ORIGINAL RESEARCH PAPER
Volume - 15 | Issue - 03 | March - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

# THE ROLE OF CROSS-SECTIONAL NEUROIMAGING IN THE EVALUATION OF PUERPERAL NEUROLOGICAL SYMPTOMS: A PROSPECTIVE CLINICO-RADIOLOGICAL STUDY

**Radio-Diagnosis**

**Dr. Sayali Kothawade*** Junior Resident, Department of Radiodiagnosis, Rajarajeswari Medical College and Hospital, Bengaluru, India *Corresponding Author

**Dr. Seetha Pramila V.V.** Professor, Department of Radiodiagnosis, Rajarajeswari Medical College and Hospital, Bengaluru, India

**Dr. Parthasarathi A** Professor and Head, Department of Radiodiagnosis, Rajarajeswari Medical College and Hospital, Bengaluru, India

## ABSTRACT

Neurological manifestations in the puerperium represent an important diagnostic challenge because symptoms such as headache, seizures and altered sensorium may arise from diverse etiologies including hypertensive encephalopathy, vascular events and infections. Early neuroimaging plays a crucial role in identifying these conditions and guiding prompt management. This prospective clinico-radiological study evaluated the role of cross-sectional neuroimaging in puerperal women presenting with acute neurological symptoms. Ninety-five postpartum patients presenting with headache, seizures, focal neurological deficits or altered sensorium were evaluated over an 18-month period. All patients underwent neuroimaging with CT brain, MRI brain or both, with additional MR angiography or venography when indicated. Imaging findings were analyzed and correlated with clinical diagnoses. Neuroimaging abnormalities were detected in 54 patients (56.8%). Posterior Reversible Encephalopathy Syndrome (PRES) was the most common diagnosis followed by Cerebral Venous Thrombosis (CVT). Other findings included watershed infarcts, intracerebral hemorrhage, subarachnoid hemorrhage, meningitis, and reversible cerebral vasoconstriction syndrome. Clinical diagnosis correlated with imaging findings in only a minority of cases, highlighting the importance of imaging in accurate diagnosis. MRI with angiographic and venographic sequences demonstrated superior diagnostic capability compared with CT in evaluating postpartum neurological disorders. Early utilization of neuroimaging allows identification of reversible conditions and facilitates timely treatment, thereby reducing maternal neurological morbidity.

## KEYWORDS

Neuroimaging, Puerperium, Posterior Reversible Encephalopathy Syndrome, Cerebral Venous Thrombosis

## 1. INTRODUCTION

The puerperium is a physiologically vulnerable period associated with multiple systemic and neurological complications. Women may present with symptoms such as headache, seizures, focal neurological deficits, visual disturbances or altered mental status. These manifestations may result from conditions ranging from benign headache syndromes to life-threatening vascular events.

Hypertensive disorders of pregnancy, particularly preeclampsia and eclampsia, are among the most common causes of neurological symptoms during the postpartum period. Posterior Reversible Encephalopathy Syndrome (PRES) is frequently encountered in this setting and is characterized by vasogenic edema predominantly affecting the parieto-occipital regions of the brain. Cerebral Venous Thrombosis (CVT) represents another important cause of postpartum neurological deterioration due to the hypercoagulable state associated with pregnancy and the puerperium.

Cross-sectional neuroimaging plays a pivotal role in evaluating these patients. Computed Tomography (CT) is often the initial modality used in emergency settings, whereas Magnetic Resonance Imaging (MRI) provides superior characterization of parenchymal and vascular abnormalities. MR angiography and venography are particularly valuable in diagnosing vascular pathologies such as CVT and reversible cerebral vasoconstriction syndrome.

Despite the importance of neuroimaging, clinical diagnosis alone may be misleading because many postpartum neurological disorders present with overlapping clinical features. Therefore, systematic imaging evaluation is essential for accurate diagnosis and appropriate management.

The present study aimed to evaluate the spectrum of neuroimaging findings in puerperal women presenting with neurological symptoms and to assess the role of cross-sectional imaging techniques in establishing the final diagnosis. (Fugate & Rabinstein, 2015). (Stam, 2005). (Mortimer et al., 2012; Gao et al., 2018).

## 2. MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Radiodiagnosis at Rajarajeswari Medical College and Hospital over a period of 18 months. The study included 95 puerperal women who presented with new-onset neurological symptoms within the postpartum period.

Patients presenting with headache, seizures, focal neurological deficits, visual disturbances or altered sensorium were included in the study. Detailed clinical history and neurological examination were performed prior to imaging. All patients underwent neuroimaging using CT brain, MRI brain or both depending on clinical indication.

