

ROLE OF MRI BRAIN IN POSTPARTUM NEUROLOGICAL COMPLICATIONS

¹Dr. Mrudula Babar, ^{2*}Dr. Seema Grover, ³Dr. Shailesh Sangani and ⁴Dr. Vijaya Late^{1,2,3,4}Terna Medical College and Hospital.

*Corresponding Author: Dr. Seema Grover

Terna Medical College and Hospital.

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ABSTRACT

Background: Acute neurological symptoms within 6 weeks after uncomplicated pregnancy and delivery are unexpected and alarming. Although acute neurological and other diseases requiring hospitalization are rare in young women, several are unique to pregnancy and postpartum period, many of which can lead to devastating complications if not recognized early. **Method and Material:** Forty postpartum patients with clinical suspicion of neurological disorders referred to the department of radio diagnosis from 04-08-2018 to 16-04-2020 underwent MRI of the brain. All MR imaging were performed on Siemens Symphony 1.5 Tesla MRI machine. T1-weighted, T2-weighted, FLAIR and additional sequences of gradient and diffusion weighted imaging were performed for all patients. Magnetic resonance venography and MR angiographies were obtained in specific patients. **Results:** Patients referred for MRI Brain had a combination of the following symptoms. Headache was the chief complaint in 35 patients (87.5%), 34 patients (85%) had recent onset of convulsions, 26 patients (65%) were drowsy /semi-conscious, 6 patients (15%) were unconscious, 5 patients (12.5%) had fever and 2 patients (5%) had hemiplegia. Abnormal findings on magnetic resonance imaging were observed in 39 out of 40 patients. The most common finding was posterior reversible encephalopathy syndrome, PRES, in 24 patients (60%), Infarct in 13 patients (32.5%), Cerebral venous thrombosis in 10 patients (25%), Intra parenchymal hemorrhage in 6 patients (15%), Pontine and extra pontine osmotic demyelination in 3 patients (7.5%), Sub arachnoid hemorrhage and Subdural hematoma were each seen in 2 patients (5%), and infective granuloma in 1 patient (2.5%).

KEYWORDS: MRI – Magnetic Resonance Imaging, PRES- Posterior reversible encephalopathy syndrome, SAH – Subarachnoid hemorrhage, SDH – Subdural hematoma.

INTRODUCTION

Any neurological disorder during post partum period could have serious consequences for mother and subsequently for child. Neurological disorders contribute to approximately 20% of maternal deaths. Symptoms and signs are nonspecific, and it can be difficult to differentiate between these conditions on clinical grounds alone.^[1] The importance of early and accurate diagnostic imaging is underscored by the fact that most patients are otherwise young and healthy and prompt institution of appropriate therapy can result in complete recovery. So it is important for the radiologist to be familiar with these entities so that these patients can be diagnosed and therefore treated rapidly and efficiently.

In India the average age of 1st pregnancy is 19.9 years, with increasing pregnancy associated complications such as eclampsia, gestational diabetes, and hypertension.^[2] Many of the neurological diseases can lead to devastating complications if not recognized early. Some, like preeclampsia, are easily recognized by obstetricians and are managed without significant neurological complications unless seizures develop. Headache is a common complaint in pregnant women and

distinguishing benign headache from one that is a sign of serious disease is often not considered until serious neurological complications develop.^[3]

Precise diagnosis is essential to guide subsequent management. This advent of Magnetic resonance imaging has proved to be a boon in the early and non-invasive diagnosis of pregnancy related neurological complications by recognition of characteristic imaging findings. Moreover, earlier use of imaging results in fewer delayed diagnoses^[4] and hence better patient management. Even when the imaging changes are less specific, knowledge of likely possibilities will lead to more appropriate earlier use of imaging. The early use of CNS imaging is mainly indicated to avoid the consequences of a delayed diagnosis.

AIMS AND OBJECTIVE

1. To evaluate the role of MRI in the diagnosis of various pathologies in post-partum period i.e., in detection and characterization of lesions.
2. To study the imaging features of various neurological pathologies in post-partum period using MRI.

3. To determine the relative frequency of various neurological disorders during post-partum period.

MATERIALS AND METHODS

A cross sectional study of MRI brain of 40 patients was performed in our department. We studied 40 patients from 04-08-2018 to 16-04-2020. The cases were included in a cross sectional retrospective observational study conducted over this period.

