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Postpartum Hemorrhagic Stroke Due to Cerebral Arterio-Venous Malformation Rupture: A Case Report

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Abstract:

Stroke risk is 3 times higher in pregnancy and postpartum time than normal and carries high mortality and morbidity. Both ischemic and hemorrhagic strokes can occur during pregnancy and postpartum time up to 12 weeks after delivery. During this time hemodynamic changes occur in circulatory and vascular system which increases risk of coagulopathy. This may cause stroke. Hemorrhagic strokes are less common type but have a higher morbidity & mortality. We report a case of 38 years old patient with no known co-morbidities, experienced hemorrhagic stroke in her postpartum time because of cerebral arterio-venous malformation (AVM) rupture following elective cesarean section. She was treated surgically by decompressive craniotomy and removal of hematoma and excision of AVM. The case highlights the need for identification of signs and symptoms of stroke as early as possible and need for a multidisciplinary approach when there is a diagnostic dilemma, particularly in the postpartum period.

Key words: Postpartum, cesarean section, hemorrhagic stroke, arterio-venous malformation.

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Introduction:

Postpartum hemorrhagic stroke is an important cause of maternal morbidity and mortality, which creates a significant diagnostic and therapeutic challenge. Non-communicable diseases (NCDs) are the major challenges in the field of public health. Stroke is the leading NCD causing death and long-term disability in Bangladesh according to BDHS 2017-18. NCDs are responsible for 67% of total deaths and the prevalence of NCD has increased over the last 10 years.[1] Most maternal strokes occur in the postpartum period (defined variously as up to 12 weeks after delivery). Both ischemic and hemorrhagic strokes can occur in pregnancy, although hemorrhagic stroke can be particularly dangerous for the pregnant patient. Hemorrhagic stroke has been documented to occur in the range of 5-35 per 100,000 deliveries with maternal and fetal mortality rates as high as 63% and 27%, respectively.[2] We report the case of a patient who experienced a hemorrhagic stroke during postpartum period followed by cesarean section due to cerebral arterio-venous malformation (AVM) rupture.

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Case summary:

A 38 years old normotensive, nondiabetic female para-2 with history of cesarean section 6 days back, presented in the emergency department with headache for 1 day, tingling and numbness of left side of the lower limb for 1 day, single episode of nausea vomiting and slurring of speech. Regarding her obstetric history, she is a mother of 2 children, both delivered by cesarean section. Age of last child is 6 days. Her last cesarean section was at 37 weeks of pregnancy with less fetal movement with history of previous cesarean section. She did not have any history of migraine, spinal headache, rises of blood pressure or fall after cesarean section in her current post-partum period. Her both antenatal periods were uneventful but she had history of spinal headache in her previous post-partum period which was treated conservatively. Her hospital stay was uneventful this time and was discharged home on 3rd postoperative day (POD) with advice for follow up on 7th POD. She has no significant family history of stroke or hypercholesterolemia. On admission in emergency room on 6th post operative day, her pulse 82 beats/min, blood pressure 170/90 mm Hg, temperature 98.6ºF, respiration rate 18 breaths/min, oxygen saturation 92%(in room air), dehydration and ankle edema were present. On neurological examination, Glassgow Coma Scale: 14/15,

pupil: 2.5 mm, bilaterally reacting to light, reflexes were diminished, planter response were flexor on right and equivocal on left side. Sensory functions were intact, slurring of speech present, eye movements: intact. Other systems were unremarkable.

She was examined by a neurologist and her Obstetrician in emergency and advised CT scan of brain and also some routine laboratory tests.

Her CT scan of brain showed: Multiple sites of intracerebral hemorrhage with intraventricular and sub arachnoid extension. After having the report of CT brain she was attended by neurosurgery consultant and after assessment she was advised for admission in the ICU. But during evaluation, patient deteriorated suddenly. She lost consciousness & unable to maintain oxygen saturation in room air and was intubated immediately. She was then transferred to ICU for definitive management. In the ICU, management was started with control of blood pressure, to prevent convulsion and to reduce brain edema. CT angiogram was done which failed to demonstrate any aneurysm or arterio venous malformation (AVM). (Figure 1, 2)

On the same day, after discussion and counselling with family members she underwent decompressive craniotomy under G/A for evacuation of hematoma. After evacuation, an AVM was identified on right tempero-parital region which was excised & sent for histopathology. Histopathology report revealed thin & thick walled blood vessels with organized thrombus & brain tissue. These features are suggestive of AVM. (Figure 3)

