

# Neonatal seizure due to maternal water intoxication in labour – a case report

We present a case report of a full term newborn presenting with seizures due to hyponatraemia at three hours of age. Mother had dilutional hyponatraemia secondary to excessive water intake during labour.

**A** baby born at 42<sup>+6</sup> weeks' gestation and weighing 3.8 kg was admitted from the postnatal ward to the neonatal intensive care unit with a history of seizures at three hours of age. Mother was well during pregnancy and had normal antenatal checks. During labour she received a syntocinon drip. She had drunk about 3 to 4 litres of water over an eight hour period during labour. Her infant was delivered by ventouse and was found to be covered in a thin layer of meconium. He cried soon after birth and did not need any advanced resuscitation.

At three hours of age, his mother witnessed two episodes of jerky movements involving all four limbs, associated with up rolling of eyes and duskiness. Each seizure lasted for about one minute. He was transferred to the neonatal unit for further management. On examination, he was found to be pink and responded appropriately. Systemic examination and neonatal reflexes were normal. He was noted to have a large bruise at the right posterior scalp. His blood sugar at that time was 2.4 mmol/L.

On the umbilical cord arterial gas, serum sodium was noted to be 124 mmol/L and on umbilical cord venous gas it was 123 mmol/L. Initial blood tests on admission to the neonatal unit showed serum sodium of 128 mmol/L. The rest of the blood tests such as WBC, platelet count, coagulation profile, and CRP were normal. His corrected serum calcium was 2.26 mmol/L and magnesium was 0.59 mmol/L. His sodium levels remained low at 125 mmol/L at 15 hours of age and returned to normal at 48 hours of age.

CT scan was normal except for a finding of cephalohaematoma over the vertex and right parietal region. EEG findings suggested right posterior temporal focal epileptiform discharge. Lumbar puncture was unsuccessful.

Initial management included fluid restriction at 40 ml/kg/day IV fluid and IV antibiotics. The antibiotics were stopped after 48 hours since the blood culture was negative. He did not have any more seizures. He was discharged back to the postnatal ward on

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day 4. Maternal serum sodium performed 24 hours post delivery was 136 mmol/L. The infant was well at seven weeks when seen in outpatient clinic.

## Discussion

Neonatal seizures occur in 1-2 per 1,000 infants born at term. Hypoxic ischaemic encephalopathy remains the most common cause. In addition, intracranial hemorrhage, focal cerebral infarction, meningitis, drug withdrawal, hypoglycaemia and hypocalcaemia can cause neonatal seizures. In our case, investigations ruled out the above mentioned possibilities. The mother had drunk excessive amount of water during labour resulting in dilutional hyponatraemia both in herself and her baby. This was evident by the low sodium levels in both cord gas samples and blood tests performed later on the baby in the neonatal unit. Unfortunately, the mother did not have sodium levels done soon after birth.

Hyponatraemia as a cause for neonatal seizures is well recognised. It is seen in conditions such as syndrome of inappropriate antidiuretic hormone secretion, Barter's syndrome, and congenital adrenal hyperplasia<sup>1</sup>. Syntocinon may have contributed to water retention in the mother. Hyponatraemia due to maternal water intoxication during labour leading to neonatal seizures has been reported in the literature<sup>2</sup>.

Water intoxication in pregnancy is associated with iatrogenic fluid overload, prolonged administration of oxytocin in hypotonic solution and after excessive oral intake of fluids by the mother during labour. During pregnancy, 50% of weight gain is due to an increase in total body water, most of which is added to the extracellular component. Serum sodium levels decrease during normal pregnancy by 3 to 5 mmol/L. Various factors predispose to water intoxication during pregnancy. Activation of a water sparing

## Keywords

newborn; seizure; water intoxication

## Key points

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1. Fluid intake during labour needs to be carefully monitored to avoid water intoxication.
2. Consider dilutional hyponatraemia as an aetiology in early neonatal seizures.

system during labour leads to impaired maternal ability to excrete the water load. Pain, emotional stress and nausea during labour increase secretion of ADH. Oxytocin which is administered during labour has a direct renal antidiuretic action<sup>3</sup>. The serum sodium level at which symptoms present is usually 120 mmol/L or less. However, the rate of fall in sodium levels may be more important than the absolute levels<sup>4</sup>.

Neonatal hyponatraemia due to maternal water intoxication has been reported in the literature since 1965. In animal studies, it has been shown that the plasma sodium concentration of the fetus is about 3 mmol/L lower than that of the mother<sup>5</sup>. Water concentration equilibrates across the placenta. Hence in a situation of maternal hyponatraemia and water intoxication the fetus is also hyponatraemic. Fetal ADH levels rise just before the onset of labour and are markedly elevated during labour. Cerebral squeeze resulting from the labour and birth process stimulates hypersecretion of ADH in the fetus. High levels of ADH and limited renal capacity leads to the newborn being unable to handle water overload resulting in hyponatraemia.

Various problems in infants such as cyanotic spells, transient neonatal tachypnoea, feeding difficulty and excessive weight loss after birth have been attributed to hyponatraemia due to intrapartum water overload. Neonatal hyponatraemia, as in adults, may result in cerebral symptoms such as lethargy, convulsions, and coma. Raised intracranial pressure caused by brain oedema may be dangerous, but open sutures and fontanelles may be protective<sup>6</sup>. The treatment of neonatal seizures due to water intoxication is by fluid restriction and anticonvulsant

therapy. In our case, seizures subsided without any anticonvulsant treatment. Long-term outcome of babies having seizures secondary to dilutional hyponatraemia seems to be good.

## Conclusion

The significance of nutrition and fluid balance during pregnancy and child birth is of primary importance to all healthcare workers involved in perinatal care. Our case, like others reported in the literature, draws attention to an important health risk during the perinatal period. It highlights the importance of advice to pregnant women regarding oral intake of fluids both in quantity and composition. If there is a history of excessive fluid intake during labour, cord samples need to be tested for sodium levels and fluid restriction in the baby should be considered depending on the sodium levels.

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