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Case Report

Multifocal cerebral cavernous malformations in pregnancy: a rare neuro-obstetric case

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ABSTRACT

Cerebral cavernous malformations (CCMs) are rare vascular lesions characterised by clusters of dilated capillaries that may present with seizures or intracranial haemorrhage. Their coexistence with pregnancy poses diagnostic and management challenges. We report a 30-year-old G2P1L1 woman at 37 weeks gestation with a history of generalized tonic-clonic seizures (GTCS) and multifocal CCMs. She had no seizures during the antenatal period. Magnetic resonance imaging (MRI) revealed multiple cavernomas with evidence of prior haemorrhage. A multidisciplinary team opted for elective caesarean section, resulting in successful maternal and foetal outcomes.

Keywords: Cerebral cavernous malformation, Seizures, Neuro-obstetrics, Caesarean section

INTRODUCTION

Cerebral cavernous malformations (CCMs), also known as cavernous angiomas or cavernomas, are vascular malformations of the central nervous system composed of clusters of dilated, thin-walled capillaries lacking intervening normal brain parenchyma. They account for approximately 10-15% of intracranial vascular malformations and may occur sporadically or in familial forms.[1,2] Clinical manifestations vary widely and include seizures, focal neurological deficits, headaches, and intracranial hemorrhage.[3,4]

The increasing use of MRI, particularly susceptibility-weighted imaging, has improved the detection of both symptomatic and asymptomatic CCMs, including multifocal lesions.[3] Multifocal CCMs are often associated with a greater lesion burden and may carry an increased cumulative risk of neurological complications, especially seizures and hemorrhage.[4,5] Repeated microhemorrhages result in hemosiderin deposition and gliosis, which contribute to epileptogenesis and neurological dysfunction.[5,6]

The coexistence of CCMs and pregnancy presents unique clinical challenges. Physiological changes during pregnancy, including increased blood volume, hormonal influences, and altered vascular dynamics, have raised concerns regarding the risk of hemorrhage and seizure recurrence. However, current evidence suggests that pregnancy does not significantly increase the risk of CCM-related hemorrhage compared with the non-pregnant state.[2,7,8] Nevertheless, women with multifocal lesions, previous hemorrhage, or a history of seizures require careful multidisciplinary assessment and individualized management.[7,9]

We report a rare case of multifocal CCMs in pregnancy with a history of recurrent seizures and prior neurosurgical intervention, highlighting the importance of coordinated neuro-obstetric care in achieving favorable maternal and neonatal outcomes.

CASE REPORT

A 30-year-old woman G2P1L1, presented at 37 weeks of gestation to our tertiary care centre for planning of delivery. Patient presented with stable vitals, GCS 15 with no complaint of pain in abdomen, leaking per vaginum and bleeding per vaginum. The patient was asymptomatic until 18-19 years of age (~2013), when she experienced her first episode of GTCS. Initial management was with alternative medicine and intermittent treatment at a local hospital. After that she had her seizure episode in the previous postpartum period, GTC type, associated with up rolling of eyes, right sided deviation of neck and weakness in the lower limbs, for which she took treatment from village doctor. Following that, she started having 2 episodes of seizures every month which was associated with temporal headache, ghabrahat and slurring of speech. She also experienced right muscular weakness in upper and lower limbs, which was suggestive of focal neurological deficit. In 2020, MRI of the brain revealed findings suggestive of a cerebral cavernous malformation. The patient was initiated on antiepileptic therapy, which resulted in reduction in seizure frequency. In July 2021, she underwent craniotomy for excision of the lesion at a tertiary care center. Postoperatively, the patient developed left-sided weakness and difficulty in ambulation, requiring physiotherapy for approximately one year.[7,8] Gradual neurological recovery was observed. Following surgery, she was started on tab levetiracetam 500 mg three times daily. The patient remained seizure-free for approximately two years.

In November 2024, antiepileptic medication was discontinued under medical supervision. The patient has remained seizure-free since then.

She was referred from PHC to our tertiary care centre for the further, management. After routine investigation we investigated for the MRI after neurophysician and neurosurgeon reference.

MRI brain (18/03/2026) left frontal lobe lesion: Well-defined lesion with reticulated ("popcorn") appearance mixed T1/T2 signal intensity peripheral hemosiderin rim with blooming on SWI mild perilesional edema size: ~14.5×13.8 mm right frontal lobe lesion: similar features size: ~15.9×19.2 mm additional findings: Multiple punctate blooming foci in: right parietal and temporal regions left cerebellar hemisphere Pons suggestive of Zabramski type II, III, IV cavernomas large area of encephalomalacia with gliosis in left temporoparietal region (old hemorrhage). Evidence of previous craniotomy defect. No midline shift or acute hemorrhage.

