

# Every Convulsion in Laboring Mother is NOT Eclampsia

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## Abstract

Hyponatremia is a recognized but underreported complication of the peripartum period. However, maternal hyponatremia in the peripartum period is a very rare cause of seizure. In this case, we highlight hyponatremia as a cause of seizures during the peripartum period.

## Key Clinical Message:

Severe hyponatremia is a rare cause of convulsions during labor. Excessive consumption of water as advised by midwives can cause severe hyponatremia, which in turn can turn into life threatening status epilepticus in a laboring mother.

## Introduction:

Mild hyponatremia is common during pregnancy due to physiologic changes of pregnancy [1]. During pregnancy, physiologic changes occur in volume- and osmoregulation that effect plasma osmolality and sodium concentration. In healthy pregnancy, the average plasma-osmolality is decreased by 5-10 mmol and the sodium concentration is decreased by 5 mmol/l [2]. Typically, this kind of hyponatremia is asymptomatic and these changes resolve on their own after delivery. The cause of hyponatremia in pregnancy is mainly due to water retention following neuro-hormonal changes during pregnancy. It has been stated that high levels of estrogen and progesterone in pregnancy can exacerbate the neurological symptoms of hyponatremia as they inhibit the maternal brain's sodium pump [3]. These changes result in a decrease in osmolality, and therefore, the threshold for the hypothalamic secretion of ADH and the threshold for thirst is reset to a lower plasma osmolality level, creating a hypo-osmolar state characteristic of pregnancy.

Symptoms of hyponatremia can vary depending on severity. It can be asymptomatic or present with headaches, nausea, dizziness, seizures, and even death. Mild hyponatremia is mostly overlooked as it presents with nausea and weakness, overlapping with symptoms of pregnancy. As sodium and water diffuse across the placenta, the fetus is also at risk of hyponatremia. This can be associated with respiratory distress, feeding problems, and seizures showing that a hyponatremia baby was delivered [1].

## Case Presentation:

A 29-year old primigravida at 39.1 weeks gestation presented in spontaneous labor. The patient had no significant past medical history except for gestational diabetes, which was controlled with diet. The patient had an uncomplicated antenatal course and followed routinely with a midwife. The patient was interested in in-home delivery with the assistance of her midwife. While the patient was in the first stage of active labor, she began to have a tonic-clonic seizure which prompted the midwife to call 911 and take the patient to the hospital. At the hospital, initial vital signs were HR 98, BP 126/70, Temp 98.9, RR 20. Physical examination showed an alert but lethargic gravida woman. The physical exam was unremarkable, except for tachycardia and a physiologic murmur. vaginal examination showed that she was completely effaced

and dilated. Given that she was on the second stage of labor, the decision was made to have a vacuum-assisted vaginal delivery. The patient was placed on the delivery table in the operating-room in case an emergent c-section was required. During the labor, the patient seized for approximately one minute. She was immediately given Ativan 2mg IV and Magnesium Sulfate 2g IV. Urgent investigations were ordered including urinalysis, basic metabolic panel, and complete blood count. Approximately four minutes later she delivered a baby boy, but while she during suturing, she had another episode of a tonic clinic seizure, also lasting approximately a minute. An additional Ativan 2mg IV was given.

The urinalysis was remarkable for a few RBC's and low urine gravity. Urine Osmolality was 87 mosm/Kg and urine sodium was 19 mmol/L. The basic metabolic panel showed a potassium of 3.6 mmol/L, sodium concentration of 115 mmol/L, serum osmolality of 256 mosm/kg, and blood sugar of 92 mg/dL. Furthermore, a CT scan was negative for any acute intracranial abnormality. A baby boy was delivered with hyponatremia, with a plasma sodium concentration of 117 mmol/L. These clinical symptoms and laboratory were suggestive for severe hyponatremia due to polydipsia leading to multiple episodes of seizure.

