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CASE REPORT

Intracerebral Hemorrhage: A Fatal Complication of Severe Preeclampsia—A Rare Case Report in a Resource-Limited Setting

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Background: Intracerebral hemorrhage (ICH) is a rare but severe complication of preeclampsia, significantly contributing to maternal morbidity and mortality, particularly in resource-limited settings. The underlying mechanisms include endothelial dysfunction, cerebral autoregulation failure, and breakdown of the blood-brain barrier. This case report aims to highlight a unique presentation of severe preeclampsia complicated by ICH, emphasizing barriers encountered in resource-limited settings and discussing long-term implications and prognosis.

Case Presentation: A 35-year-old multiparous woman presented two days postpartum with altered mental status, aphasia, and right-sided hemiparesis. Her pregnancy was complicated by severe preeclampsia and intrauterine fetal death. Computed tomography (CT) revealed a left basal ganglia hemorrhage extending into the ventricles. She received conservative management including antihypertensive medications, magnesium sulfate for seizure prophylaxis, and anti-edema therapy. Despite limited diagnostic resources, laboratory evaluations ruled out coagulopathies and vascular anomalies. After 20 days of multidisciplinary care, significant neurological recovery was achieved. Follow-up after four weeks demonstrated complete functional recovery, with resolution confirmed by repeat CT.

Conclusion: This case uniquely underscores the critical importance of timely multidisciplinary care and robust antenatal monitoring in mitigating severe complications such as ICH associated with preeclampsia. The patient's full recovery highlights the potential for successful conservative management even in resource-constrained environments. Future clinical practice and research should focus on improving antenatal care accessibility, patient education, and developing context-specific management guidelines to reduce maternal morbidity and mortality in similar settings.

Keywords: intracerebral hemorrhage, severe preeclampsia, antenatal care, multidisciplinary management, resource-limited settings

Introduction

Intracerebral hemorrhage (ICH), accounting for approximately 15% of all stroke cases, was responsible for 2.9 million deaths worldwide in 2019 and is considered the most severe form of stroke, with hemorrhagic stroke having the highest mortality rate and the poorest functional outcomes.[1] The prevalence of stroke varies, comprising 11% of all strokes in high-income nations and 22% in low- and middle-income countries.[1]

Intracerebral hemorrhage (ICH), a cerebrovascular event occurring within the brain tissue, is a rare but serious complication of preeclampsia, with an incidence ranging from 3.5 to 26 cases per 100,000 deliveries.[2]

This condition is associated with significant maternal mortality, estimated to be 9–38%, and some survivors experience lasting disabilities.[2] Intracerebral hemorrhage (ICH) may result from conditions such as gestational hypertension, preeclampsia, eclampsia, rupture of arteriovenous malformations, cerebral aneurysms, or cerebral venous sinus thrombosis.[3] The pathophysiological mechanisms underlying intracerebral hemorrhage in preeclampsia and its associated

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complications primarily stem from elevated blood pressure, this results in impaired cerebral autoregulation and excessive cerebral perfusion, which subsequently disrupts the blood-brain barrier (BBB). Consequently, these changes contribute to the development of cerebral edema and vascular endothelial damage as microangiopathy.[2] Rapid and accurate diagnosis of ICH during pregnancy, coupled with timely intervention, is linked to reduced maternal and perinatal morbidity and mortality.[2] For pregnant women, the primary risk factors for ICH are preeclampsia and eclampsia.[4]

According to the 2023 UN report on Trends in Maternal Mortality from 2000–2020, Somalia continues to face one of the highest maternal mortality rates globally, with 621 maternal deaths per 100,000 live births, this staggering statistic highlights the ongoing challenges faced by pregnant women in Somalia, particularly in resource-limited settings where timely access to quality healthcare remains scarce.[5]

Here, we report an uncommon case of ICH in a pregnant woman with severe preeclampsia in a resource-limited setting.

