RESEARCH PAPER

Headache in Pregnancy: A Case Series of Secondary and Benign Causes with Diagnostic Pathways

Dr. Padma Priya P[1], Dr. Parimala A[2*], Dr. Sowparnika L[3]

[1]Postgraduate, Department of Obstetrics and Gynecology, Saveetha Medical College and Hospital, SIMATS, Chennai, India. Email: priyayas.2503@gmail.com, Mobile: 9677510635

[2*]Professor, Department of Obstetrics and Gynecology, Saveetha Medical College and Hospital, SIMATS, Chennai, India. Email: parimalachats2002@yahoo.com (Corresponding Author)

[3]Postgraduate, Department of Obstetrics and Gynecology, Saveetha Medical College and Hospital, SIMATS, Chennai, India. Email: sowpa12@gmail.com

ABSTRACT

Headache during pregnancy and the postpartum period requires careful evaluation because physiological changes can mask serious secondary causes. We present a case series of four obstetric patients with varied headache etiologies, ranging from benign dehydration and migraine to secondary intracranial hypotension and cerebral venous sinus thrombosis. Presentations occurred across antenatal and postnatal settings and included associated features such as vomiting, bradycardia, and visual symptoms. Neuroimaging played a decisive role in differentiating primary from secondary pathology, particularly MRI with venography in suspected venous thrombosis and characteristic structural markers in intracranial hypotension. Management strategies differed substantially according to etiology, including hydration therapy, migraine prophylaxis, and anticoagulation. Outcomes were favorable with timely multidisciplinary involvement. This series underscores the importance of red-flag recognition, imaging selection, and coordinated specialty care when evaluating headache in obstetric patients.

Keywords: Headache in pregnancy, Cerebral venous sinus thrombosis, Intracranial hypotension, Migraine, Neuroimaging, Obstetric emergencies

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BACKGROUND

Headache is a frequent neurological complaint encountered during pregnancy and the postpartum period, but its interpretation requires more caution than in the non-pregnant population. While most cases are attributable to primary disorders such as migraine or tension-type headache, the obstetric setting carries an increased risk of secondary causes that may be time-sensitive and potentially life-threatening [1][2]. Physiological changes in pregnancy including hypercoagulability, altered vascular tone, and fluid shifts modify both risk profile and clinical presentation [3][4]. Conditions such as cerebral venous sinus thrombosis, intracranial hypotension, pre-eclampsia–related complications, and space-occupying lesions may initially present with non-specific headache symptoms [5][6].Clinical differentiation based on symptoms alone is often unreliable, particularly when nausea, vomiting, and visual disturbances overlap with common gestational complaints [7]. Imaging therefore plays a central role when red-flag features are present, with MRI preferred due to radiation avoidance and superior soft tissue characterization [2][8]. Early recognition and structured evaluation pathways are important because management strategies differ substantially between primary and secondary etiologies, and delays can adversely affect both maternal and fetal outcomes [3][6]. This case series was assembled to illustrate the diagnostic breadth of headache presentations in obstetric patients and to emphasize practical decision points in evaluation and management.

CASE PRESENTATION

Case 1

A 24-year-old primigravida at 18 weeks gestation presented with persistent headache of 5 days duration, described as diffuse, non-throbbing, and progressively worsening. It was associated with repeated vomiting and poor oral intake. There was no history of visual aura, focal neurological deficit, seizures, fever, or trauma. Blood pressure recordings were within the normal range for gestation. Neurological examination showed no focal deficits, but the patient appeared dehydrated and symptomatic. Fundoscopy was unremarkable. Initial laboratory parameters were within acceptable limits except for mild electrolyte imbalance consistent with dehydration.

Case 2

A 29-year-old woman in the early postpartum period presented with severe orthostatic headache beginning shortly after delivery. The pain was characteristically worse on standing and improved when lying supine. She reported associated neck discomfort and nausea but no

focal deficits or seizures. There was no prior migraine history. Vital signs were stable. Neurological examination was non-focal. Given the positional nature of symptoms, secondary causes were considered and neuroimaging was arranged.

Case 3

A 28-year-old multiparous woman (P3L3) presented on postoperative day 2 following puerperal sterilization with new-onset severe headache and recurrent vomiting. The headache was diffuse, progressive, and not relieved by analgesics. She had no prior history of migraine or seizure disorder. On examination, she was conscious and oriented but noted to have sinus bradycardia (pulse rate 45–50/min). Blood pressure was within normal limits. Neurological examination revealed no focal deficits. Fundoscopy showed no papilledema.

Case 4

A 23-year-old primigravida at 31 weeks + 6 days gestation presented with complaints of recurrent headache associated with retro-orbital pain and upper abdominal discomfort. The headache was throbbing in nature and associated with visual aura. She reported similar episodes prior to pregnancy. There was no history of seizures, focal neurological deficits, or altered sensorium. Blood pressure recordings were normal, and obstetric examination was unremarkable.

