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Severe Hypernatremia in an Eclamptic Patient with HELLP Syndrome: A Case Report

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Abstract:

- ***Background:***

Hypernatremia is a serum sodium concentration greater than 145mmol/L. When it exceeds 160mmol/L, it is classified as severe hypernatrenia. It is a rarely documented condition in obstetric practice which is associated with increased morbidity and mortality. Its occurrence in an eclamptic patient with HELLP syndrome further worsens the prognosis.

- ***Case Presentation:***

A 22-year-old unbooked primigravida at 37 weeks of gestation who presented with multiple episodes of convulsion, loss of consciousness and jaundice. Her serum sodium was 181.3mmol/L on admission. She was managed as a case of antepartum eclampsia with HELLP syndrome and severe hypernatremia. Following resuscitation, she had an emergency caesarean section with a good perinatal outcome and was managed in the Intensive Care Unit (ICU) by a multidisciplinary clinical team. Her severe hypernatremia was treated exclusively with a gradual decrease in serum sodium and plasma osmolality, and also replacement of free water, which was done parenterally. Patient regained consciousness on day 14 of admission and was discharged home on day 31 for follow-up.

- ***Conclusion:***

Severe hypernatremia is associated with high mortality if not properly managed. The same goes for eclampsia with HELLP syndrome. A patient presenting with these two medical conditions makes the prognosis worse; therefore, multi-disciplinary team management with adequate intensive care is required to achieve good perinatal and maternal outcomes as seen in our patient.

Keywords*: Eclampsia, HELLP syndrome, Hypernatremia, Severe.*

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I. INTRODUCTION

Eclampsia is one of the commonest causes of fetal[1] and maternal[2] morbidity and mortality. It is a multi-system disorder affecting approximately 0.3% of all pregnant women globally[3]. Despite its high maternal and fetal morbidity and mortality, the exact aetiology and pathophysiology of pre-eclampsia/eclampsia remains to be elucidated. Several studies have considered the relationship between serum electrolytes such as Calcium and Magnesium in pre-eclampsia[4]. Similarly, serum Sodium and Potassium have been found to directly affect blood pressure, with some studies recording statistically significant hypernatremia in patients with pre-eclampsia/eclampsia[5]. The possible mechanism of hypernatremia in eclampsia is unclear however; some authors have proposed that it could be due to vasoconstriction in pre-eclamptic/eclamptic cases, which leads to a decrease in glomerular filtration rate and stimulation of renin-angiotensin-aldosterone system that sends signals to retain sodium from urine, hence resulting in hypernatremia. The changes in maternal serum ions may be the aggravating factor for the elevated blood pressure in pre-eclampsia/eclampsia.

Hypernatremia is defined as a rise in the serum sodium concentration to a value exceeding 145mmol/L[6]. It is a hyperosmolar condition commonly caused by a decrease in total body water relative to the electrolyte components which results in neuronal cell shrinkage and subsequent brain injury presenting as loss of consciousness and seizures. When the serum Sodium level is greater than 160mmol/L, it becomes severe hypernatremia, which is a life-threatening condition that is associated with a high mortality rate of about 50% [7].

We present a rare case of an eclamptic patient with HELLP syndrome who presented with severe hypernatremia and was managed successfully. Both mother and baby were discharged in good condition.

II. CASE PRESENTATION

Our patient was a 22-year-old unbooked primigravida at 37 weeks of gestation who was rushed to the emergency obstetric unit of our facility with elevated blood pressure, multiple episodes of generalized tonic-clonic convulsions, loss of consciousness, and jaundice. On examination, she was unconscious with Glasgow Coma Scale (GCS) score of 6/13, deeply icteric with bilateral pitting pedal oedema. Her pulse rate, blood pressure, and SPO2 were 140 beats/min, 222/144mmHg, and 84% respectively, with urinary catheter draining scanty dark-coloured urine. Obstetric examination revealed a symphysio-fundal height of 36cm, a singleton fetus in longitudinal lie, cephalic presentation, with no palpable uterine contraction. The fetal heart rate was 145beats/min. There were no cervical changes. A diagnosis of Antepartum eclampsia with an unfavourable cervix and suspected HELLP syndrome was made. She had an oropharyngeal airway passed, intranasal oxygen was administered and she was maintained in a left lateral position. She also had Magnesiun sulfate administered according to the Pritchard regimen and intravenous Hydralazine for blood pressure control. Blood and urine samples were taken for investigations, and her relatives were counseled for an emergency Caesarean section after stabilization. Her bedside clotting time was 4 minutes.

