**Late Onset Postpartum Eclampsia with Intracerebral Hemorrhage: A Case Report of Neurological Complications and Management Following Cesarean Delivery**

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# **Abstract:**

Hypertensive disorders in pregnancy, including preeclampsia and eclampsia, are significant contributors to maternal morbidity and mortality. While abnormalities in placental vasculature are thought to play a major role in the development of these conditions, hypertension can also manifest after pregnancy as postpartum hypertension, exhibiting similar features to those seen during pregnancy. A 31-year-old healthy woman developed right-sided weakness and had a seizure on the 11th postpartum day following a cesarean section. A CT scan of the head revealed an intracranial bleed, which was managed with the Pritchard regimen, conservative measures, and close monitoring.

Delayed postpartum eclampsia, once controversial, is now increasingly recognized but remains understudied. Although guidelines from ACOG and NICE do not specifically define it, postpartum eclampsia is generally considered new-onset hypertension occurring 48 hours to 6 weeks postpartum. Risk factors include advanced maternal age, Black race, maternal obesity, and cesarean delivery, with headache being the most common symptom.

Postpartum blood pressure monitoring is often overlooked, increasing the risk of severe complications, such as target organ damage and intracranial bleeding. Though uncommon, postpartum eclampsia poses a serious threat to postpartum women if not adequately managed.

**Keywords:**Postpartum hypertension, Intracranial Hemorhhage

# **INTRODUCTION**:

Eclampsia, characterised by convulsions, remains a significant contributor to maternal morbidity and mortality, particularly in the postpartum period.[(1)](https://www.zotero.org/google-docs/?9KPJ63) It stands as the second most common cause of maternal death, while its impact is even more devastating in developing nations. From 1979 to 1992, data from the Centers for Disease Control and Prevention revealed that approximately 19.6% of maternal deaths were attributed to pre-eclampsia/eclampsia, signifying a mortality ratio of 1.5 pregnancy-related deaths per 100,000 live births.[(2)](https://www.zotero.org/google-docs/?sTKg1s)

Late postpartum eclampsia, characterized by convulsions occurring more than 48 hours but within 4 weeks after delivery, poses a significant diagnostic and management challenge.[(3)](https://www.zotero.org/google-docs/?ZI4wLK) Intracerebral bleed or hemorrhagic stroke refers to any bleed that occurs within the brain parenchyma. It is a devastating condition with high morbidity and mortality.The approximate rate of intracerebral hemorrhage (ICH) is between 6 to 8 cases per 100,000 deliveries, and the rate of stroke (inclusive of all causes) ranges from 26 to 34 cases per 100,000 deliveries.[(6–8)](https://www.zotero.org/google-docs/?O7ZFQf) Probable factors contributing to postpartum eclampsia include early postpartum discharge protocols with delayed follow-up visits, leaving a critical window where complications might manifest without medical oversight.

We report a case of a 31-year-old who developed right-sided weakness and an episode of seizure on 11th postpartum day following a cesarean section adhering to SCARE 2020 Guidelines.[(9)](https://www.zotero.org/google-docs/?5tQXuK)

# **Case History/Examination:**

A 31-year-old woman developed right-sided weakness and an episode of seizure on the 11th postpartum day following a cesarean section. Over the following days, her weakness progressively worsened, accompanied by increasing hypertension. Upon examination, the patient had a Glasgow Coma Scale (GCS) score of E4V5M6, was well-oriented to time, place, and person, and presented with a blood pressure of 150/110 mm Hg. Her bilateral pupils were equal and reacted appropriately to light. Sensory function was intact, and deep tendon reflexes were normal at 2+. Motor examination revealed right-sided weakness with power rated ⅕ in the lower leg and ⅖ in the upper leg on the Medical Research Council (MRC) scale, while the left side was normal. No signs of meningeal irritation were observed.

