovascular Disease: Pathophysiology, Diagnosis and Management*. Malden, MA: Blackwell Science; 2004: 1684-1697.
5. Zunker P, Happe S, Georgiadis AL, Louwen F, Georgiadis D, et al. Maternal cerebral hemodynamics in pregnancy-related hypertension. A prospective transcranial Doppler study. *Ultrasound Obstet Gynecol*. 2000; 16: 179-187.
6. Donaldson JO. The brain in eclampsia. *Hypertens Pregnancy*. 1994; 13: 115–133.
7. Richards AM, Moodley J, Graham DI, Bullock MR. Active management of the unconscious eclamptic patient. *Br J Obstet Gynecol*. 1986; 93: 554–562.
8. Richards AM, Graham DI, Bullock MR. Clinical pathological study of neurological complications due to hypertensive disorders of pregnancy. *J Neurol Neurosurg Psychiatr*. 1988; 51: 416–421.
9. Schwartz RB, Jones KM, Kalina P, Gajakian RL, Mantello MT, et al. Hypertensive encephalopathy: findings on CT, MR-imaging, and SPECT-imaging in 14 cases. *Am J Radiol*. 1992; 159: 379–383.