Patient was planned for elective LSCS at term as per the ACOG guidelines which was uneventful. A healthy live-born neonate delivered. No perioperative and postoperative seizure noted. Patient was called up for follow up on post operative day.[7]

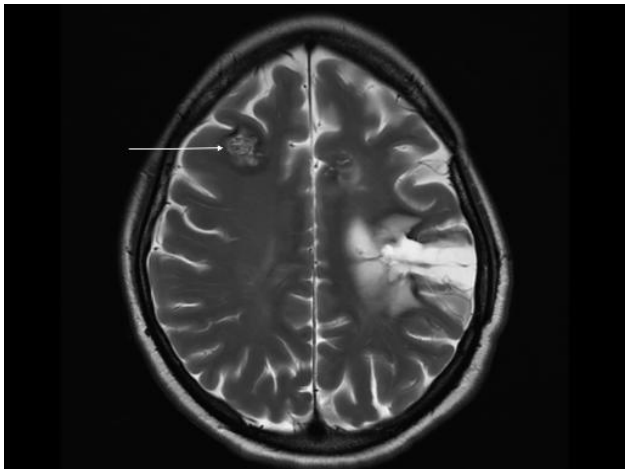

Figure 1: MRI brain (T2-weighted axial) showing Zabramski type II cerebral cavernous malformation in right frontal lobe.

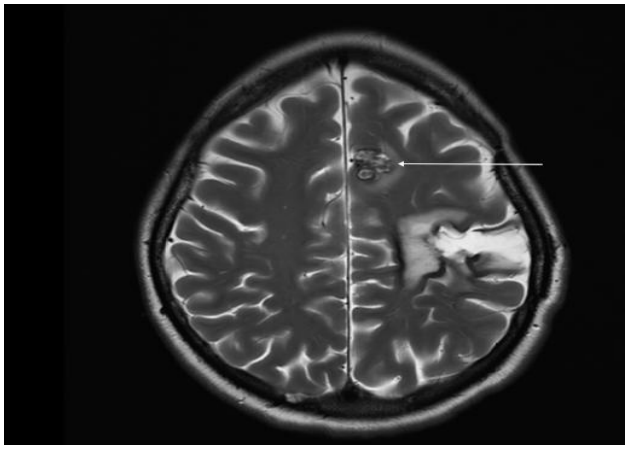

Figure 2: MRI brain (T2-weighted axial) showing Zabramski type II cerebral cavernous malformation in left frontal lobe.

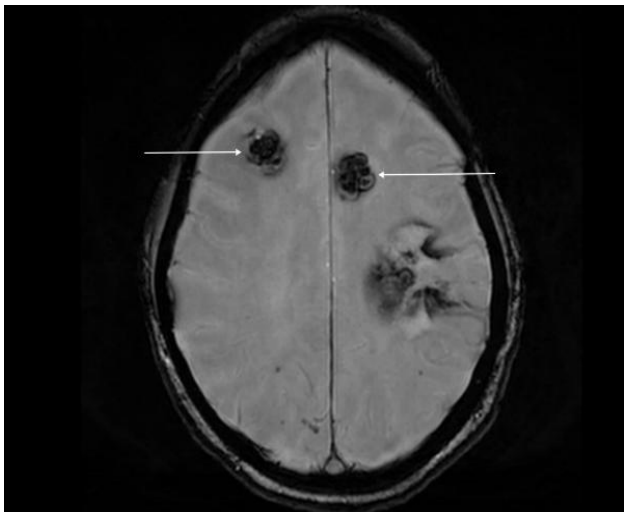

Figure 3: T2W coronal MRI of brain showing Zabrramski type II cerebral cavernous malformation in bilateral frontal lobes.

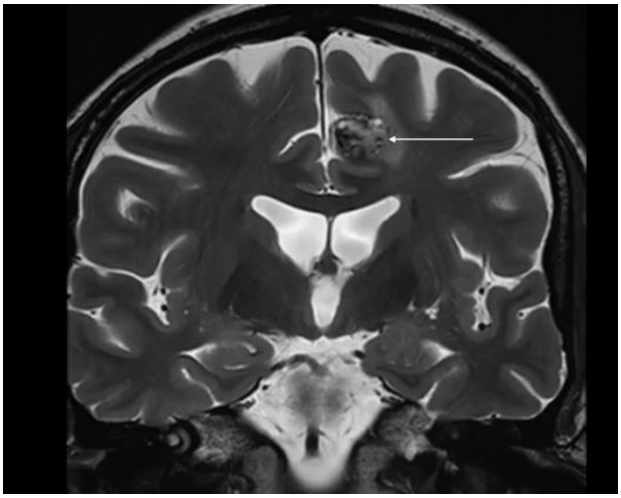

Figure 4: T2W coronal MRI of brain showing Zabramski type II cerebral cavernous malformation in left frontal lobe.