**Methods:**

Laboratory investigations were within normal ranges as detailed in (Table 1), and urine analysis was normal upon both routine and microscopic examination. A CT angiogram of the head showed a hyperdense area measuring approximately 4.25 x 2.61 x 2.48 cm (+68 HU) involving the left high frontal lobe, centrum semi-ovale, and globus pallidus of the left basal ganglia. This was associated with surrounding hypodense areas suggestive of perilesional edema extending into the ipsilateral lateral ventricle, third ventricle, fourth ventricle, and bilateral cortical sulci. Notable mass effects included a mild midline shift in the region of the centrum semi-ovale and ipsilateral effacement of sulci. Additionally, the left posterior cerebral artery and its branches exhibited an attenuated caliber. (Figure 1)Magnetic resonance venography (MRV) was performed to rule out sagittal sinus thrombosis, which returned normal results. ( Figure 2)

The patient was managed conservatively with close monitoring of the Glasgow Coma Scale (GCS), pupils, and neurological deficits. Strict blood pressure control was maintained, and periodic assessments including electrocardiograms (ECG), echocardiograms (ECHO), and urine albumin measurements were conducted to monitor for target organ damage. The Pritchard regimen, involving magnesium sulfate with vigilant monitoring for possible toxicity as detailed in (Table 2), was incorporated into the treatment plan. Physiotherapy was initiated, and the patient showed significant improvement. She was discharged on the 10th day of admission.

Upon discharge, the patient was scheduled for regular follow-up visits to monitor her recovery and ensure continued stability. During these visits, her blood pressure was consistently within normal limits, and there were no signs of residual neurological deficits or further seizures. Follow-up imaging showed resolution of the intracerebral haemorrhage. The patient continued physiotherapy to address any residual weakness and reported gradual improvement in mobility and overall function. She was advised on lifestyle modifications and provided with educational resources on managing postpartum health. Subsequent consultations confirmed sustained recovery.

# **DISCUSSION**: Eclampsia, notorious for its multisystem involvement, is a poorly understood complication contributing to significant maternal morbidity and mortality, occurring during the third trimester, labour, or early puerperium. The existence of a delayed postpartum variant of eclampsia was a matter of controversy in the past, but now, several studies have shed some light on its significance.[(3,10,11)](https://www.zotero.org/google-docs/?kZUAki) However, it remains an understudied disease process.Although international guidelines like The American College of Obstetricians and Gynecologists (ACOG) and the National Institute of Health and Care Excellence (NICE) have not specifically defined postpartum eclampsia, it is generally accepted that it is new onset hypertension occurring 48 hrs postpartum up to 6 weeks of postpartum. One study found that there has been a steady decrease in the incidence of antenatal and intrapartum eclampsia along with a relative increase in postpartum eclampsia; this trend has been attributed to the introduction of widespread antenatal care and the introduction of National health services.[(12)](https://www.zotero.org/google-docs/?jZD9S1)

The aetiology of postpartum eclampsia is poorly understood because its existence on its own contradicts the widely accepted fact that the delivery of the placenta “cures” eclampsia/pre-eclampsia and dares to ask whether postpartum eclampsia is a subtype of eclampsia or an entirely new spectrum of pregnancy-related hypertension. Although one study found an association between postpartum eclampsia within 48-72 hrs after delivery and higher levels of soluble fms-like tyrosine kinase (sFlt1), it still fails to address the pathophysiology of late-onset postpartum eclampsia.[(12)](https://www.zotero.org/google-docs/?wwpKkS)The majority of women with delayed-onset postpartum preeclampsia present with neurological symptoms, classically a headache, within the first 7–10 days postpartum. Eclampsia as the presenting symptom occurs only in 10-15% of the patients while a few present with symptoms of volume overload such as shortness of breath and peripheral oedema.[(13)](https://www.zotero.org/google-docs/?vBbY1C)The increase in blood pressure in eclampsia causes disturbed cerebral autoregulation, cerebral hyperperfusion, BBB disruption and formation of cerebral oedema. In addition to the hypertensive state, the loss of cerebral autoregulation and increased permeability of the blood-brain barrier also contribute to the development of intracerebral and intraventricular haemorrhage at lower pressures. [(14)](https://www.zotero.org/google-docs/?d0drTK) Unilateral weakness, as demonstrated in this patient, has not been an observed phenomenon in these patient groups, however, stroke is a common finding in patients with eclampsia.  
  
