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Case Report

Delta hypertension as an emerging predictor of post-partum eclampsia in normotensive patients: a case study and implications for clinical practice

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ABSTRACT

Delta hypertension is defined as a significant late-pregnancy increase in mean arterial pressure (MAP) as compared to its mid-pregnancy value. This case report details a rare instance of post-partum eclampsia in a normotensive patient, emphasizing delta hypertension's role in predicting eclamptic events at blood pressure readings conventionally considered to fall within normotensive range. A 23-year-old primigravida, with a normal medical history and consistent prenatal care, experienced unexpected post-partum eclampsia. Her pregnancy was uneventful until delivery, despite thrombocytopenia noted during labour. Initially recording a blood pressure range of 90/60 mmHg to 100/60 mmHg, the patient's blood pressure rose to 130/80 mmHg at term. Post-delivery she suffered from an episode generalized tonic-clonic seizure, despite maintaining blood pressure within normotensive limits. Extensive investigations were done to evaluate the episode- CT and MRI brain were done to rule out brain parenchymal defects, additionally 2D echocardiography, blood biochemistry panels, USG abdomen and pelvis revealed no abnormalities, indicating no typical eclamptic pathologies. Treatment included emergency seizure management and subsequent monitoring showing a return to pre-existing ante-natal blood pressure values without further incident or need for anti-hypertensive medications. Delta hypertension, a significant yet often overlooked rise in blood pressure later in pregnancy, was pivotal in this patient's clinical course. This condition suggests underlying endothelial dysfunction leading to critical end-organ damage, exemplified by this patient's post-partum eclampsia. Delta hypertension underscores the necessity for close longitudinal blood pressure monitoring protocols in ante-natal period, advocating for more nuanced assessments that could better predict and manage eclampsia in patients.

Keywords: Delta hypertension, Eclampsia, High-risk obstetrics

INTRODUCTION

Preeclampsia is traditionally defined as a hypertensive disorder that typically occurs after the 20th week of gestation, characterized by new-onset hypertension (blood pressure BP ≥ 140/90 mm Hg) and proteinuria (≥ 300 mg of protein in a 24-hour urine sample) or the presence of signs of end-organ dysfunction.[1] Post partum eclampsia typically occurs within 48 hours of delivery, and its pathophysiology is thought to involve systemic endothelial dysfunction that leads to cerebral vasospasm, ischemia and seizures.

Delta hypertension refers to a significant increase in MAP that occurs later in pregnancy. This sudden rise can indeed be a sign of preeclampsia, even if the blood pressure remains below the traditional threshold of 140/90 mm Hg.[2]

This condition, which involves a rise in MAP during late pregnancy that does not exceed the preeclampsia threshold of 140/90 mm Hg, challenges the conventional diagnostic criteria and underscores the need for a customized approach to the management and monitoring of pregnant women.[3] As many women may develop serious end-organ dysfunction at relatively mild levels of hypertension, the

conventionally defined thresholds of blood pressure may not reliable enough to stratify the risk of adverse outcomes in pre-eclampsia.[4] Our case study involves a rare case of post-partum eclampsia occurring secondary to delta hypertension of pregnancy in a traditionally normotensive patient.

CASE REPORT

Patient information

The subject of our case study was a 23-year-old female belonging to lower socio-economic class, housewife by occupation, primigravida with 40 weeks of gestation referred to our tertiary care facility in view of need for multi-disciplinary care of thrombocytopenia (platelet count on admission 35,000/mm^3), bleeding time of 4 minutes 30 seconds with no significant recent or past medical history and an antenatal record free from complications. Throughout her pregnancy, her blood pressure readings were logged and ranged between 90/60 mmHg and 100/60 mmHg. She was admitted in active labour with a blood pressure reading of 130/80 mmHg, significantly higher than her baseline.