Case Presentation

A-35 years old female, para 5, gravid 4, Presented to the Emergency Department (ED) on the second postpartum day with altered mental status, aphasia, right-side weakness for 3 days, and headache for three weeks. There was no history of seizures, trauma, or falls prior to arrival at the ED. On her history She had gestational hypertension for a previous pregnancy, and during her last pregnancy, one week prior to presentation, she experienced lower limb swelling and severe headache but did not visit any hospital. Seven days later, she developed sudden onset of right-sided hemiparesis and altered mental status, and was immediately taken to a local hospital with a high blood pressure (BP) of 200/110 mmHg and intrauterine fetal death (IUFD) on ultrasonography. started labetalol (5 mg/4 mL) and induced labor induction. She was delivered vaginally by an IUFD male baby with an Apgar score of 0/10. On 2sd day on her postpartum day, she was referred to our hospital with a Glasgow coma scale (GCS) score of 9/15 eye 3, verbal 1, and motor 5. Upon presentation to the Emergency Department, the patient's vital signs included a blood pressure of 190/110 mmHg, heart rate of 112 beats per minute, and temperature of 36.9°C. Neurological evaluation revealed a Glasgow Coma Scale (GCS) score of 9, with 3 eye responses 3, Verbal response 1, and 5 motor responses. The patient exhibited aphasia and right-sided hemiparesis. Motor strength was evaluated using the Medical Research Council (MRC) scale and was estimated to be grade 2, although the evaluation was challenging due to the patient's limited cooperation. An obstetric examination revealed a contracted uterus below the umbilicus. Laboratory investigations showed significant findings, including marked proteinuria (++) and pronounced hematuria (+++) on urinalysis. Liver enzyme levels were elevated, while coagulation factor levels remained within normal limits, and kidney function tests were normal as shown in (Table 1). A brain non-contrast computed tomography (CT) scan confirmed the presence of cerebral parenchymal hyperdense collection (4.4x 3.2×3 cm) centered in the left basal ganglia hemorrhage with extension into the lateral 3rd and 4th ventricles associated with prelesional edema and mass effect (Figure 1A). Additionally, head CT angiography excluded the presence of vascular anomalies (Figure 1B). The patient was admitted with a diagnosis of intracerebral hemorrhage (ICH) secondary to severe preeclampsia, with atypical HELLP syndrome included in the differential diagnosis due to the elevated liver enzymes, although the normal platelet count and the absence of other typical features make it less likely. The patient was admitted to the intensive care unit, where a nasogastric (NG) tube was placed for feeding and medication administration. Treatment was initiated with mannitol (20%), administered at a loading dose of 350 mL, followed by a maintenance dose of 100 mL three times daily. Additionally, dexamethasone 8 mg was administered three times daily as part of the anti-edema management protocol, MgSO4, according to the Pritchard regimen for prevention of eclampsia, which included a loading dose of 14 g, followed by a maintenance dose of 5 g administered every 6 h for a total duration of 24 h, and nifedipine 20 mg tab twice a day, nimodipine 30 mg three times a day as BP control through (NG) and for feeding; the patient also received intravenous fluids, antibiotics, and proton pump inhibitors as part of the treatment regimen. After eight days in the ICU, clinical and neurological improvements were noted, with a Glasgow Coma Scale (GCS) score of 13/15, decrease liver enzymes (Table 1) and normal urinalysis. The patient was subsequently transferred to an inpatient ward for continued monitoring and physiotherapy. Over the course of 12 days in the ward, the patient demonstrated significant physical and neurological recovery. On the day of discharge, the patient was advised to continue physiotherapy and attend follow-up appointments in an outpatient setting, including regular evaluations at the cardiology

Table 1 The Result of the Laboratory Investigations

Tests	Reference Range	On ICUAdmission	On ICU Discharge	On Ward Discharge
White cell count (WBC, *10^9 /L)	4.00-10.00	14.80	10.4	8.62
Hemoglobin (HB, g/dl)	12.0-16.0	12.3	11.2	13.3
Platelet (PLT, *10^9 /L)	100-300	149	133	142
C-reactive protein (CRP, mg/L)	2.5-10	159.7	30.73	7.4
Aspartate transaminase (AST, U/L)	6-38	623.1	265.2	112
Alanine transaminase (ALT, U/L)	6-40	576.9	312.8	95
Creatinine (Crt, mg/dl)	0.4-1.4	0.84	1.2	0.97
Blood urea (Blood urea, mg/dl)	10-50	36.82	194.3	32.3
Sodium (Na+, mmol/l)	135-145	135.9	140.2	137.1
Potassium (K+, mmol/l)	3.5-5.5	4.2	5.9	3.6
Calcium (Ca+, mmol/l)	2.10-2.70	2.4	1.9	2.3
Prothrombin time (PT, sec)	10-14	13.0	14.0	12
Activated partial Thromboplastin time (APTT, sec)	11-45	55.2	47.5	32.4
International Normalized Ratio (INR)	0.8-1.1	1.08	1.16	1
D-Dimer (ng/mL)	50-500	596	410	323

Note: *Multiplication Sign.

clinic. Four weeks into the follow-up period, the patient regained right-side limb function and had no neurological deficit on this day; we repeated the CT scan of the brain without contrast and revealed normal findings (Figure 2), and she was advised to undergo family planning and regular antenatal visits for an upcoming pregnancy and we were followed up in the last six month and recovered well.