The patient's electrolytes, Urea and Creatinine results (Table 1) revealed severe hypernatremia (Na+ = 181.3mmol/L) and hypokalemia (2.89mmol/L). The results of the full blood counts and peripheral blood film (Table 2) revealed leucocytosis of 20.08 X10 ^{9}, with a relative neutrophilia of 87.6%, low platelets of 95 x 10 ^{9} with presence of spherocytes, schistocytes and burr cells on peripheral blood film. The liver function test result showed elevated liver enzymes and serum bilirubin (Table 3). The hospital's multidisciplinary team was involved in the patient's management.

Seven hours into the admission, she had a caesarean section under general anaesthesia, however, at surgery; she was noticed to have excessive bleeding from the subcutaneous layer during skin closure. She was delivered of a live male neonate with Apgar's scores of 8, 9 at first and fifth minutes respectively, birth weight of 2.575kg. She was transferred to the ICU, where she had 2.0 units of fresh whole blood transfused through an inserted central line. The severe hypernatremia (Na+ = 181.3mmol/L) was managed by the intensivists by a careful gradual decrease in serum sodium using 0.45% sodium chloride (half-normal saline), aiming at a maximum of 0.5mmol/L/hr sodium reduction. The total body water (TBW) deficit was calculated, added to the ongoing and insensible losses, and administered parenterally. The serum Sodium was monitored hourly to ensure a gradual drop in serum Na^{+} level. The associated hypokalemia was corrected with potassium infusion.

Following the surgery, her blood pressures ranged between 140-150/95-105mmHg and she was seizure-free. However, she remained unconscious despite having received 3 doses of 250mls IV 20% Mannitol. Intravenous Dexamethazone was also administered. A brain CT scan was not done because of financial constraints. On the fourth day of surgery, she was noticed to be febrile with her temperature ranging between 39.3^{o}C and 40.2^{o}C, her antibiotics were changed from intravenous Ceftriazone to intravenous Meropenem, and the fever subsided. A nasogastric tube was passed for enteral feeding and oral medications including oral antihypertensives. She was commenced on physiotherapy and thromboprophylaxis with enoxaparin.

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Table 1 Trend of Na^+ and other Electrolytes on Admission, Day 5, 10 and 15

Electrolytes	Normal range	On admission	Day 5	Day 10	Day 15
Na^+ (mmol/L)	135-145	**181.30**	176.30	161.10	137.40
K^+ (mmol/L)	3.5-5.3	**2.89**	2.93	3.01	3.79
Cl^- (mmol/L)	99-110	148.0	141.60	120.0	116.2
$HCO3^-$(mmol/L)	21-30	22.33	22.60	22.0	22.46
Cr (umol/L)	45-84	109.50	86.50	63.40	56.30
Urea mmol/L	2.8-7.2	14.82	10.20	8.50	3.94
Mg^{2+} (mmol/L)	0.73-1.06	-	-	0.8	1.18
Uric acid (unmol/L)	-	477.7	-	-	-

