RADIOLOGICAL FINDINGS IN PERI-PARTUM NEUROLOGICAL EMERGENCIES: EXPERIENCE FROM A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Acute neurological diseases requiring hospitalization are unusual in young women. Some of these diseases are unique to pregnancy and the post-partum period including pre-ecclampsia. Others such as cerebral venous thrombosis, ischemic stroke, intracranial hemorrhage, etc. are indirectly related to pregnancy and seen less frequently. To explore the causes of neurological emergencies in this specific patient population, we performed a radiological audit of young women in pregnancy and postpartum period presenting with neurological emergencies. **Material and methods:** This was a retrospective study carried in the Department of Radiology, Liaquat National Hospital over one year from January 2013 till January 2014, after approval by ethical review committee of the hospital. Patients presenting with neurological signs and symptoms during pregnancy or in postpartum period (up to 6 weeks) requiring medical referral were included in the study. **Result:** A total of 18 patients presented with acute neurological emergencies during postpartum period. Imaging was done in all those patients including CT and MRI while MRV was done in selective patients. Age range was between 20-33 years. The commonest radiological diagnosis was PRES in 9 patients. Other patients had cerebral venous thrombosis (4 patients), intra-cerebral hemorrhage (2 patients), infarction (1 patient), ADEMS (1 patient) and arterio-venous malformation (1 patient). **Conclusion:** Young women in pregnancy and post-partum period can present with a variety of acute neurological emergencies. In our series, PRES was the commonest diagnosis.

INTRODUCTION

Acute neurological emergencies in the form of coma, neurological deficit, headache and seizures are common in peri-partum period and are an important cause of admission to the critical care unit [1]. Diverse pathological conditions can affect the central nervous system during pregnancy and postpartum period, some of which are specific to the physiological process of reproduction such as eclampsia or postpartum cerebral angiopathy [2]. Others are non-specific but occur more often in pregnant women such as dural venous sinus thrombosis, cerebral infarction and pituitary apoplexy [2]. Many of these neurological diseases can lead to devastating complications if not recognized early [3]. Pregnant and post-partum patients who present with acute neurological symptoms need a thorough diagnostic evaluation that targets a range of pathological conditions [4]. As neurological diseases contribute to approximately 20% of natural death, it is critical to identify these high risk patients and consider early diagnostic testing and potential care [3]. Posterior Reversible Encephalopathy Syndrome (PRES) is a recently described clinic-radiological syndrome that is associated with several medical conditions including eclampsia. It is important to recognize and treat the etiology responsible for PRES as it can progress from reversible vasogenic edema to irreversible ischemic damage if appropriate treatment is not provided [5].

MATERIALS AND METHODS

This was a retrospective study done at the Radiology Department of Liaquat National Hospital Karachi over one year duration from January 2013 to January 2014. Ethical review committee of the hospital approved the study. All pregnant, post-abortion or post-partum patients (up to six weeks of termination of pregnancy) presenting with predominantly neurological signs and symptoms were included in the study. Medical record numbers were retrieved and files were reviewed to fill the proforma. Demographic variables, clinical parameters, time of presentation and imaging findings were recorded. These included age, clinical presentation, time of presentation (antepartum / postpartum), imaging abnormality, its site and outcome on follow up scans. Two radiologists reviewed all MR images.

RESULTS

A total of 18 patients with acute neurological emergencies were included in the study. All the cases belonged to patients in postpartum period. Their ages ranged