Due to brain edema, the bone flap was kept outside. The next follow up CT brain demonstrated hydrocephalous due to intraventricular hematoma. On the same day, external ventricular drain was inserted under general anesthesia. She was managed in ICU in collaboration with Obs and Gyne dept for 12 days. She was gradually weaned off from ventilation on 10th post operative day and shifted to ward. External ventricular drain was removed after 10 days and lumber drain was placed for 10 days. After removal of the lumber drain, lumber puncture was carried out at regular interval to analyze CSF. She developed pneumonia and urinary tract infection which was treated accordingly during

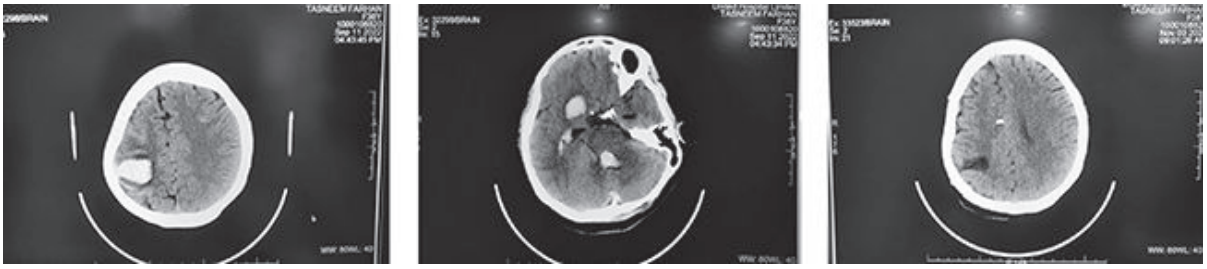

Figure 1: *CT brain showing intracerebral hemorrhage with intraventricular & sub arachnoid extension.*

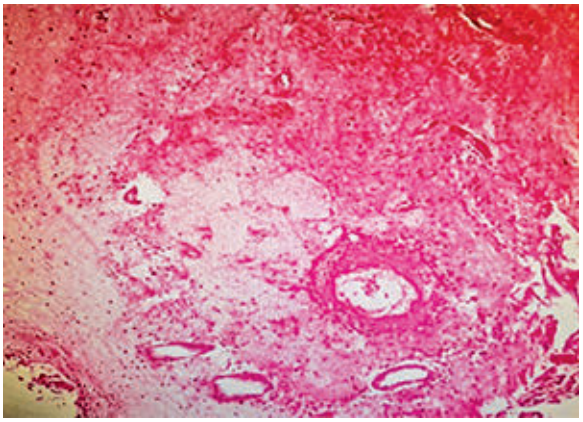

Figure 2: *CT brain showing resolution of haematoma.*

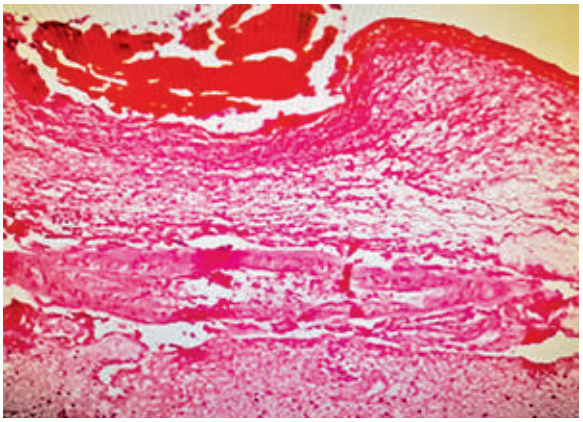

Figure 3: *Histopathological slide of excised AVM*

her long stay in the hospital. During post operative period she had several episodes of convulsion which was controlled by anticonvulsant drugs(phenobartiton, levetiracetam) with watch full observation by Neuro medicine dept. In the meantime her CSF study revealed free of blood and after resolution of her brain oedema, she underwent cranioplasty with autologous bone flap and placement of ventriculo peritoneal shunt. After surgery slow but remarkable neurological recovery was noticed. Eventually she was discharged on 40th post operative day after satisfactory improvement of her symptoms (sensory and motor functions) with advice for long term rehabilitation therapy. After that patient came for follow up in outpatient department at regular intervals with significant clinical improvement.

Discussion:

Stroke during pregnancy has been related to some risk factors like chronic hypertensive disorder, hypertensive disorders of pregnancy, gestational diabetes, increasing maternal age, smoking, thrombophilias, and migraines, among other conditions. [3,4,5] Of these risk factors, our patient did not have any above risk factors. But pregnant women who have a cesarean delivery appear to be more likely to suffer a stroke during the following year than women who give birth normally due to derangement of body hemostatic mechanism.