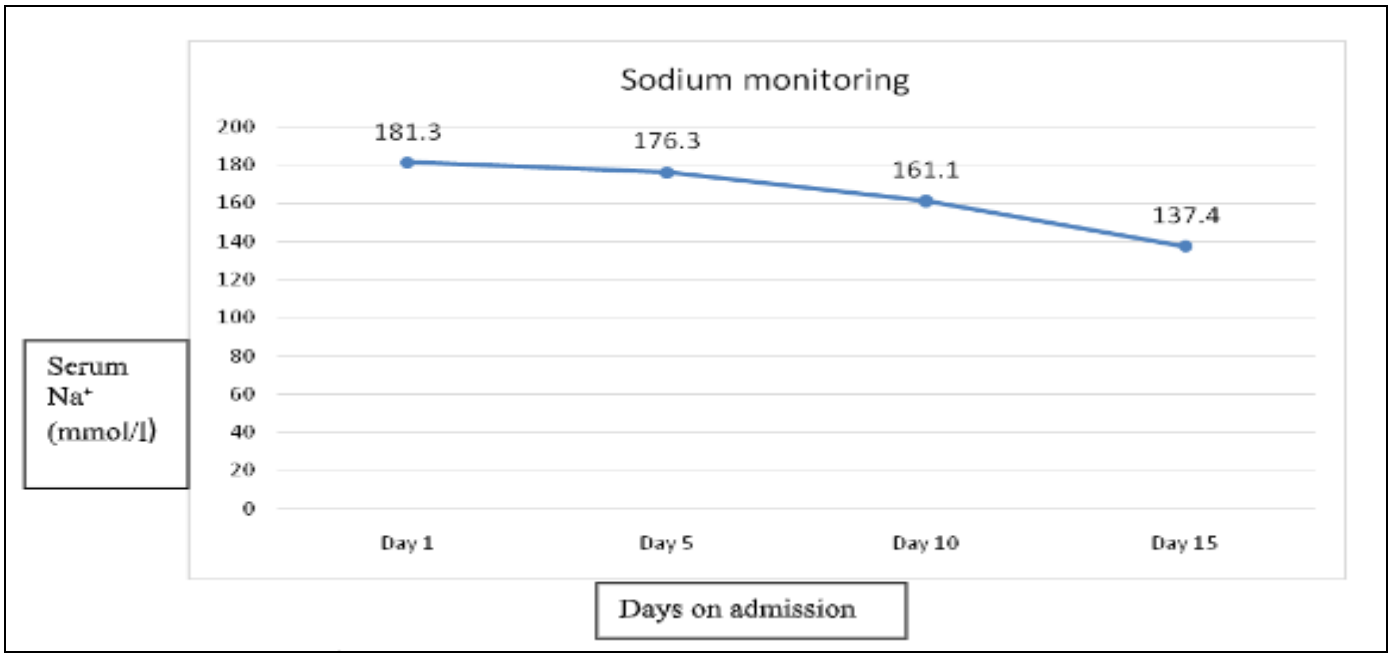

Fig 1 Line Graph Showing the Trend of Serum Na^+ during Corrections

Table 2 Showing the Admitting Full Blood Count Result

Parameter	Value	Unit	Normal range
WBC	**20.08**	10^9	4-11
Neutrophils	**87.60**	%	40-75
Lymphocytes	8.00	%	20-40
Monocytes	4.20	%	3-10
Eosinphils	0.00	%	1-6
Basophil	0.20	%	0-1
PCV	31.5	%	36-45
HGB	10.8	g/dl	12-18
Platelets	**95**	10^9	100-400

Table 3 Showing the Trends of Liver Function Test (LFT) Results

Parameters	On admission	Repeat test at Day 12	Normal range
Total Bilirubin (umol/l)	**102.90**	3.68	2-21
ALT (u/l)	**1389.10**	22.20	7-45
AST (u/l)	**1950.80**	22.20	8-35
GGT (iu/l)	23.90	31.20	5-78
Total Protein (g/l)	63.40	64.00	66-83
Albumin (g/dl)	34.70	41.40	34-53
Direct Bilirubin (umol/l)	**64.22**	2.08	1.7 – 5.1
Globulin (g/dl)	28.6	-	**25-35**

On day 7 of admission, her parenteral antibiotics were changed to oral and administered through the nasogastric tube. Jaundice was noticed to have cleared on day 10 of admission, and the result of repeat LFT was within normal range **(Table 3).** Patient was managed as an unconscious patient until day 14 on admission when she regained

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consciousness, but with quadriplegia**.** Physiotherapy was continued, and she was discharged home on day 31 of admission with minimal mobility support for her to be seen in the postnatal clinic. Two weeks review in the clinic, the patient walked into the consulting room unaided, and her blood pressure was 125/70mmHg.

III. DISCUSSION

Hypernatremia is defined as a rise in the serum sodium concentration to a value exceeding 145mmol/L[6]. It becomes severe when the value exceeds 160mmol/l, as seen in our patient. It is a hyperosmolar condition commonly caused by a decrease in total body water relative to the electrolyte components, resulting in neuronal cell shrinkage and subsequent brain injury, presenting as loss of consciousness and seizures, as seen in this patient's presentation. The fact that the patient was pregnant and presented with features of severe pre-eclampsia and convulsion made the diagnosis of eclampsia more considerable [8], thereby masking the suspicion of dyselectrolytemia such as hypernatremia until the result of electrolytes confirmed this additional diagnosis.