Risk factors of postpartum preeclampsia include older maternal age, black race, maternal obesity and cesarean delivery with the most common symptoms include headache.[(15)](https://www.zotero.org/google-docs/?Owjadu) Having shared a common risk factor, including chronic endothelial dysfunction and risk for long-term hypertension; stroke and eclampsia, have been known to worsen postpartum morbidity and mortality concurrently. Cerebral hyperperfusion and increased cerebral perfusion pressure occurring in eclamptic patients increase wall tension of cerebral vessels and, therefore, increase the risk of intracerebral haemorrhage.[(16)](https://www.zotero.org/google-docs/?E1Oudp) Women with preeclampsia suffering from a stroke during the puerperium account for <1% of the postpartum population.[(17)](https://www.zotero.org/google-docs/?aColla)

Pre-eclampsia (PE) impacts approximately 4.6% of pregnancies worldwide, with a 95% uncertainty range of 2.7-8.2%. It represents a significant contributor to adverse pregnancy outcomes.[(18)](https://www.zotero.org/google-docs/?fB035d)Hypertension during pregnancy mostly develops during the antepartum but can also develop denovo in postpartum. While there are no clear guidelines for the diagnosis of postpartum hypertension however literature suggests any new-onset hypertension between 48 hours to 6 weeks postpartum can be considered as postpartum hypertension.[(13)](https://www.zotero.org/google-docs/?S9jFv2)

Pregnancy-related hypertension is characterised by a systolic blood pressure (SBP) equal to or exceeding 140 mm Hg and/or diastolic blood pressure (DBP) equal to or exceeding 90 mm Hg on two or more occasions separated by at least 4 hours. Severe hypertension is identified when SBP is 160 mm Hg or higher and/or DBP is 110 mm Hg or higher on two or more occasions, with a short interval of repetition (minutes). [(19,20)](https://www.zotero.org/google-docs/?0lLTje)It can be classified as immediate postpartum eclampsia ( occurring within the first 48 hours ) and Delayed onset postpartum preeclampsia ( occurring after 48 hours ) up to 6 weeks after delivery. [(13)](https://www.zotero.org/google-docs/?nQ63Z3)In cases of severe or resistant hypertension, hypokalemia, abnormal creatinine, or a strong family history of renal disease, investigation of secondary causes of hypertension is crucial .[(19)](https://www.zotero.org/google-docs/?caNJT2)

Stroke, also known as a cerebrovascular accident, ranks as the fourth leading cause of death among all women and the eighth leading cause of pregnancy-related mortality.[(21)](https://www.zotero.org/google-docs/?xFdU8O)Approximately 36% of women with pregnancy-associated strokes (PASs) have comorbid preeclampsia and preeclampsia increases stroke risk during the puerperium up to 6-fold.[(22)](https://www.zotero.org/google-docs/?T5RWMF)PAS encompass infections, primarily genitourinary, chronic hypertension, prothrombotic conditions, and coagulopathies. Women with preeclampsia face an elevated risk of stroke when presenting with urinary tract infections, chronic hypertension, prothrombotic conditions, and coagulopathies. Addressing infections can be a crucial modifiable risk factor in this population, and screening for coagulopathies and prothrombotic conditions might be advisable for women with preeclampsia. [(22)](https://www.zotero.org/google-docs/?6glW9e)Intracerebral haemorrhage is a common finding in women dying from eclampsia, and it is generally agreed that haemorrhage is a result of severe hypertension, although coagulation disorders associated with eclampsia may also play a role [(23)](https://www.zotero.org/google-docs/?0wt1b6)Women generally present with typical postpartum cerebral angiopathy, with severe headaches of sudden onset, normal cerebrospinal fluid and occasional seizures. [(24)](https://www.zotero.org/google-docs/?6N3SiG)

Timely diagnosis is crucial for effective management. Therefore, heightened awareness and a strong suspicion are essential to prevent delayed diagnosis and the associated risk of severe complications. Management of postpartum eclampsia includes the use of anti-hypertensive, magnesium and diuresis[(15)](https://www.zotero.org/google-docs/?MII1pK) Fast-acting antihypertensive medications such as labetalol, hydralazine, or nifedipine are recommended for women with severe hypertension. Hypertension lasting over 15 minutes can precipitate stroke which warrants prompt restoration to normotensive state. Nifedipine may be the drug of choice being the fastest. For persistent postpartum hypertension, consider starting a long-acting antihypertensive agent, with labetalol and nifedipine being effective options, with labetalol potentially requiring a lower dose and causing fewer adverse effects.[(19)](https://www.zotero.org/google-docs/?GeP3Rp) However, the postpartum treatment is the same as during pregnancy and even more efficient given the possibility to use every category of antihypertensive drugs if lactation is abandoned [(25)](https://www.zotero.org/google-docs/?EkfLMo)