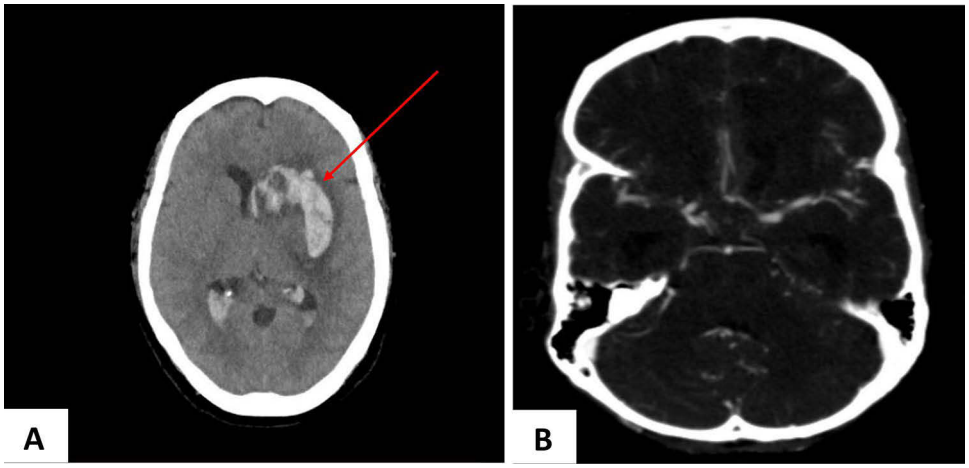

Figure 1 (**A**) Axial non-contrast CT of the head illustrates the characteristics of acute hemorrhage; the red arrow indicates an acute left basal ganglia hemorrhage with intraventricular extension and associated midline shift. (**B**) CT angiography demonstrates normal intracranial vasculature without aneurysms, malformations, or occlusions.

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Figure 2 Axial non-contrast CT of the head shows normal ventricular morphology, intact midline structures, and no evidence of hemorrhage, mass effect, or pathological findings.

Discussion

This case study reported severe preeclampsia combined with inadequate antenatal care (ANC) as a significant risk factor for intracerebral hemorrhage (ICH) while systematically excluding other potential causes or contributing factors.

Preeclampsia contributes to intracerebral hemorrhage (ICH) through endothelial dysfunction and blood-brain barrier (BBB) breakdown; endothelial dysfunction, triggered by oxidative stress, inflammatory cytokines, and impaired nitric oxide production, damages the vascular endothelium, resulting in increased permeability, vasoconstriction, and disrupted autoregulation of cerebral blood flow, promoting edema formation and compromising vascular integrity, which predisposes patients to hemorrhagic events; additionally, endothelial injury degrades tight junction proteins essential for BBB integrity, enhancing permeability and allowing plasma proteins and other substances to infiltrate brain parenchyma, and this increased permeability, combined with severe hypertension and endothelial damage, facilitates cerebral edema and predisposes to ICH.[6]

Research conducted by Bateman et al identified gestational hypertension, preeclampsia/eclampsia, and thrombocytopenia as significant independent risk factors, contributing to 30.5% of pregnancy-related ICH cases.[7] Additional research has also emphasized gestational hypertension and preeclampsia as significant risk factors, occurring in 14–50% of instances.[2] Among the easily reversible risk factors for stroke during pregnancy, hypertension remains prominent.[8] Pregnant women that hypertensive is typically linked to approximately one-third of experiencing stroke cases; hemorrhagic stroke is the without hypertension.[8] A 2013 review highlighted with preeclampsia/eclampsia, which is typically linked to approximately one-third of pregnancy-related stroke cases.[9] Hemorrhagic stroke is the most frequent type associated with preeclampsia/eclampsia.[8] The risk escalates when preeclampsia is further complicated by eclampsia, hemolysis, elevated liver enzymes, low platelet count (HELLP) syndrome, or abruption with coagulopathy.[7] To reduce the risk of intracranial hemorrhage (ICH) in patients with gestational hypertension, consistent prenatal check-ups are essential. Preeclampsia itself remains a potentially fatal complication of pregnancy-induced hypertension.[10] Due to the accessibility, affordability, and efficacy of antenatal care (ANC) services, preeclampsia is now less frequently observed. However, it still occurs in patients who neglect their ANC or delay seeking medical attention when complications arise.[10] Antihypertensive treatments like labetalol for pre-eclampsia and methyldopa for chronic hypertension play a key role in managing gestational hypertension, while magnesium sulfate is used in severe cases to prevent seizures and reduce complications associated with hypertensive disorders during pregnancy.[11] In this case, the patient had a history of gestational hypertension in her previous pregnancy. During her recent pregnancy, she developed severe preeclampsia and received insufficient antenatal care, potentially contributing to intracerebral hemorrhage.

Other causes of ICH in pregnant and postpartum women include ruptured vascular malformations, such as arteriovenous malformations (AVMs) or aneurysms, and hemorrhage from cerebral venous sinus thrombosis.[12] In our patient, these causes were ruled out using CT angiography of the head available in our setting.