Severe Hypernatremia in isolation is associated with high morbidity and mortality[9]. Similarly, eclampsia is associated with increased maternal and fetal morbidity and mortality[2]. In a critical situation like in the case of our patient who had eclampsia with HELLP syndrome and also had severe hypernatremia, expert management with a multidisciplinary team and ICU care is necessary for maternal and fetal survival. The fluid deficit, predicted insensible and ongoing losses, was calculated and administered over 48 hours. The severe hypernatremia was gradually corrected with a target of lowering the serum sodium by not more than 0.5mmol/L per hour to prevent cerebral oedema, which may lead to herniation, permanent neurological deficits, and myelinolysis if Sodium is rapidly lowered. The serum electrolytes were measured hourly in the ICU and followed up with serial neurological examinations. It became normalized on day 15 of admission with full regain of consciousness; however, the patient developed quadriplegia, which was successfully managed with continuous physiotherapy.

The presence of new-onset grand mal seizure and or unexplained coma during pregnancy occurring after 20 weeks of gestation in this patient led us to make a diagnosis of Antepartum Eclampsia. Eclampsia is associated with significant maternal and fetal morbidity and mortality [10] which include intrauterine growth restriction, abruptio placenta, fetal distress, and intrauterine fetal death; however, our patient didn't develop any of these. Our patient had clinical and laboratory evidence of maternal multi-organ systems involvement, including hepatic, renal, cardiovascular, and central nervous system (CNS) involvement. Most cases of eclampsia present in the third trimester, as seen in this patient who presented at 37 weeks of gestation. The aetiology of eclampsia remains unknown [8] however the patient had some risk factors such as nulliparity and low socio-economic status.

Standard principles of management of eclamptic patients were initiated in this patient to resuscitate, abort and prevent further seizures, control blood pressure, and deliver the fetus. An oropharyngeal airway was passed to keep the airway patent while intranasal oxygen was commenced to improve maternal and uteroplacental oxygen delivery. This patient's seizure and high blood pressure were controlled with Magnesium sulphate (using Pritchard regimen) and hydralazine for blood pressure control, respectively. Magnesium sulfate is the drug of choice to treat and prevent eclampsia[11]. These principles of management are also the management principles for patients with HELLP syndrome. HELLP syndrome is defined as Hemolysis, Elevated Liver enzymes, and low platelets. It is a multi-systemic disease, resulting in generalized vasospasm, microthrombi formation, and coagulation defects[12].

Her vital signs, saturation, and fetal heart rates were monitored. Delivery is the definitive treatment of eclampsia after stabilization, and the mode of delivery should be based on obstetric indications. The choice of caesarean section in this patient was due to an unfavourable cervix, as ripening the cervix in this patient might result in a prolonged intrapartum course and thereby increase morbidity and mortality. This patient had general anesthesia as the choice of anesthesia because she was unconscious. The outcome at surgery was good as she was delivered of a live baby with good Apgar scores that weighed 2.545kg. Even though, the bedside clotting time done at presentation was 4 minutes, the excessive bleeding noticed during closure of the subcutaneous layer could be due to thrombocytopenia in the patient with the possibility of disseminated intravascular coagulopathy (DIC) setting in. However, this was corrected by transfusing two units of fresh whole blood immediately after surgery.

Patient was transferred to the ICU however; she remained unconscious, necessitating a suspicion of cerebral oedema associated with eclampsia. A request for a brain CT was made, however patient's relatives couldn't afford it because of financial constraints. Intravenous Mannitol was commenced, and the patient had three doses of 250 mL of 20% mannitol with no improvement in the level of consciousness. The diagnosis of severe hypernatremia (181.3mmol/L) in this patient could explain her continuous state of unconsciousness. This severe hypernatremia was managed by a gradual decrease in serum sodium and plasma osmolality. The replacement of free water was done parenterally. The patient's serum Sodium became normalized on day 15 of admission with a serum Na^+ of 137.4mmol/L, and subsequent values were within normal range. Few studies [5] have recorded significantly high level of Sodium in patients with pre-eclampsia/eclampsia compared to normotensive pregnant women, as seen in our patient.