Inclusion criteria

- All post-partum patients including patients up to six weeks after termination of pregnancy presenting with the clinical history of acute neurological illness such as seizures, alteration of sensorium, severe headache, focal neurological deficit and visual disturbances in varying combinations. In our study there were no patients with visual disturbances.
- Refractory atypical eclampsia –those patients who do not respond to Mg SO₄ and anti-hypertensive treatment within 24 hrs after initiation of the treatment and/or develop repeated episodes of convulsions.

Exclusion criteria

1) Patients with known neurologic disease such as epilepsy, a history of previous stroke and known central nervous system malformation

2) Contraindications for MRI:

Patients having

- Ferromagnetic Ocular foreign body
- Brain Aneurysm Clip
- Implanted neural stimulator.
- Implanted cardiac pacemaker or defibrillator.
- Cochlear implant
- Other implanted medical devices: (e.g. Swan Ganz catheter)
- Insulin pump
- Metal shrapnel or bullet
- Patients with surgery of uncertain type where the presence of metal clips or wires cannot be excluded.

RESULTS AND DISCUSSION

This retrospective cross-sectional study of 40 patients was carried out in a tertiary care hospital. The study

included post partum patients having neurological complications and presenting with various complaints like headache, convulsion, unconsciousness, drowsy/semi consciousness, fever and hemiplegia. These patients were referred from obstetrics and gynecology department for MRI brain evaluation. Headache in 35 patients (87.5%) and convulsions in 34 patients (85%) were the main presenting complaints in our study followed by drowsiness, unconsciousness, fever and hemiplegia.

In our study 24 patients (60%) were found to be hypertensive at the onset of the disease. In this study maximum number of patients (62.5%) were primi gravida. Abnormal findings on magnetic resonance imaging were observed in 39 out of 40 patients. The most common finding was posterior reversible encephalopathy syndrome, PRES, in 24 patients (60%) Infarct in 13 patients (32.5%), Cerebral venous thrombosis in 10 patients (25%), Intra parenchymal hemorrhage in 6 patients (15%) Pontine and extra pontine osmotic demyelination in 3 patients (7.5%) Sub arachnoid hemorrhage in 2 patients (5%), Subdural hematoma in 2 patients (5%),

In our study 13 patients (32.5%) showed diffusion restriction on diffusion weighted imaging suggestive of cytotoxic edema. In our study total 10 patients (25%) showed blooming on gradient imaging out of which 2 patients (5%) were found to have SAH, 2 patients (5%) had SDH, and 6 patients (15%) had intra parenchymal hemorrhage. a. Only 1 (2.5%) patient showed normal imaging study.

In our study 1 (2.5%) patient was found with infective granuloma with the patient profile consistent with Ahmadi SA et al published in 2011 and imaging features consistent with tuberculoma⁹⁰

The present study was undertaken with an aim of evaluating various pathologies in post partum period i.e. in detection and characterization of lesions and to determine the relative frequency of various neurological disorders during post partum period.^[5] Following disorders were noted, few of them occurring in combination in the same patient:

Table 1: Distribution of neurological findings in symptomatic patients.

Sr No	Classification	No. of patients
1.	PRES	24 (60%)
2.	Infarct	13(32.5%)
3.	Cerebral venous thrombosis	10(25%)
4.	Intra parenchymal haemorrhage	6(15%)
5.	Pontine and extra pontine osmotic demyelination	3(7.5%)
6.	SAH	2(5%)
7.	SDH	2(5%)
8.	Infective granuloma	1(2.5%)
9.	Normal study	1(2.5%)

1. Posterior reversible encephalopathy syndrome

In our study 24 patients (60%) were diagnosed to have PRES. MR imaging of the brain in PRES is characterized by areas of altered signal intensity predominantly involving the occipital and parietal regions. In few cases extensive, asymmetric involvement of the brain occurred along with involvement of atypical areas like temporal lobes in 18 patients (75%), the frontal lobes in 16 patients (66.6%), cerebellum in 13 patients (54.1%), basal ganglia in 7 patients (29.1%) corpus callosum in 3

patients(12.5%) and brain stem in 2 patients (8.3%) thus reinforcing the thought that anterior regions were also frequently involved in PRES.^[6] These findings were consistent with the article by McKinney et al published in October 2007 “Posterior Reversible Encephalopathy Syndrome: Incidence of Atypical Regions of Involvement and Imaging Findings.^[7]”

Few cases showed hemorrhagic transformation, infarction and SAH. (table 2)

Table 2: PRES with other imaging manifestations.