A study involving 471 participants from the Republic of Korea revealed that women with two, three, or four children faced a notably increased risk of overall hemorrhagic stroke, intracerebral hemorrhage, and subarachnoid hemorrhage, respectively, compared to those with no children or only one child.[13] ICH during pregnancy or shortly after childbirth is often triggered by the onset of preeclampsia or eclampsia, particularly when severe hypertension is poorly managed. Meeks et al discovered that women with pregnancy-induced hypertension were 2.73 times more likely to develop ICH than those without this condition. Furthermore, approximately one-third (35.29%) of women experiencing ICH also had preeclampsia or eclampsia, which was linked to a 9.23-fold higher ICH risk compared to women without these complications.[14] In the case presented, the patient had multiple previous pregnancies and a history of gestational hypertension. Her most recent pregnancy was complicated by preeclampsia, which was characterized by poorly controlled blood pressure and inadequate prenatal care. Clinically, patients may experience symptoms such as headache, altered mental state, seizures, or localized neurological and visual disturbances.[15] Our patient reported a headache and exhibited focal neurological symptoms (aphasia and right-sided hemiparesis). For all pregnant patients showing signs of cerebrovascular events, neuroimaging is advised.[16] Intracerebral hemorrhage is definitively diagnosed through CT and MRI scans. A non-contrast CT scan is typically the initial choice for ICH diagnosis because of its widespread availability and high sensitivity and specificity.[2] In this case study, the diagnosis was confirmed using a non-contrast CT scan, which was accessible and cost-effective in our resource-limited setting. Ultimately, diagnosis was based on the patient's clinical presentation, laboratory findings, and imaging results.

The management of stroke during pregnancy requires a collaborative approach involving various specialists including obstetricians, neurologists, neurosurgeons, critical care physicians, anesthesiologists, physical therapists, and pediatricians. The primary objectives are to sustain cerebral perfusion pressure, avoid secondary brain damage, and successfully deliver both the infant and placenta.[8] In the acute phase, blood pressure should be carefully lowered, aiming for a maximum of 160/110.[17] The goal is to keep diastolic blood pressure between 90 mm Hg and 100 mm Hg to prevent cerebral bleeding.[18] Labetalol administered intravenously has been commonly employed as the initial treatment to reduce blood pressure in pregnant patients experiencing stroke.[4] Magnesium sulfate (MgSO4) should be incorporated into the acute management protocol to prevent the occurrence of eclampsia.[15] Our patient received intravenous labetalol and magnesium sulfate (MgSO4) following the Pritchard protocol for seizure prevention.[8]

The limitations of this study include the limited availability of multidisciplinary teams, particularly the shortage of neurosurgical specialists for patients requiring surgical intervention and specialized postoperative care. Additionally, the restricted availability of MRI due to resource constraints may have impacted the precision of imaging-based diagnoses. Another significant limitation is the absence of serum magnesium monitoring despite the administration of magnesium sulfate therapy; although the patient showed clinical improvement and no signs of magnesium toxicity, measuring serum magnesium levels could have provided further insight into the treatment's safety and effectiveness. Finally, the findings from this case are limited in their generalizability due to the single-patient case report format.

This case underscores the critical importance of adequate antenatal care (ANC) in preventing severe complications, such as preeclampsia-related intracerebral hemorrhage (ICH), highlights the potential for successful conservative medical management in low-resource settings where multidisciplinary teams and surgical options are unavailable, and demonstrates that timely, resource-appropriate interventions can lead to favorable maternal outcomes even in challenging healthcare environments.

Conclusion

This case highlights intracerebral hemorrhage as a rare but life-threatening complication of preeclampsia, especially in low-resource settings with inadequate antenatal care. Timely diagnosis and conservative management—including antihypertensive therapy, seizure prophylaxis, and anti-edema treatment—can result in significant recovery, as seen in this patient. A multidisciplinary approach involving obstetricians, neurologists, critical care specialists, and internists is crucial for identifying and managing high-risk pregnancies.

Enhancing antenatal care with neurological evaluations, patient education, and collaborative care can prevent severe complications. Future research should focus on developing context-specific guidelines and affordable interventions to improve the detection and management of preeclampsia-related complications in resource-limited settings, ultimately reducing maternal morbidity and mortality.

Abbreviations

ANC, antenatal care; ICH, intracerebral hemorrhage; MRI, magnetic resonance imaging; CT, computed tomography; AVMs, arteriovenous malformations; HELLP, Hemolysis, elevated liver enzymes, and low platelet count.

Ethics and Consent

Informed Consent: Written consent was obtained from the patient for the publication of this case report, including authorization to use any accompanying images. At SIMAD University, ethical approval from the Institutional Review Board was not required for case reports.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare that they have no conflicts of interest related to this study.

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