The management of patients with eclampsia is a multidisciplinary approach as our patient was managed by a team of clinicians consisting the obstetricians, intensivists, hematologists, anaethetists, dieticians, physiotherapists, clinical psychologists, midwives, and neonatologists, hence good outcomes. The management of HELLP syndrome is

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resuscitation and delivery of the fetus as was done in this patient. Even though the use of corticosteroids in the treatment of HELLP syndrome is controversial, Intravenous Dexamethasone was administered to our patient, as steroids are theorized to alter the degree of intravascular endothelial injury and prevent further hepatocyte death and platelet activation[13].

The jaundice resolved on day 10 of delivery, and markedly elevated liver enzymes and serum bilirubin became normalized on day 12 of delivery (Table 3). She was fed with fortified diets via a nasogastric tube during the period of unconsciousness. She became fully conscious on day 14 of admission and was discharged home on day 31 with Implanon contraception insertion after adequate counseling.

Her follow-up at the postnatal clinic was uneventful; she has fully recovered, and her baby was well immunized for age. She was then counseled on the need for pre-conception care in subsequent pregnancy.

IV. CONCLUSION

Severe hypernatremia is associated with high mortality if not properly managed. The same goes for eclampsia with HELLP syndrome. A situation whereby a patient presenting with these two medical conditions makes the prognosis worse; therefore, multi-disciplinary team management with adequate intensive care is required to achieve good perinatal and maternal outcomes as seen in our patient.

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The authors have declared that no competing interests exist.

REFERENCES

[1]. Ambia AM, Wells CE, Yule CS, Mclntire DD, Cunningham FG. Fetal heart rate tracings associated with eclampsia seizures. Am J Obstet Gynecol. 2022 Oct. 227 (4):622.e1-622.e6.
[2]. Vigil-De Gracia P. Maternal deaths due to eclampsia and HELLP syndrome. Int J Gynaecol Obstet. 2009 Feb. 104(2):90-94.
[3]. Abalos E, Cuesta C, Carroli G, Qureshi Z, Widmer M, Vogel JP, et al. Pre-eclampsia, eclapsia and adverse maternal and perinatal outcomes: a secondary analysis of the World Health Organization Survey on Maternal and Newborn Health. BJOG. 2014;121 (Suppl 1):14-24.
[4]. Priya R, Kavitha D, Glory MR, Kavitha M. Study of serum calcium and magnesium levels in pre-eclampsia and eclampsia compared to normotensive and its effects on maternal and perinatal outcome. Int J Acad MED Pharm 2023; 5(1):973-975.
[5]. Uddin SMN, Haque M, Barek MA, Chowdhury MNU, Das A, Uddin MG. et al. Analysis of serum calcium, sodium, potassium, zinc and iron in patients with pre-eclampsia in Bangladesh: A case-control study. Health Sci Rep. 2023;6(2):e1097.
[6]. Peter N, Patel D, Farouk SS, Rein JL. Salt and Water: A review of Hypernatremia. Adv kidney Dis Health. 2023 Mar. 30 (2):102-109.
[7]. Ates I, Ozkayar N, Toprak G, Yilmaz N, Dede F. Factors associated with mortality in patients presenting with hypernatremia. Intern Emerg Med. 2016;11:451-459.
[8]. Warrington JP. Placenta ischemia increases seizure susceptibility and cerebrospinal fluid cytokines. Physiol Rep. 2015 Nov. 3 (11).e12634.
[9]. Alshayeb HM, Showkat A, Babar F, Mangold T, Will BM. Severe hypernatremia correction rate and mortality in hospitalized patients. Am J Med Sci. 2011; 341(5): 356-360.
[10]. Sibai BM. Treatment of hypertension in pregnant women. N. Eng. J. Med. 1996; 335:257-260.
[11]. Committee opinion no 652: Magnesium sulfate use in obstetrics. Obstet Gynecol. 2016 Jan. 127(1):e52-53.
[12]. Sibai BM. The HELLP syndrome (hemolysis, elevated liver enzymes, and low platelets): much ado about nothing. Am J Obstet Gyanecol. 1990; 162:311-316.
[13]. O□Brien JM, Barton JR. Controversies with the diagnosis and management of HELLP syndrome. Clin Obstet Gynecol. 2005 Jun. 48 (2): 460-477.