between 20 to 33 years. Spiral CT was done in only one patient with hemorrhage, while MRI was done in rest. MRV was done in patients in whom there was a suspicion of cerebral venous thrombosis (CVT). The commonest radiological diagnosis was PRES in 9 patients. Other patients had cerebral venous thrombosis (4 patients), intra-cerebral hemorrhage (2 patients), infarction (1 patient), ADEMS (1 patient) and arterio-venous malformation (1 patient) (Table1). In patients with PRES, seizure and headaches were the main presenting complaints. All patients had history of hypertension. MRI showed the lesions to be characteristically located in parietal and occipital regions with involvement of basal ganglia, brainstem and deep white matter. These were hypointense on T1WI and hyperintense on T2WI. Changes were best seen on FLAIR images. Six weeks follow up in 4 patients showed complete resolution of abnormal signals. Only one patient had basal ganglia hemorrhage along with PRES. She presented with seizures and left sided weakness after undergoing caesarian section. On imaging there was acute hematoma in right lentiform nucleus. Along with this, high signal intensity was seen in subcortical white matter of both occipital and parietal regions. Four patients had cerebral venous thrombosis (CVT). Headache and fever were the main presenting complaints. These patients were of relatively older age between 28-35 years. MRI along with MRV was done in all these patients which showed haemorhagic infarctions not following arterial territory and also involving deep gray matter i.e., thalamus. One patient had intra-ventricular dissection of blood into lateral ventricles. On T1 axial contrast images, filling defect (empty delta sign) was seen in all four patients. MRV was similarly diagnostic in all four patients. Two patients presented with intracranial bleed. One had a large hematoma in left superior parietal region. The other one had sub-acute hematoma in right basal ganglia. One patient presented with right sided weakness two days after delivering the baby. On imaging there was a sub-acute ischemic infarct in left posterior parietal periventricular region. Two unusual cases were also seen, which were not directly related to pregnancy or puerperium. One of these had subarachnoid haemorrhage in postpartum period. On imaging there was arterio-venous malformation in right superior parietal region, which had bled in postpartum period. Another case was of a 20 year old patient who presented with postpartum quadriplegia. MRV showed high signal intensity in bilateral centrum semi-ovale, lentiform nuclei and both cerebral peduncles. These showed mild restriction on diffusion weighted images and patchy post contrast enhancement. A diagnosis of acute disseminated encephalomyelitis syndrome (ADEMS) was made. She was treated with steroids and responded well.

Table 1:

PRES	9
CVT	4
ICB	2
INFARCTION	1
AVM	1
ADEMS	1
Total	18

DISCUSSION

The goal of this study was to record the incidence and radiological findings in various peripartum neurological emergencies and to the best of our knowledge, this is the first such report. We found PRES to be the commonest diagnosis in this group of patients, which interestingly remains an infrequent clinical diagnosis in day to day obstetric care [6]. Clinical manifestations of PRES include an acute and self-limiting headache, altered mental status, cortical blindness and seizures [7].The differential diagnoses include various acute neurologic conditions including ischemic stroke. Pathogenesis of PRES has been suggested to be a temporary failure of cerebral auto-regulation leading to intracranial hypertension, breakdown of blood brain barrier and consequent vasogenic edema [8]. The other mechanism proposed suggests that vasospasm consolidates the reversible edema resulting in cytotoxic edema [9, 10]. One important consideration not to be overlooked is the fact that PRES can develop in patients with normal blood pressures. A significant minority of patients with PRES have been reported to be normotensive at the time of presentation [11, 12]. The lesions are characteristically located at parietal and occipital lobes followed by frontal lobes, the inferior temporoccipital junction and cerebellum [13] (Figure1). PRES, however, is not an exclusively posteriorly located process (Figure2). A study of 70 patients by Alexander M. Mckinny et al, showed that the incidence of region involvement was parieto-occipital 98.7%, temporal 68.4%, thalamus 30.3%, cerebellum 34.2%, brainstem 18.4% and basal ganglia 11.8%[14]. T2 weighted images are not the most sensitive sequences for the detection of edema in cortical/subcortical regions being close to the CSF spaces and therefore FLAIR images have been considered superior in picking up the edematous regions because of their ability to suppress the overlying CSF signals [15]. CVT emerged as second most frequent diagnosis after PRES. It was the cause of seizures in 4 out of 18 patients in this study. It is the most common cerebrovascular incident during puerperium. Clinical menifestations consist of headache, vomiting, focal or generalized seizures, confusion and altered level of consciousness [16]. A study by Kamel H, et al showed that the elevated risk of thrombosis persists until 12 weeks after delivery. However, the absolute

increase in risk beyond 6 weeks after delivery is low [17]. A venous etiology should be strongly suspected when infarction occurs in pregnant patients, especially when infarcts do not appear to respect arterial territories or when infarcts occur in both thalami which may be due to thrombosis of deep cerebral veins on imaging [18] (Figure3). MRI venography is considered the technique of choice for diagnosis, and follow up of CVT but in certain cases, MRI could be superior as it shows the thrombosis itself and not just the absence of signal as seen on MRI venography [19]. The clinical picture can be identical in the cases of PRES and CVT however the imaging findings especially on MRI and MRV can help the clinicians to make the correct diagnosis and initiate the appropriate treatment [20]. Pregnancy and postpartum period are associated with a marked increase in the risk of ischemic stroke and intracerebral hemorrhage with the highest risk in puerperium [21]. Intracerebral hemorrhage is the rarer of two stroke subtypes but it carries the greater risk of morbidity and mortality. Presentation is with headache, seizure and focal neurological deficit [22]. Some of the risk factors associated with pregnancy related stroke include hypertension, diabetes, valvular heart disease, hypercoagulable disorders and migraine [23]. We had one case of acute disseminated encephalomyelitis syndrome (ADEMS). It is an inflammatory disease of central nervous system resulting in multifocal demyelinating lesions affecting the grey and white matter of brain and spinal cord [24]. MRI is an important preclinical tool available to aid in the diagnosis of ADEMS and to distinguish it from other inflammatory diseases [25]. Despite the importance of careful clinical evaluation, it was the imaging studies that provided the final diagnosis in most of our cases. Many neurological conditions that may be seen during pregnancy were not observed in this study probably because the period of study was relatively short. A study over at least 5 years would be more inclusive of all varieties of neurological diseases. Diagnosis of PRES was made based only on the MR findings especially FLAIR sequences and no gold standard was available for reference. This also highlights the critical role of MR in such diagnoses.