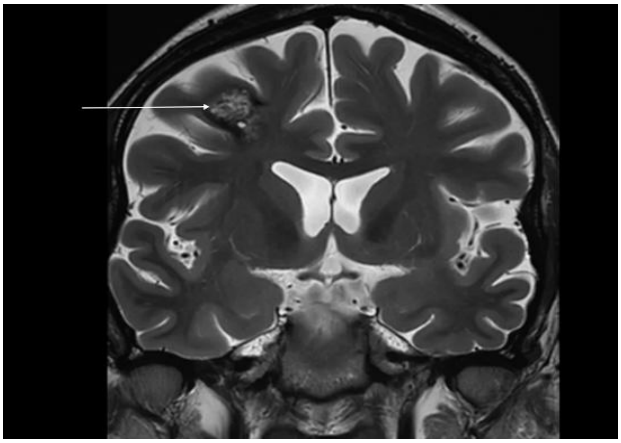

Figure 5: T2W axial MRI image of brain showing Zabramski type II cerebral cavernous malformation in right frontal lobe.

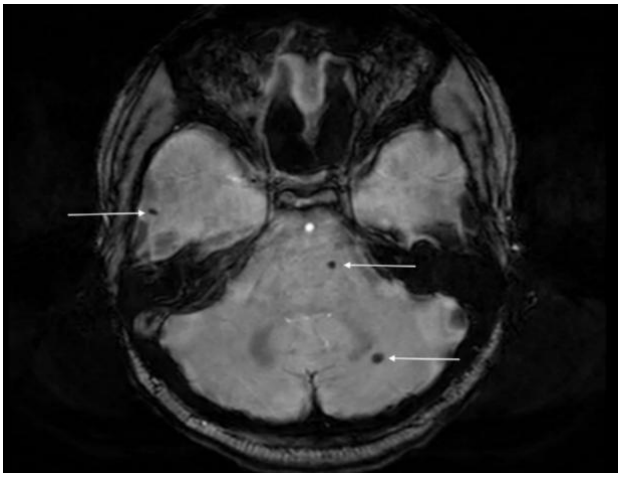

Figure 6: SWI axial MRI brain showing blooming in left cerebellar hemispehere, right temporal lobe and left side of pons-suggestive of type IV cavernous angioma.

DISCUSSION

Cerebral cavernous malformations are increasingly recognized due to widespread use of MRI. These lesions are characterized by repeated microhemorrhages leading to hemosiderin deposition and gliosis, which contribute to epileptogenesis.[3,6] Seizures are the most common presentation, occurring in nearly 40-50% of patients the mechanism involves: chronic hemosiderin deposition, cortical irritation and gliotic changes surrounding the lesion.[3,6] In the present case, seizure recurrence postpartum suggests increased vulnerability during periods of physiological stress.

Effect of pregnancy on CCM Physiological changes during pregnancy include: Increased circulating blood volume hormonal effects on vascular endothelium Increased angiogenic factors. Despite these changes, several studies have shown: No significant increase in hemorrhage risk during pregnancy.[1-3] Risk remains comparable to baseline (1-3% annually). However, symptomatic lesions and multifocal disease may carry higher individual risk, warranting closer monitoring. Multifocal CCM: clinical implications multifocal CCMs: Are often familial associated with higher lesion burden Increase cumulative risk of hemorrhage and seizures.[3,4] The presence of lesions in eloquent areas (brainstem, cerebellum) further increases clinical significance. Management in pregnancy conservative management preferred in stable patients includes: Observation, seizure control with antiepileptics majority (~65-70%) managed conservatively, surgical management indications: refractory seizures recurrent haemorrhage. Progressive neurological deficits second trimester is considered safest for neurosurgical intervention.[7]

Mode of delivery

Vaginal delivery

Not contraindicated in stable cases. Safe if no raised intracranial pressure.

Cesarean section

Preferred in multiple lesions prior hemorrhage.

Poor seizure control high-risk neurological status studies report LSCS in approximately 50-60% of such cases.[9]

In this case, LSCS was justified due to: multifocal lesions prior hemorrhagic changes.

Need of neurological follow-up Antiepileptic therapy optimization consideration of definitive neurosurgical management if indicated conclusion multifocal cerebral cavernous malformations in pregnancy are rare but manageable with appropriate planning. Pregnancy does not significantly increase hemorrhage risk; however, individualized assessment is crucial. A multidisciplinary

approach ensures optimal maternal and fetal outcomes. Cesarean section may be preferred in patients with multifocal disease and prior hemorrhagic sequelae.

CONCLUSION

Multifocal cerebral cavernous malformations in pregnancy represent a rare but clinically significant neuro-obstetric condition requiring careful risk stratification. Although current evidence suggests that pregnancy does not substantially increase the risk of hemorrhage, the presence of multiple lesions, prior hemorrhagic sequelae, and a history of seizures necessitates individualized management. This case highlights that favorable maternal and fetal outcomes can be achieved through a multidisciplinary approach involving obstetricians, neurologists, and anesthesiologists.

Mode of delivery should be tailored to the patient's neurological status, with cesarean section being a reasonable option in high-risk cases to minimize hemodynamic stress and potential neurological complications. Close antenatal surveillance and appropriate postpartum neurological follow-up remain essential.

Overall, this report underscores the importance of personalized care and coordinated decision-making in optimizing outcomes in pregnancies complicated by multifocal cerebral cavernous malformations.

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