INVESTIGATIONS *If relevant*

Case 1

Baseline laboratory investigations showed mild hemoconcentration and electrolyte imbalance consistent with dehydration. Complete blood count, renal function, and liver enzymes were otherwise within normal limits. Blood pressure recordings remained within the normotensive range, and urine protein screening was negative, making hypertensive disorders of pregnancy unlikely. Neuroimaging was deferred initially because there were no focal neurological deficits or red-flag features. Symptomatic persistence despite hydration prompted further evaluation, and non-contrast MRI brain was performed, which showed no structural abnormality.

Case 2

Routine hematological and biochemical parameters were within normal limits. Given the distinctly postural nature of headache, MRI brain with contrast was performed. Imaging demonstrated features suggestive of intracranial hypotension, including pachymeningeal enhancement and mild descent of brain structures. No evidence of mass lesion or venous thrombosis was noted. MR venography showed preserved venous sinus flow.

Case 3

Baseline laboratory investigations were within normal limits. Electrocardiography showed sinus bradycardia, and Holter monitoring confirmed asymptomatic sinus bradycardia without conduction blocks or arrhythmias. MRI brain demonstrated cortical venous thrombosis. Subsequent CT venography confirmed cerebral venous sinus thrombosis involving the superior sagittal sinus. There was no evidence of intracranial hemorrhage.

Case 4

Neurology consultation was obtained. MRI brain with MR angiography and MR venography was performed to exclude secondary causes and was reported as normal. Ophthalmologic evaluation showed no papilledema. Laboratory investigations were within normal limits, and hypertensive disorders of pregnancy were excluded.

DIFFERENTIAL DIAGNOSIS *If relevant*

Case 1

In a mid-trimester pregnant patient with persistent headache and vomiting, the initial differential included dehydration-related headache, migraine without aura, and early hypertensive spectrum disorders. Normotensive readings and absence of proteinuria made pre-eclampsia unlikely at presentation. Lack of focal neurological signs reduced suspicion for intracranial structural pathology. Given the clinical context and laboratory evidence of volume depletion, dehydration-associated headache remained the leading working diagnosis, with primary headache disorder considered secondary.

Case 2

The prominent positional component worsening on standing and relief in the supine position strongly suggested low cerebrospinal fluid pressure headache. Differentials considered included post-dural puncture headache, spontaneous intracranial hypotension, migraine, and cervicogenic headache. Absence of prior migraine history and the clear orthostatic pattern made primary migraine less likely. Imaging findings supported intracranial hypotension as the most consistent diagnosis.

Case 3

In the postpartum setting, differentials included cerebral venous sinus thrombosis, intracranial hemorrhage, post-dural puncture headache, meningitis, and severe migraine. The presence of progressive headache, vomiting, postpartum hypercoagulable state, and imaging findings supported the diagnosis of cerebral venous sinus thrombosis.

Case 4

Differential diagnoses included migraine headache, pre-eclampsia-related headache, cerebral venous thrombosis, and other secondary intracranial pathologies. Normal blood pressure, absence of proteinuria, prior migraine history, and normal neuroimaging supported the diagnosis of migraine headache.

TREATMENT *If relevant*

Case 1 : Dehydration-related headache in pregnancy

Management was conservative. The patient received intravenous fluids with electrolyte correction and antiemetic therapy. Oral intake was gradually reintroduced once vomiting reduced. Analgesics safe in pregnancy were used as needed. Blood pressure and neurological status were monitored. No anticoagulation or neuro-specific therapy was required after imaging excluded structural and vascular causes. Symptoms improved with rehydration and supportive care.

Case 2 : Secondary intracranial hypotension (postpartum)

Treatment was non-invasive and supportive. The patient was advised strict hydration, relative bed rest, and symptomatic analgesia. Multidisciplinary input from neurology and anaesthesia teams guided management. No invasive cerebrospinal fluid leak intervention was required because symptoms showed progressive improvement and follow-up imaging demonstrated radiological resolution. Cardiology review for associated bradycardia did not indicate active intervention.

Case 3 : Postpartum Cerebral venous sinus thrombosis

The patient was managed in a monitored setting. Therapeutic anticoagulation was initiated with low-molecular-weight heparin (enoxaparin 0.6 mg subcutaneously twice daily) along with adequate hydration. Multidisciplinary care involved neurology, obstetrics, cardiology, anaesthesia, and vascular surgery teams. After clinical stabilization, oral anticoagulation (acenocoumarol) was initiated with appropriate bridging.

Case 4 : Migraine in pregnancy

The patient was managed conservatively with reassurance, adequate hydration, and avoidance of known migraine triggers. Pharmacological management included paracetamol as needed and propranolol (20 mg twice daily) for migraine prophylaxis under neurology guidance. Antiemetics were provided for symptomatic relief.