- **Computed Tomography (CT)**

Non-contrast CT (NCCT) brain was performed in hemodynamically unstable patients, those presenting with acute severe headache, suspected intracranial haemorrhage, or reduced consciousness.

CT imaging was acquired using standard axial sections with 5 mm slice thickness from skull base to vertex.

- **Magnetic Resonance Imaging (MRI)**

MRI brain was performed using a 1.5 Tesla system. The standardized imaging protocol included:

- Axial T1-weighted imaging
- Axial and coronal T2-weighted imaging
- Fluid-attenuated inversion recovery (FLAIR) sequences
- Diffusion-weighted imaging (DWI) with apparent diffusion coefficient (ADC) mapping
- Susceptibility-weighted imaging (SWI) or Gradient Echo (GRE) sequences
- Magnetic Resonance Venography (MRV) using time-of-flight (TOF) technique
- Magnetic Resonance Angiography (MRA) when indicated

Gadolinium contrast was administered only when clinically indicated.

Demographic details, clinical presentation, timing of symptom onset and imaging findings were documented. The data were analyzed descriptively to determine the frequency and distribution of various neuroimaging diagnoses.

## 3. RESULTS

Among the 95 patients included in the study, neuroimaging abnormalities were detected in 54 patients (56.8%). The majority of patients developed neurological symptoms within the first week following delivery.

Posterior Reversible Encephalopathy Syndrome was the most frequently encountered diagnosis. Imaging typically demonstrated bilateral symmetric vasogenic edema involving the parieto-occipital regions. In some cases, atypical involvement of the frontal lobes and deep gray matter structures was also observed.

Cerebral Venous Thrombosis was the second most common diagnosis. The superior sagittal sinus was the most frequently involved sinus followed by the transverse sinus. Several patients with CVT demonstrated associated venous infarction or lobar hemorrhage.

Other imaging diagnoses included watershed infarcts, intra-parenchymal hemorrhage, subarachnoid hemorrhage, meningitis, reversible cerebral vasoconstriction syndrome, and rare conditions such as pituitary apoplexy.

Headache was the most common presenting symptom followed by seizures. CT brain served as the initial imaging modality in several cases; however, MRI was required for definitive characterization of lesions. Clinical diagnosis alone showed limited correlation with final imaging diagnosis.

**Table 1: Demographic and Clinical Characteristics**

| Parameter | Value |
|---|---|
| Total patients | 95 |
| Positive imaging findings | 54 (56.8%) |
| Normal imaging | 41 (43.2%) |
| Presentation within 1 week postpartum | 87% |
| Clinical–radiological concordance | 32.63% |

**Table 2: Distribution of Neuroimaging Diagnoses**

| Parameter | Value |
|---|---|
| Total patients | 95 |
| Positive imaging findings | 54 (56.8%) |
| Normal imaging | 41 (43.2%) |
| Presentation within 1 week postpartum | 87% |
| Clinical–radiological concordance | 32.63% |

Among the 48 patients who initially underwent non-contrast CT, definitive characterization required subsequent MRI in all cases where pathology was identified, emphasizing the superior diagnostic yield of MRI in puerperal neurological evaluation.

Clinical diagnosis correlated with imaging findings in only 32.63% of cases, highlighting the limited reliability of clinical assessment alone in differentiating puerperal neurological disorders.

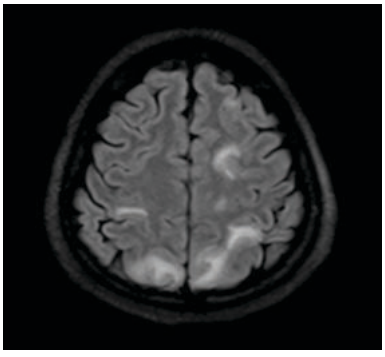

**Figure 1. Posterior Reversible Encephalopathy Syndrome (PRES).**

Axial FLAIR image showing bilateral symmetric hyperintensities involving the frontal, parietal and occipital lobes in a 21-year-old postpartum female with eclampsia.

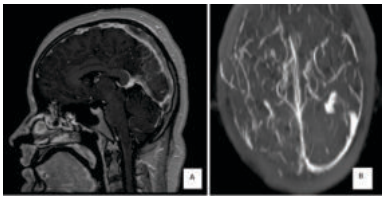

**Figure 2. Cerebral Venous Thrombosis (CVT).**
(A) Contrast-enhanced sagittal T1-weighted MRI demonstrating non-enhancing thrombus within the superior sagittal sinus and sinus confluence with involvement of adjacent cortical veins. (B) MR venography showing non-visualization of the right transverse sinus suggestive of cerebral venous thrombosis in a 27-year-old postpartum female with headache and visual disturbances.