In terms of prognosis, the risk of severe maternal morbidity has been found to be higher among women with postpartum eclampsia compared to those with the antepartum subtype, according to recent evidence, Long-term morbidity of eclamptic patients presents as cardiovascular malfunction, such as chronic hypertension and heart failure, but whether this finding can be extrapolated to the postpartum eclamptic variants is still a matter yet to be researched.18 Future pregnancy outcomes, both in terms of the fetal well-being and the maternal recurrence of postpartum eclampsia, are also yet to be addressed by literature, but a general recommendation is to take antihypertensive medications with a favourable pregnancy safety profile for those in whom medication therapy has been prescribed.Women with risk factors for postpartum hypertension (overweight, advanced age, diabetes mellitus) should be informed for their risk and that their BP should be measured at home on a regular basis for 4 weeks.

The management of ICH is indifferent to pregnant and non-pregnant patients and uses a multidisciplinary approach. Canadian Stroke Best Practice Consensus Statement recommends cessel imaging with MR or CT angiography after a hemorrhagic stroke is confirmed.[(26)](https://www.zotero.org/google-docs/?fkdv9z)The basic principle is initial resuscitation of the patient followed by the evacuation of any hemorrhage causing critical mass effect. After initial stabilization, focus should be redirected to finding out the underlying source of the hemorrhage.[(27)](https://www.zotero.org/google-docs/?lCXk5l) Initial stabilization methods include controlling the blood pressure, (Systolic BP < 160 mmHg) and anticoagulant reversal. When appropriate, endovascular treatment options should be used judiciously.[(26)](https://www.zotero.org/google-docs/?WjOSAw) Ruptured aneurysm requires the attention of a multidisciplinary team and a decision on whether to coil or clip the aneurysm should be in the best interest of the patient. The Canadian Stroke Best Practice Consensus Statement suggests low grade symptomatic Arterio-venous malformation be resected, where possible and, for high grade AV malformation, multimodality approach with an interdisciplinary team is advisable.[(26)](https://www.zotero.org/google-docs/?c6uawK) All these interventions should be performed keeping in mind the necessity of appropriate postpartum care of the woman.

**CONCLUSION:**

This case illustrates the critical nature of recognizing and effectively managing delayed postpartum eclampsia, a condition that, despite the delivery of the placenta, can still pose significant risks.The successful integration of the Pritchard regimen and close observation resulted in a positive outcome, underscoring the efficacy of established treatment protocols in managing such complications. Regular blood pressure monitoring should continue throughout the puerperium to facilitate early diagnosis and intervention. This case also reinforces the importance of early detection and intervention to prevent severe outcomes associated with postpartum eclampsia. There’s also a necessity for further research into the pathophysiology and management of postpartum eclampsia to enhance clinical practice and patient safety.

# **Author Contributions**

NS,MY,RJ,NAS,KB wrote the original manuscript, and reviewed, and edited the original manuscript.MY,RJ,NAS,KB reviewed and edited the original manuscript.

# **Conflicts of interest Statement**

The authors have no conflict of interest to declare.

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# **Consent**

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

# **Data Availability**

All the required information is within the manuscript itself.

# **Provenance and peer review** Not commissioned, externally peer-reviewer

# **Key Clinical Message:**

**-Late-Onset Postpartum Eclampsia:** The case report details a 31-year-old woman who developed right-sided weakness and seizures on the 11th postpartum day following a cesarean section, illustrating the occurrence of late-onset eclampsia beyond the typical postpartum period.

**-Neurological Complications:** The patient presented with progressive weakness and hypertension, and imaging revealed a significant hyperdense area in the left frontal lobe and basal ganglia, suggestive of intracerebral hemorrhage (ICH) with associated perilesional edema.

**-Management Approach:** Conservative management included strict blood pressure control, close monitoring of neurological status, and the Pritchard regimen with magnesium sulfate. Physiotherapy was initiated, and the patient was discharged on the 10th day of admission.

**-Recommendations for Follow-Up:** Highlights the importance of regular blood pressure monitoring for at least six weeks postpartum to ensure early detection of complications and facilitate prompt intervention, particularly in patients with risk factors for postpartum hypertension and eclampsia.

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