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CASE REPORT

Eclampsia and posterior reversible encephalopathy syndrome in a parturient complicated by SARS COVID-19 pneumonia

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Abstract A primigravida at 32 weeks of gestation presented to us with eclampsia and Posterior Reversible Encephalopathy Syndrome (PRES) along with SARS COVID-19 pneumonia. Immediate termination of pregnancy was done under general anesthesia and patient was electively ventilated in view of increased oxygen requirements. Further therapy using magnesium sulphate, antihypertensives, steroids, and convalescent plasma was carried out. The condition of the patient steadily improved leading to her extubation on the 4th postoperative day and subsequent discharge on the 8th day of admission.

Introduction

Management of pregnant parturient with SARS COVID-19 can be challenging as it is extremely contagious and can cause severe life threatening acute lower respiratory tract infection. Physiological and immunomodulatory changes during pregnancy may exacerbate the presentation of COVID-19.[1] Pregnant patients with SARS COVID-19 seem to be more prone to develop hypertensive disorders of pregnancy.[1] Upon binding to ACE 2, COVID-19 causes its downregulation, thus lowering angiotensin levels, which can mimic/worsen the vasoconstriction, inflammation, and pro-coagulopathic effects that occur in preeclampsia and eclampsia.

Posterior Reversible Encephalopathy (PRES) has been well-described to be associated with hypertensive disorders of pregnancy.[2,3] Even though diagnosis of PRES may be challenging, early recognition of this condition is important so that it stays reversible. We encountered a complicated clinical scenario as our parturient was hypoxic with SARS

Abbreviations: ACE 2, Angiotensin converting enzyme 2; COVID-19, Coronavirus disease 2019; LDH, Lactate Dehydrogenase; MRI, Magnetic Resonance Imaging; PCR, Polymerase Chain reaction; PRES, Posterior Reversible Encephalopathy Syndrome; RT, Reverse Transcriptase; SIMV + PS, Synchronized Intermittent Mandatory Ventilation + Pressure Support.

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Table 1 Laboratory investigations.

	Day of admission	Day 2	Day 5	Day 7
Hemoglobin ($g.dL^{-1}$)	14		12.8	
WBC count ($cells.mm^{-3}$)	8700	11,000	9432	6534
Total Bilirubin ($mg.dL^{-1}$)	3.2		1.9	1.2
Albumin ($g.dL^{-1}$)	2.8		3.3	3.1
SGOT ($U.L^{-1}$)	82		45	44
SGPT ($U.L^{-1}$)	78		43	41
Urea ($mg.dL^{-1}$)	78		67	45
Creatinine ($mg.dL^{-1}$)	1.5	1.6	1.4	1.1
INR	1.3			
D Dimer ($ng.mL^{-1}$)	5209			
Fibrinogen (mg%)	646			
Procalcitonin ($ng.mL^{-1}$)	0.45			
Ferritin ($ng.mL^{-1}$)	1746			
LDH ($U.L^{-1}$)	408			
IL 6 ($pg.mL^{-1}$)	298		100	

COVID-19 pneumonia along with eclampsia and PRES. A thorough search on the available literature at that time failed to give adequate insight as to how we could probably manage this clinical scenario. We were able to manage the case successfully based on our clinical judgment. The case has been described in detail below.

Description of the case

After procuring appropriate consent from the patient and our institutional board of ethics committee, we present the case of a 34-year-old primigravida 32 weeks of gestation who was referred to our institute from a local hospital where she presented with headache and generalised tonic-clonic seizures. An MRI was performed there following which she received a loading dose of 2 g magnesium sulphate and was shifted to our institution. On presentation she appeared to be disoriented, confused, and irritable. She was saturating at 92% on room air with stable hemodynamic parameters. Her bystanders revealed that she was diagnosed to have hypertension 3 days back when she consulted a local doctor due to persistent headache.

In the ER she was administered sedation in the form of intravenous midazolam in view of her extreme agitation. Intravenous labetolol was started as an infusion as her blood pressure was high (210/110 mmHg), along with magnesium sulphate (2 g bolus and 1 $g.h^{-1}$ infusion). The MRI films from the local hospital were reviewed by our in-house radiologist which showed features of PRES with several areas of altered signal intensity in the left temporal, occipital lobes, and basal ganglia.

By this time, her initial blood investigations arrived showing normal hemoglobin and cell count. Liver function tests were deranged along with high Lactate Dehydrogenase (LDH) and aminotransferases (Table 1). As it was the protocol of our hospital to screen all patients preoperatively due to the on-going pandemic, her COVID-19 RT-PCR (GeneXpert) came out to be positive. After a multidisciplinary consultation, which included obstetricians, neurologists, and anesthesiologists, it was decided to perform a LSCS on her under general anesthesia with elective postoperative ventilation and management in our COVID-19 ICU.

Her pre-induction vitals in the OR were a heart rate of 123 per minute, blood pressure of 180/100, and saturation of 90% that increased to 94% with preoxygenation with 100% FiO2. A modified rapid sequence intubation was performed using propofol 3 $mg.kg^{-1}$ and atracurium 1 $mg.kg^{-1}$. As her saturation varied between 89–90% post-intubation, oxygenation was maintained using 100% FiO2. Propofol infusion at a dose of 8.0 $mg.kg^{-1}.h^{-1}$ was used to maintain anesthesia. A 1.8 kg live baby was delivered within 9 minutes of induction of anesthesia but had to be intubated in view of bradycardia and low oxygen saturation. Uterine hypotonia was countered by administering a 1-unit bolus of oxytocin, followed by an infusion of 10 units per hour for 4 hours. The reminder of the surgery was uneventful with a total estimated blood loss of 800–1000 mL. The patient received 1.5 liters of Ringer lactate, 500 mL of gelatine along with one unit of packed red cells as a part of the intraoperative fluid replacement. Infusion of labetolol was continued at 5 $mg.h^{-1}$ in view of hypertension. She was electively ventilated and shifted to our COVID-19 ICU for further management.