Sr. No.	PRES with other imaging manifestations	No. of patients
1	PRES without infarct/haemorrhage	19(79.16%)
2	PRES with infarct	4(16.6%)
3	PRES with haemorrhage	1(4.16%)
	Total no of patients	24 (100%)

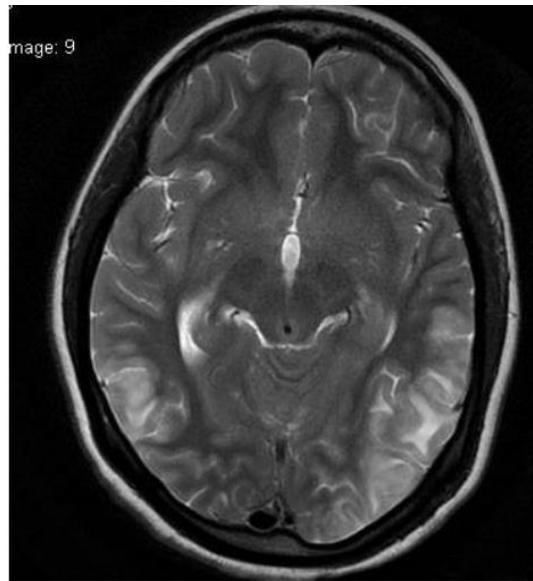


Figure 1: T2WI asymmetric hyperintensity in bilateral parieto-occipital lobes.



Figure 2: Atypical imaging feature in the form of hyperintensity in bilateral cerebellar hemispheres on axial T2WI.

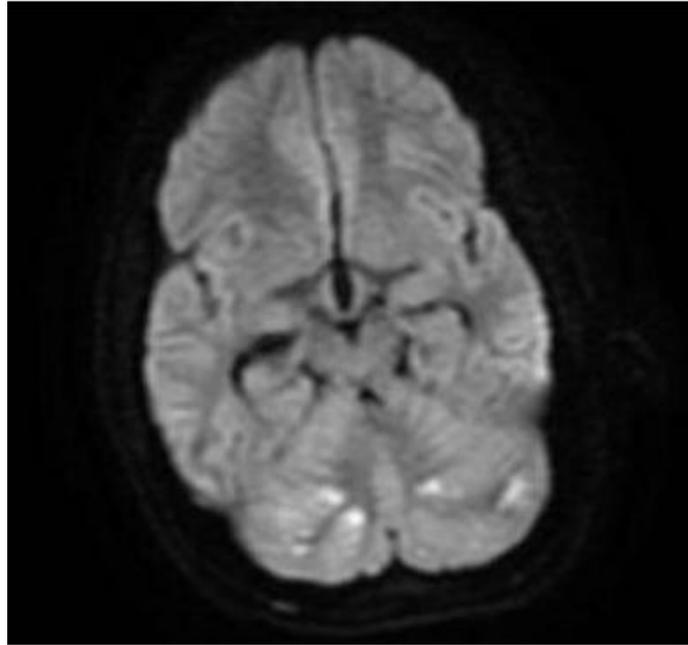


Figure 3: Similar patient showing multiple discrete foci of restriction in bilateral cerebellar hemisphere on diffusion weighted imaging.

2. Cerebral venous sinus thrombosis

In our study 10 patients (25%) were found to have cerebral venous sinus thrombosis. Out of 10 patients of CVT, 9 patients were associated with neuroparenchymal changes and only 1 patient did not have any

neuroparenchymal changes (Table -3). Superior sagittal sinus (70%) was found to be the commonest sinus to thrombose followed by transverse sinus (60%), Sigmoid sinus (40%), Straight sinus (10%), Jugular bulb (30%), Cortical veins (30%).

Table 3: Cerebral venous thrombosis with other imaging manifestations.