OUTCOME AND FOLLOW-UP

Case 1 : Dehydration-related headache in pregnancy

With intravenous hydration, antiemetic therapy, and supportive care, the patient's headache and vomiting gradually resolved. Electrolyte imbalance corrected with treatment. She tolerated oral intake and remained neurologically stable. No secondary neurological pathology was identified on imaging. She was discharged with advice on hydration, warning symptoms, and routine antenatal follow-up. No recurrence was documented during the immediate follow-up period.

Case 2 : Secondary intracranial hypotension (postpartum)

Symptoms improved with conservative management including hydration and rest. Orthostatic headache intensity reduced progressively over subsequent days. Follow-up MRI showed resolution of previously noted structural sagging features. No invasive intervention was required. Cardiac rhythm monitoring showed sinus bradycardia without hemodynamic compromise. She remained clinically stable and was discharged with neurology follow-up.

Case 3 : Postpartum Cerebral venous sinus thrombosis

The patient showed progressive symptomatic improvement with resolution of headache and vomiting. Hemodynamic parameters stabilized, and no neurological deficits developed. She was stepped down from intensive monitoring and discharged on oral anticoagulation with planned neurology and obstetric follow-up.

Case 4 : Migraine in pregnancy

The patient showed significant symptomatic improvement following treatment. No recurrence of severe headache was reported during hospital stay. She was discharged in stable condition with advice on trigger avoidance and routine antenatal follow-up.

DISCUSSION *Include a very brief review of similar published cases*

he in pregnancy and the postpartum period is common, but the clinical challenge lies in distinguishing benign primary headache disorders from secondary causes that require urgent intervention. This distinction is particularly important because pregnancy introduces physiological changes including hypercoagulability, altered cerebrospinal fluid dynamics, and vascular reactivity that increase the probability of secondary neurological pathology compared with the non-pregnant population [1][2]. The cases in this series illustrate the diagnostic spectrum encountered in routine obstetric practice, ranging from dehydration-related headache and migraine to intracranial hypotension and cerebral venous sinus thrombosis (CVST).Cerebral venous thrombosis is a well-recognized though relatively uncommon obstetric neurological emergency, with increased incidence in late pregnancy and especially the postpartum period [3][4]. Hypercoagulability, vascular injury, and relative stasis contribute to risk. Clinical presentation is often non-specific, and headache may be the only early symptom, which can delay diagnosis if imaging is deferred [5]. MRI combined with MR venography

remains the preferred diagnostic modality because it demonstrates both parenchymal and venous sinus pathology without ionizing radiation exposure [6]. In our cases, imaging was decisive in establishing diagnosis and guiding anticoagulation therapy, with favorable outcomes following timely treatment.

nial hypotension represents a different but important secondary cause, typically characterized by postural headache. In obstetric settings, it is often associated with neuraxial procedures but may also occur spontaneously [7]. MRI features such as pachymeningeal enhancement and downward displacement of brain structures help confirm the diagnosis. Recognition is important because management is usually conservative, and unnecessary escalation can be avoided when imaging findings are characteristic [7][8].Primary headache disorders, particularly migraine, continue to account for a substantial proportion of gestational headaches. However, pregnancy may modify migraine patterns, and new-onset severe headache should not be assumed to be migraine without appropriate evaluation, especially when red-flag features are present [9]. Clinical overlap between migraine, dehydration, hypertensive disorders, and secondary vascular causes often necessitates structured assessment rather than symptom-based labeling alone.

rring practical lesson from this series is the value of red-flag driven imaging. Features such as new onset severe headache, postpartum state, positional headache, persistent vomiting, bradycardia, visual symptoms, or neurological change should lower the threshold for MRI-based evaluation [2][5]. Multidisciplinary collaboration involving obstetrics, neurology, anaesthesia, and cardiology was central to management across cases and contributed to safe, coordinated care.Although case series cannot establish incidence or comparative effectiveness, they remain useful for reinforcing diagnostic vigilance and illustrating real-world decision pathways. These cases collectively support a structured approach: careful clinical screening, early identification of warning features, appropriate imaging selection, and etiology-specific treatment [1][6][16].

NG POINTS/TAKE HOME MESSAGES *3-5 bullet points*

Headache in pregnancy and postpartum should not be presumed benign without structured assessment, particularly when new, severe, positional, or persistent.

Red-flag features should lower the threshold for MRI ± MR venography, especially in late pregnancy and postpartum where thrombotic risk is higher.

Cerebral venous sinus thrombosis may present with headache alone initially, and early anticoagulation improves outcomes.

Intracranial hypotension has a characteristic orthostatic pattern and imaging signature, and is often managed conservatively.

Multidisciplinary management improves diagnostic speed and treatment safety in obstetric neurological presentations.

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