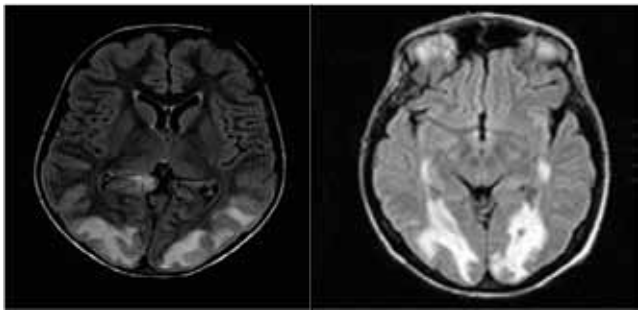

Figure 1: Characteristic imaging pattern of PRES in different patients - presence of edema involving the white matter of the posterior portions of both cerebral hemispheres.

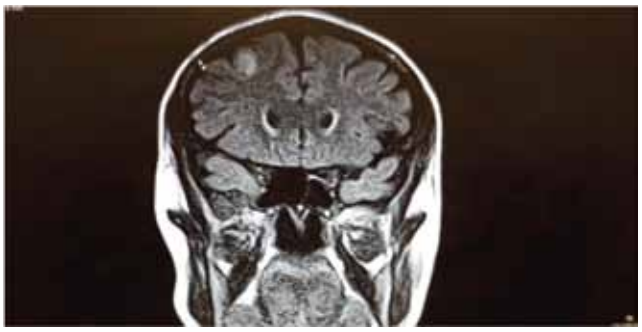

Figure 2: PRES is not an exclusively posteriorly located process. MRI FLAIR image of a 22 years old patient with PRES shows edema in right frontoparietal region.

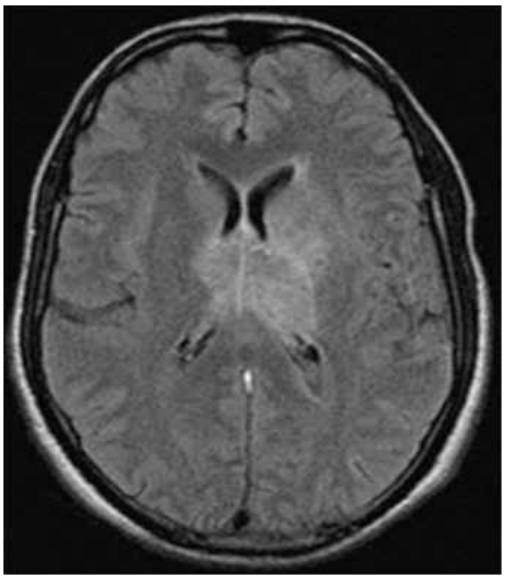

Figure 3: A case of CVT showing bilateral thalamic infarctions.

CONCLUSION

In our series, PRES emerged as the predominant neurological disorder in the postpartum period. Although there is controversy regarding the pathogenesis of PRES, it is imperative that the syndrome of PRES is correctly recognized on neuroimaging as the condition is reversible and potential complications can be avoided with appropriate treatment. FLAIR remains the most sensitive sequence in its detection. PRES can be seen in normotensive patients and is not an exclusively posteriorly located process. Likewise CVT is also an important consideration in pregnant and postpartum women because of its increased risk. MRV is usually found to be the most accurate diagnostic tool. Other causes like ischemic stroke and intracerebral hemorrhage, ADEMS and AVM can also be seen in this period in patients presenting with neurological symptoms. As these conditions are infrequent and require multidisciplinary approach, clinicians should consider early transfer of these patients to a center that can deliver full diagnostic testing and care.

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