Sr no.	CVT with other imaging manifestations	No. of patients
1	CVT with venous infarct without hemorrhage	3(30%)
2	CVT with venous infarct with hemorrhage	6(60%)
3	CVT without any neuro-parenchymal changes	1(10%)
	Total no of patients	10(100%)

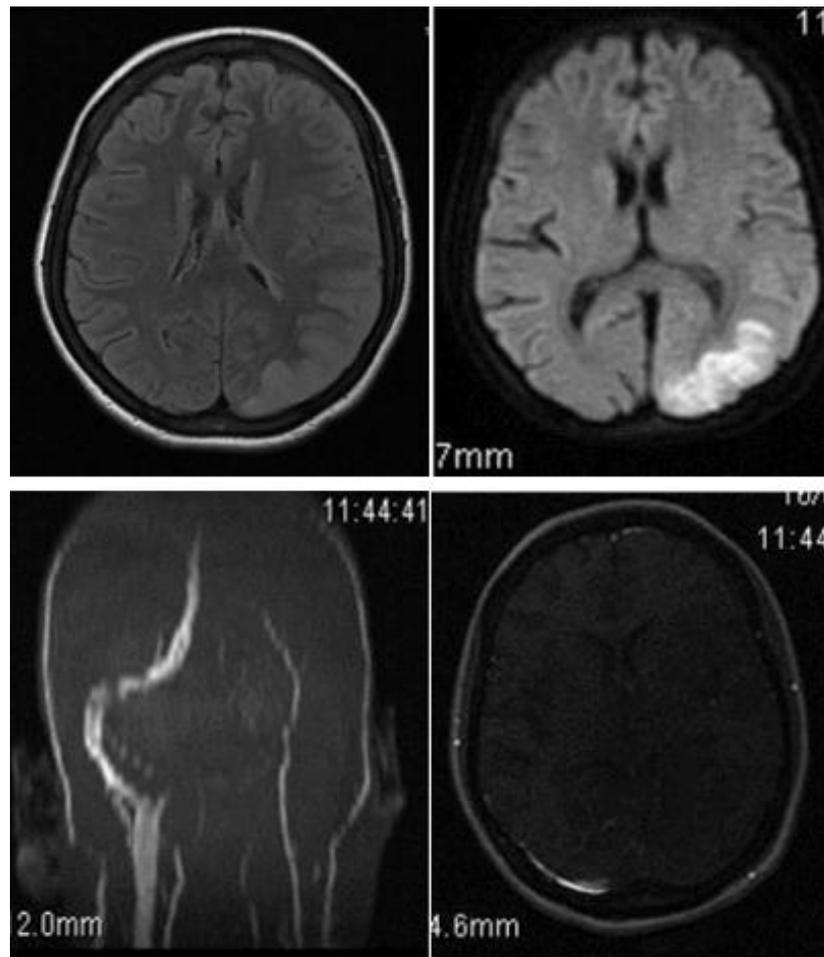


Figure 4: A) axial FLAIR image showing hyperintensity, the corresponding area showing restriction on DWI in figure (B), (C) 3 D TOF MR venography anterior portion of superior saggital sinus, left transverse sinus and left IJV are not visualized suggesting thrombosis. (D) MR Venography axial image shows loss of flow void in left transverse sinus.

3. Hemorrhages

In our study total 10 patients (25%) showed blooming on gradient imaging out of which 2 patients (5%) were found to have SAH, 2 patients (5%) had SDH, and 6 patients (15%) had intra parenchymal hemorrhage.

4. Pontine and extra pontine osmotic demyelination

In our study 3 patients(7.5%) were found to have pontine and extra pontine osmotic demyelination. In our study 1 out of 3 patients of osmotic demyelination syndrome was found to have T2/FLAIR hyperintensity in pons. The other two patients had T2/FLAIR hyperintensity in corpus callosum, cerebellum, pons and basal ganglia.

5. Infective Granuloma

In our study only 1 (2.5%) patient was found to have infective granuloma. Ahmadi SA et al published in 2011 that Tuberculoma is common in endemic areas but its occurrence during pregnancy is occasional and of particular interest are its intriguing clinical picture mimicking toxemia of pregnancy and brain tumor.^[8]

CONCLUSION

All post partum neurological complications are not related to eclampsia and imaging plays an inevitable role for the diagnosis of array of various pathologies. Posterior reversible encephalopathy syndrome was the most common disorder seen followed by infarcts and cerebral venous thrombosis. MRI is a key imaging modality in the evaluation of various pathologies of brain in post partum patients with neurological complications owing to its superior contrast resolution, lack of ionizing radiation and in better characterization of lesions.

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