After determining the hyponatremia was the cause of the patient's seizures, the patient was given 100ml of 3% normal saline as an IV bolus, followed by a continuous rate of 2 mmol/L. Sodium levels were measured every 6 hours. Over the next three days, the patient remained seizure free and her sodium level improved to 129mmol/L. She began to follow commands intermittently but still remained lethargic. On Day 4 the patient became more alert and she was oriented to place and person but not time or situation. She was transferred out of the MICU on Day 5 and soon thereafter discharged from the hospital.

## Discussion:

Maternal hyponatremia is an important yet unrecognized cause of seizure during the peripartum period. As discussed above, specific physiological changes, as well as management practices during the peripartum period can contribute to maternal and neonatal hyponatremia

Hyponatremia is common during pregnancy and but sodium levels as low as 115 mmol/L are extremely rare. A prospective study in 2008 which included 287 women at the time of labor determined that approximately 7% of women had a plasma sodium concentration of 130 mmol/L or lower.[3] The study correlated the hyponatremia to fluid volume administered during labor and not due to oxytocin or epidural analgesia.[3] Similar to our patient, the patients' with hyponatremia in the study also required device assistance or caesarian section for delivery. However, unlike our patients, none of them experienced a grand mal seizure.

In our search, we have uncovered only six other reported cases of severe hyponatremia in laboring mothers resulting in neurological sequelae[3] [4][5][6][7][8]. The interesting issue in our case is that it is the second reported case where fluid loading contributed to the patient's hyponatremia was purely via oral free water intake. Furthermore, this case is only case where oral free water intake caused multiple grand-mal seizures during the peripartum period. In the five other cases, fluid supplementation was with oral intake of water and electrolyte drinks as well as with intravenous fluid and incidental additional fluid via required oxytocin infusion.

Our patient suffered from seizures due to an acute intoxication of water causing acute hyponatremia. The patient was advised by the midwife to increase her water intake as she was getting closer to term "to clean the baby". Acute hyponatremia can result in neurological symptoms due to the water movement into the brain resulting in cerebral edema which can manifest as seizures, altered mental status, and in severe cases, even coma and death [9]. These changes are typically brought on less than 48 hours. In chronic hyponatremia, neurological changes are very subtle, and patients are typically asymptomatic as the brain adapts to the changes over a longer duration of time (greater than 48 hours) by generating ionogenic osmoles [3]. This mechanism protects the brain by reducing the risk of cerebral edema and therefore, the risk of seizures.

During labor, water intoxication could also occur due to ADH-like-action of oxytocin. Oxytocin and ADH are both released from the posterior pituitary gland are structurally similar which could also result in water retention as it stimulated the ADH receptors of the kidney [3]. Oxytocin is primarily given to help augment

labor [10]. There have also been cases reported of water intoxication due to intravenous oxytocin infusion in normal pregnant women that resulted in severe hyponatremia and a grand-mal seizure [11]. Although our patient did not receive intravenous oxytocin, there is a natural release of oxytocin that occurs during delivery which also could have played a role in this acute hyponatremic setting of our patient that further exacerbated the hyponatremia.

Although our patient presented with features mimicking eclampsia during labor, she had no history of pre-eclampsia. Eclampsia is a life-threatening, pregnancy-related multi-organ disorder that manifests as unexplained seizures after 20 weeks of gestation due to abnormal placental development in a patient with a history of pre-eclampsia [12]. Pre-eclampsia is characterized by a prior history of hypertension, proteinuria, thrombocytopenia, and liver dysfunction [12].

### Conclusion:

In conclusion, our case highlights a rarely seen phenomenon in pregnancy. Hyponatremia secondary to polydipsia causing seizures in the peripartum period is an uncommon occurrence. Although severe hyponatremia is not a common cause of seizure in laboring mother, physician should always consider all possible medical and obstetric causes of seizure. In addition, mid-level providers such as midwives need to be educated about the risks of excessive water drinking during pregnancy leading to hyponatremia.

### Author Contribution:

Author contributions: Bisrat Nigussie cared for the patient, conceived and designed the case report and wrote the manuscript; Fuad Abaleka and Tigist Gemechu cared for the patient, conceived and designed the case report and wrote the manuscript; Shahnaz Akhter and Selin Galiboglu

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