## 4. DISCUSSION

The present study highlights the importance of neuroimaging in the evaluation of puerperal neurological symptoms. PRES emerged as the most common imaging diagnosis, consistent with previous studies reporting a strong association between hypertensive disorders of pregnancy and vasogenic cerebral edema.

The pathophysiology of PRES is believed to involve endothelial dysfunction and failure of cerebral autoregulation, resulting in vasogenic edema predominantly affecting posterior cerebral regions. MRI plays a crucial role in identifying these characteristic imaging features and distinguishing PRES from other causes of postpartum neurological deterioration.

Cerebral Venous Thrombosis constituted the second most frequent diagnosis in our cohort. Pregnancy and the postpartum period are well-recognized risk factors for venous thrombosis due to hypercoagulability and vascular endothelial changes. MR venography remains the investigation of choice for confirming sinus thrombosis.

The study also demonstrated that clinical assessment alone often fails to accurately predict the underlying pathology. Many patients initially suspected to have hypertensive encephalopathy or seizure disorders were ultimately diagnosed with vascular conditions on imaging.

Early neuroimaging is therefore essential in postpartum patients presenting with neurological symptoms. Prompt identification of reversible conditions such as PRES or CVT allows timely treatment and significantly improves neurological outcomes. (Bartynski, 2008; McKinney et al., 2007).

## 5. CONCLUSION

Cross-sectional neuroimaging plays a critical role in the evaluation of neurological symptoms during the puerperium. PRES and CVT represent the most common underlying etiologies. MRI with angiographic and venographic sequences provides superior diagnostic accuracy compared with CT. Early and appropriate imaging evaluation facilitates prompt diagnosis, guides management and helps prevent long-term neurological complications in postpartum women.

## REFERENCES


1. Bartynski, W. S. (2008). Posterior reversible encephalopathy syndrome: Fundamental imaging and clinical features. AJNR American Journal of Neuroradiology, 29(6), 1036–1042.
2. Calabrese, L. H., Dodick, D. W., Schwedt, T. J., & Singhal, A. B. (2007). Reversible cerebral vasoconstriction syndromes. Annals of Internal Medicine, 146(1), 34–44.
3. Covarrubias, D. J., Luetmer, P. H., & Campeau, N. G. (2002). Posterior reversible encephalopathy syndrome: Prognostic utility of diffusion-weighted MR images. AJNR American Journal of Neuroradiology, 23, 1038–1048.
4. Dormont, D., Anxionnat, R., Evrard, S., et al. (1994). MRI in cerebral venous thrombosis. Journal of Neuroradiology, 21, 81–99.
5. Ducros, A. (2012). Reversible cerebral vasoconstriction syndrome. The Lancet Neurology, 11(10), 906–917.
6. Edlow, J. A., Caplan, L. R., O'Brien, K., & Tibbles, C. D. (2013). Diagnosis of acute neurological emergencies in pregnant and post-partum women. The Lancet Neurology, 12(2), 175–185.
7. Fugate, J. E., & Rabinstein, A. A. (2015). Posterior reversible encephalopathy syndrome. The Lancet Neurology, 14(9), 914–925.
8. Gao, G., Zucconi, R. L., & Zucconi, W. B. (2018). Emergent neuroimaging during pregnancy and the postpartum period. Neuroimaging Clinics of North America, 28(3), 419–433.
9. Leach, J. L., Fortuna, R. B., Jones, B. V., & Gaskill-Shipley, M. F. (2006). Imaging of cerebral venous thrombosis. Radiographics, 26(Suppl 1), S19–S41.
10. McKinney, A. M., Short, J., Truwit, C. L., et al. (2007). Posterior reversible encephalopathy syndrome: Incidence of atypical regions and imaging findings. AJR American Journal of Roentgenology, 189(4), 904–912.
11. Mortimer, A. M., Bradley, M. D., Likeman, M., Stoodley, N. G., & Renowden, S. A. (2012). Cranial neuroimaging in pregnancy and the post-partum period. Clinical Radiology, 67(5), 500–508.
12. Saposnik, G., Barinagarrementeria, F., Brown, R. D., et al. (2011). Diagnosis and management of cerebral venous thrombosis. Stroke, 42(4), 1158–1192.
13. Singhal, A. B., Hajj-Ali, R. A., Topcuoglu, M. A., et al. (2011). Reversible cerebral vasoconstriction syndromes: Analysis of 139 cases. Archives of Neurology, 68(8), 1005–1012.
14. Stam, J. (2005). Thrombosis of the cerebral veins and sinuses. New England Journal of Medicine, 352(17), 1791–1798.