Although the numbers in the literature vary, ischemic strokes, including cerebral venous thrombosis, seem to be more common than hemorrhagic strokes during pregnancy.[4,5] Hemorrhagic strokes have been reported and comprise 25% of strokes occurring at any time during pregnancy[4] and 40% of during antenatal period.[3] Another US study based on the Nationwide Inpatient Sample database found 15.7% of antenatal,10.8% of delivery-related, and 35.6% of postpartum strokes to be hemorrhagic in nature.[6] Hemorrhagic strokes are often related to preeclampsia/eclampsia as well. In addition, several types of vascular malformations can cause hemorrhagic strokes in both pregnant and non-pregnant patients, including cerebral aneurysm, arteriovenous malformation (AVM), and cavernous malformation.[7,8,9]

AVMs are a vascular malformation consisting of a tangle of dysplastic vessels, referred to as the nidus, which is fed by arteries and drained by veins without intervening capillaries. The absence of capillaries results in high flow, low resistance shunting between the arterial and venous system.[10] The prevalence of cerebral AVMs is estimated at 0.01- 0.50% of the population. AVM is generally present in patients aged between 20 and 40 years, the childbearing age for women. Globally, the natural history of AVMs is poorly understood and even less understood in postpartum patients, because its frequency is rare and changes in the maternal body are complicated during this period.[11]

Pregnancy & postpartum period by itself is a hyper dynamic state, where changes occur in the hemostatic system. Blood volume is about 30 to 40% & plasma volume 40 to 50% raised during pregnancy[12] There is a remodeling in blood vessels due to the increase in cardiac output and blood volume with a reduction of elastin and collagen in vessel wall resulting in less stiffness and more relaxation. The blood volume and blood pressure also gradually increased during pregnancy, reaching the peak during late pregnancy & in post-partum times. Cerebral AVM lost the ability to adjust blood flow because of vascular abnormalities, which contributed rupture of AVM leading to hemorrhagic stroke. So from Obstetricians point of view steps to be taken to avoid those contributing factors.

A patient with intracerebral hemorrhage can present with variable signs and symptoms such as decreased level of consciousness, contralateral sensory-motor deficits of varying severity, signs of brain-stem dysfunction, signs of higher level of cortical dysfunction, signs of cerebellar involvement. Our patient presented in emergency with the symptoms like altered level of consciousness, headache, tingling and numbness of left side of the lower limb, nausea, vomiting, raised blood pressure and diminish reflexes with planter response were flexor on right and equivocal on left side. This raised the suspicion of cerebral hemorrhage and immediate neuro medicine & surgery consultation was taken. And further management was done by multidisciplinary approach in this private hospital in Dhaka. Her initial symptoms of stroke were ignored at home for nearly 24 hours.

There are two main approaches in management of intracranial hemorrhage. First, evaluation and management in the emergency room, intensive monitoring of neurologic and cardiovascular status, the mass effect and intracranial hypertension, ventricular blood, and hydrocephalous. Secondly evaluation and

management for early intubation, neurosurgical consultation, hyperventilation, intra venous mannitol and thrombolytic therapy.[13]Our patient was intubated in emergency room & transferred to ICU where subsequently treated according advice of neuromedicine & neurosurgery along with obs & gynae department.

The goals of the surgical evacuation of a hematoma are to reduce the mass effect and prevent prolonged interaction between the hematoma and normal tissue, which can initiate pathologic process. Morbidity and mortality are related to compression of the brainstem and are decreased by timely decompression.[13] Decompressive craniotomy and excision of AVM was done on the day of admission. And then insertion of external ventricular drainage was done to reduce hydrocephalus. In the prolong hospital stay, our patient developed pneumonia and recurrent UTI which were also treated appropriately.

The management of postpartum stroke is challenging. Timely assessment and of a patient with postpartum stroke reduces the rate of mortality and morbidity. In our case, patient was correctly diagnosed in time, managed very promptly and energetically and had good recovery after the treatment of an uncommon case of stroke.

The rate of recurrence of ICH in subsequent pregnancies and postpartum period depends on the underlying etiology. Usually AVMs once taken care of do not recur.

Conclusion:

Early diagnosis of postpartum hemorrhagic stroke with appropriate timely multidisciplinary management can achieve the best outcome for the pateient.

Limitation and future directions:

When analyzing research papers on postpartum hemorrhagic stroke, the major limitation was paucity of research papers. Some papers say the risk is less at postpartum period. More studies are needed on postpartum ICH due to AVM rupure in Bangladesh.

Disclosure:

The authors have no financial or proprietary interest in the subject matter of this article.

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