Clinical findings and timeline

Apart from need of four units of random donor platelet transfusion during labour and delivery, the patient's care was uneventful, and she delivered a low birth weight term female neonate weighing 2.1 kg. Post-delivery, the patient developed a small vaginal hematoma of size 3×3 cm at the episiotomy site, necessitating surgical intervention under anaesthesia for drainage and repair. Post op monitoring revealed her blood pressure to range from 130/80 to 130/84 mmHg. Three hours post-op she experienced an episode of generalized tonic-clonic seizure lasting 1.5 min marking a severe escalation in her clinical presentation.

Therapeutic intervention

Immediate stabilization measures were implemented following the seizure, as per existing hospital protocol. The patient was then administered loading dose of magnesium sulphate and further loading dose of intravenous levetiracetam after neurology advise, to mitigate any further seizure activity. Patient was shifted to intensive care unit for close monitoring and further stabilisation. She experienced no further seizures, and her blood pressure gradually returned to her pre-pregnancy baseline of 100/60 mmHg.

Diagnostic assessment

The patient underwent extensive diagnostic evaluations to rule out other potential causes of her symptoms. A comprehensive battery of investigations including serial blood biochemistry, hemogram (Table 1), CT and MRI scans of the brain (Figure 1), fundoscopy, abdominal ultrasound and 2D echocardiography were performed, all of which returned normal findings, thus structural brain anomalies or other systemic abnormalities were ruled out.

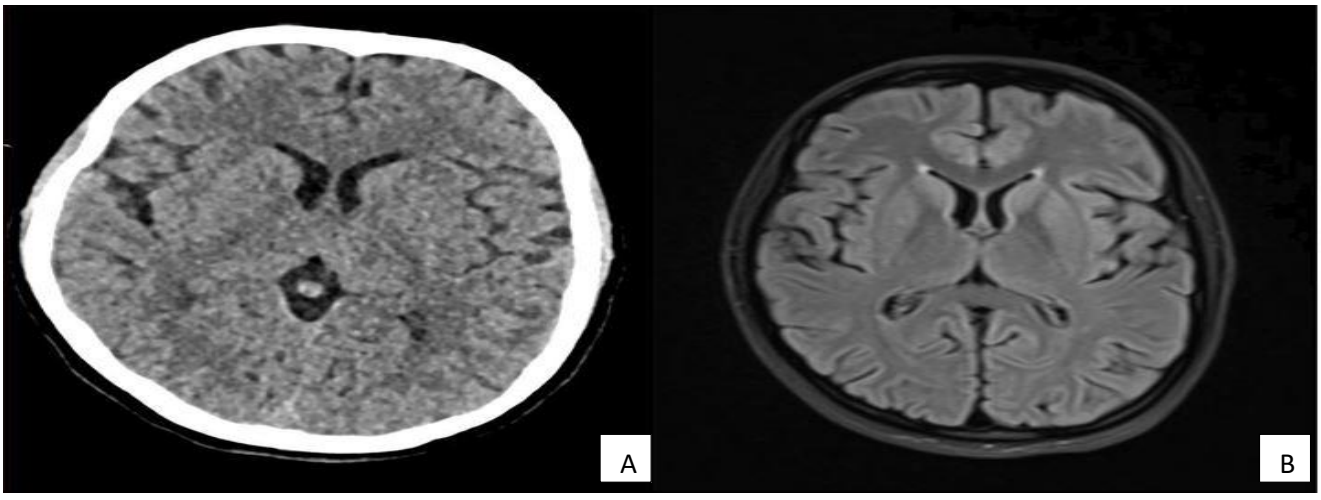

Figure 1 (A and B): Axial section of CT-brain and FLAIR MRI brain revealed no structural brain defect, or anomaly to which seizure activity could be attributed.

Table 1: Trend of haematological and biochemistry investigations values reveal an improvement in thrombocytopenia by day 3 PNC with no other significant metabolic derangement.