Ventilation was continued in the ICU using controlled ventilation with 80% FiO2 on the day of the surgery. A chest CXR was performed which showed bilateral symmetrical peripheral opacities typical of COVID-19 pneumonia. She was enrolled in our convalescent plasma trial as per our institutional protocol. Sedation was maintained using infusions of fentanyl and midazolam along with atracurium for paralysis. Blood pressure was controlled using labetolol infusion titrated to maintain a MAP of 90 mmHG. Her inflammatory markers were elevated with LDH (408 $U.L^{-1}$), Procalcitonin 0.45 $ng.mL^{-1}$, and IL6 of 298 $pg.mL^{-1}$. Intravenous solumedrol 80 $mg.day^{-1}$ was started in two divided doses. Furosemide was added in order to maintain a negative fluid balance. Other supportive measures like broad spectrum antibiotics and low molecular weight heparin were also initiated.

By the 3rd postoperative day, her CXR was showing significant improvement with reduced FiO2 requirements. Two doses of convalescent plasma were transfused 24 hours apart on the 2nd and 3rd postoperative day. Atracurium infusion

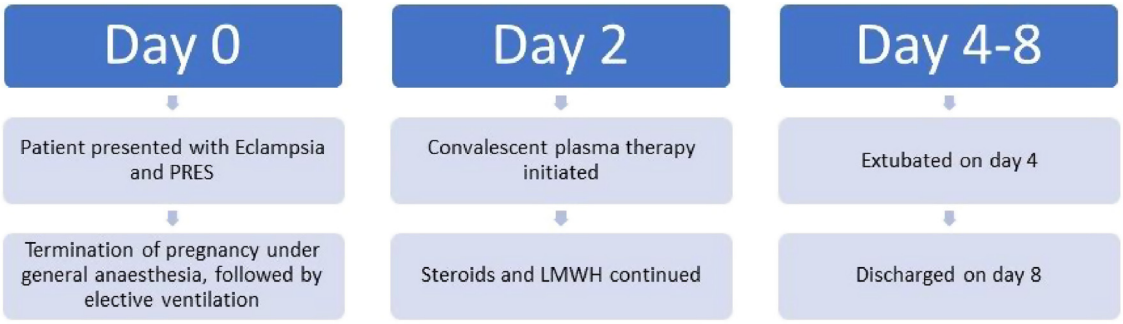

Figure 1 Timeline of events.

was stopped, sedation was tapered, and she was weaned to SIMV + PS mode of ventilation by the end of the day. We were able to extubate her on to a face mask on the 4th postoperative day. She remained in the ICU for three more days during which she was mobilized, resumed on oral feeds, started on oral antihypertensives. She was shifted to ward on the 8th postoperative day following which an MRI was repeated which revealed a normal study. Hence, the diagnosis of PRES was confirmed based on reversibility of radiological and neurological findings. Our neonatologists were able to extubate the newborn on the 5th day of birth and were successful in discharging the baby on its 14th day of life. Progression of clinical events has been summarized to a timeline in Figure 1.

Discussion

Posterior Reversible Encephalopathy Syndrome (PRES) may present as a manifestation of systemic hypertension, toxemia of pregnancy and chemotherapy. It has also been reported with sepsis and immunosuppressive drugs.[3] Multiple theories have been proposed for pathogenesis of PRES, however, the most widely accepted etiology is cerebral hyperperfusion secondary to systemic hypertension leading to a disruption of autoregulatory mechanisms. Preeclamptic and eclamptic women are prone to developing PRES due to sudden surges in blood pressure.

Several studies have also pointed towards an alternative pathogenesis of PRES which includes endothelial dysfunction and immunological activation with release of cytokines.[4] Increased levels of serum cytokines like IL 2 and IL 6 are seen in SARS COVID-19 which can cause endothelial dysfunction and PRES in these patients. In all probability PRES, in our case, was primarily caused by systemic hypertension related to eclampsia and was further exacerbated by cytokine storm of SARS COVID-19. We were able to identify two case reports relating to occurrence of PRES in COVID-19.[4,5] All of them reported prolonged hospital stay due to pneumonia, associated with mortality in a couple of them.

Ours is probably the first reported case of PRES associated with eclampsia and complicated by SARS COVID-19 pneumonia. Complications of PRES include progressive vasogenic and cytotoxic edema which may lead to cerebral herniation and infarction. Termination of pregnancy is the definitive treatment in this situation along with control of blood pressure and seizures using infusions of antihypertensives and magnesium sulphate.

This case was further complicated by the impaired oxygenation due to COVID-19 pneumonia. Maintenance of adequate oxygenation is of paramount importance in cases of PRES as they are usually associated with some degree of raised intracranial hypertension. Hypoxia and hypercarbia should be avoided at all costs in these patients. We believe that prompt initiation of therapy using steroids and convalescent plasma would have mitigated the cytokine storm. This was evident by the rapid improvement in oxygenation and sensorium of the patient.

As the pandemic shows no signs of slowing down, similar cases are bound to present with increasing frequency. It needs to be kept in mind that these patients, in addition to antihypertensives and magnesium sulphate, may also end up requiring steroids, toclizumab, and convalescent plasma to mitigate the cytokine storm associated with COVID-19. We did not use antivirals like Remdesevir, as data relating to its safety in pregnant women were scarce at that time. But we believe Remdesivir can be used on a compassionate basis keeping in mind the risk benefit analysis.

Conflicts of interest

The authors declare no conflicts of interest.

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