Parameters	On admission	Day-1 PNC	Day-2 PNC	Day-3 PNC
Hemoglobin (g/dl)	12.3	10	11.1	10.8
Total leucocyte count (thousand/mm^3)	8.6	11.1	9.5	8.7
Total platelet count (lacs/mm^3)	0.35	0.75	0.83	1.08
Serum bilirubin (mg/dl)	0.7	0.6	0.8	0.7

Continued.

Parameters	On admission	Day-1 PNC	Day-2 PNC	Day-3 PNC
Serum ALT level (U/l)	41	38	35	28
Serum AST level (U/l)	36	32	40	32
Serum calcium (mg/dl)	8.9	8.8	9	8.9
Serum magnesium (mg/dl)	2.18	2.2	2.3	2.29
Serum potassium (meq/l)	3.9	3.7	3.9	3.8
Serum sodium (meq/l)	136	135	142	140
Serum creatinine (mg/dl)	0.9	1.1	0.9	0.91
Prothrombin time (seconds)	15.1	16	17	15
Bleeding time (Minutes)	4:30	02:30	02:00	02:45
Clotting time (Minutes)	03:30	03:45	03:15	04:00
INR	1.1	0.9	0.88	1.00
Albuminuria (dipstick)	Trace	Trace	Trace	Nil

Follow-up and outcomes

Over the course of five days post-delivery, the patient's condition improved steadily. Her blood pressure normalized, platelet counts restored within normal limits, and she remained free from any further complications. She was discharged on day 13 post-partum after detailed evaluation by neurologist with a prescription for oral levetiracetam and scheduled for follow-up appointments. The successful outcome of this case was due in part to the prompt recognition and treatment of her eclamptic episode, despite the atypical presentation.

DISCUSSION

Delta hypertension, characterized by a significant rise in blood pressure later in pregnancy without exceeding the conventional preeclampsia thresholds, suggests a possible endothelial dysfunction, which can lead to severe complications such as eclampsia.

Macdonald-Wallis et al investigated the relationship between maternal blood pressure measurements in the third trimester of pregnancy and adverse pregnancy outcomes, including preeclampsia, fetal growth restriction, and preterm birth, and found that higher blood pressure measurements were significantly associated with an increased risk of adverse feto-maternal outcomes.[1] Rise in blood pressure at term may reflect cardio-vascular maladaptation to systemic endothelial dysfunction secondary to aberrant vascularisation of the placenta, and cause features of hypertensive end-organ damage.[2]

In our case, features of hypertensive end organ damage were apparent-low birth weight baby (<2.8 kg), thrombocytopenia and seizure, despite the blood pressure of the patient lying within the traditionally defined normotensive limits. It is noteworthy that after delivery, the BP readings of the patient started to recede towards her early pregnancy BP values, indicating a gradual recovery from endothelial dysfunction. Thus, delta hypertension maybe potential predictor of adverse outcomes associated with hypertensive end-organ damage, and it emphasizes the need for closely monitoring trajectory of change in blood pressure amongst pregnant women with advancing gestational age and to compare it with mid-pregnancy baseline values to assess for abrupt rise near term.

This introduces the paradigm that at-risk pregnancies maybe identified by customized cut-off values based on the BP readings of early weeks of gestation rather than relying on erstwhile conventional definitions of pre-eclampsia.

CONCLUSION

This case highlights the importance of considering delta hypertension as a significant risk factor for eclampsia, even in patients whose blood pressure readings remain below the established thresholds for hypertension.

Clinical significance

Longitudinal blood pressure monitoring during the antenatal period must include this paradigm, and an increase in surveillance is warranted for patients having a significant increase in blood pressure near term as compared to the mid-pregnancy baseline. Such measures could lead to earlier interventions and potentially prevent severe outcomes in similar cases.

Patient perspective

The patient had been referred from two tiers of peripheral hospitals due to her high-risk status and expressed relief and gratitude for the medical attention and care she received. Her experience underscores the importance of effective communication and timely referral for care of high-risk pregnancy cases.

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