

# Case report: hyponatremia and generalized convulsion after intravenous oxytocin infusion

## *Olgu sunumu: İntravenöz oksitosin infüzyonu sonrası gelişen hiponatremi ve jeneralize konvülsiyon*

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### Abstract

Most patients with drug-induced hyponatraemia are asymptomatic and the diagnosis is made incidentally following routine blood tests. Mild cases may be managed either by stopping the drug or by careful observation if the drug is considered essential. Severe hyponatremia (serum sodium levels less than 120 mmol/l) is associated with increased morbidity and mortality (confusion, convulsions, coma, congestive heart failure e.g.). We present a case of severe water intoxication with convulsion and prolonged coma, following the use of a high dose syntocinon infusion. A 22-year-old female who has intrauterine anencephalic fetus was referred to our hospital. Intravenous oxytocin was used to induce first-trimester abortion, eight hours later generalized tonic-clonic seizures occurred and coma followed. Hyponatremia was found as the cause and treated by intravenous infusion of hypertonic 3% NaCl. The patient recovered and no seizure observed on follow-up. The central nervous system manifestations of acute hyponatremia may be related to cerebral edema. Drugs administration and electrolyte disturbances should be remembered as causes of coma and seizure in obstetric patients.

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**Key words:** Oxytocin, seizure, coma

### Özet

İlaça bağlı gelişen hiponatremi olgularının çoğu asemptomatiktir ve tanı rutin kan incelemesini takiben tesadüfen konur. Hafif olgular, ilaç kesilerek ya da ilaç kullanımı gerekli ise dikkatli bir şekilde gözlenerek takip edilir. Şiddetli hiponatremi (serum sodyum düzeyi 120 mmol/l'den düşük) artmış morbidite ve mortalite ile (konfüzyon, konvülsiyon, koma, konjestif kalp yetmezliği v.s) birlikte dir. Bu yazıda, yüksek doz oksitosin infüzyonu kullanımını takiben gelişen konvülsiyon ve uzamış komalı ciddi su intoksikasyonu olan bir olguyu sunuyoruz. Hastanemize 22 yaşında intrauterin anensefalik fetusa sahip bayan hasta yönlendirilmişti. İlk trimester abortusu sağlamak için intravenöz oksitosin kullanılmış ve takiben sekiz saat sonra jeneralize tonik-klonik nöbet ve uzamış koma gelişmişti. Neden olarak hiponatremi saptandı ve iv hipertonic %3 NaCl infüzyonu ile tedavi edildi. Hasta klinik olarak düzeldi ve takipte nöbet gözlenmedi. Akut hiponatreminin santral sinir sistemi bulguları, serebral ödemle ilişkili olabilir. İlaç uygulamaları ve elektrolit bozuklukları obstetrik hastalarda nöbet ve komanın nedeni olarak akla gelmelidir.

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**Anahtar kelimeler:** Oksitosin, nöbet, koma

### Introduction

Drug-induced hyponatraemia is commonly associated with diuretics, selective serotonin reuptake inhibitors, antiepileptics, oxytocin, monoamine oxidase inhibitors, non-steroidal anti-inflammatory drugs, angiotensin converting enzyme inhibitors, desmopressin and exogenous antidiuretic hormone. As oxytocin is structurally related to vasopressin (an antidiuretic hormone), it is known to have antidiuretic properties when given in high doses (>20 mU/min). If prolonged high doses of oxytocin are given with large volumes of hypotonic solution, water intoxication can occur. Eggers et al have previously reported a case of severe water intoxication with convulsion and prolonged coma, following the use of high dose Syntocinon infusion (1). Oxytocin has an antidiuretic-hormone like effect as well as a contractile activity on uterine smooth muscle (2).

Hyponatremia (<120 mEq/l) can be associated with severe neurological damage. There are studies reporting that seizures and coma may be associated with oxytocin-induced hyponat-

remia (2,3). Woodhouse has presented two patients that developed water intoxication after high-dose oxytocin infusions (4). In this study we report a case of severe hyponatraemia presenting with seizures and deep coma after intravenous oxytocin infusion.

### Case Presentation

A 22-year-old female who has intrauterine anencephalic fetus was referred to our hospital because of generalized tonic-clonic seizure and prolong coma. In her history, at referred hospital, intravenous oxytocin was used to induce first-trimester abortion. Intravenous oxytocin infusion 12 gutt per minute was started and eight hours later generalized tonic-clonic seizures occurred and coma followed. Her gravida was first and gestational age was 14 weeks. She didn't explain previous abortion, parity or operation. Her medical and family history was unremarkable. On physical examination, the vital signs were normal except from hyperventilation. She was uncon-

cious, and no motor deficit was recorded with painful stimulus. Meningeal irritation signs were negative. Deep tendon reflexes of lower extremities and plantar responses were absent. Blood examinations revealed Na:120 mEq, plasma osmolality:204, urine osmolality:407 mosmol/kg and urine Na:51 mq/day. Cerebrospinal fluid examinations were normal. Thyroid function tests, level of plasma cortisol, glucose and other routine hematological examinations were normal. Cranial computerized tomography revealed cerebral edema. Magnetic resonance imaging was considered as normal. Hyponatremia was corrected by intravenous infusion of hypertonic 3% NaCl, 100cc per hour. Serum sodium level was measured every hour. The serum sodium increased to normal ranges in six hours. Seizures stopped and she recovered in three days time.

## Discussion

Severe hyponatremia (serum sodium levels less than 120 mmol/l) may be associated with increased morbidity and mortality. The antidiuretic effect of oxytocin can result in water retention and hyponatremia, and may lead to coma, convulsions and even maternal death. These risks are mainly associated with the oxytocin infusions at early stages of pregnancy. In early stages uterine sensitivity to oxytocin is far less than it is at term and much larger doses are required to stimulate uterine contractions(5).

Acute hyponatremia may be life-threatening because of cerebral edema. Early symptoms such as headache, nausea, vomiting and mental confusion should be recognized (2). The brain partially adapts to the hypo-osmolality within 24 hours, reducing the cerebral water excess by losing or inactivating intracellular osmotically active solutes (6). If the patient develops hyponatremia of 125 mmol/l (osmolality 260 mosmol/kg) acutely, that is within 3 days, then symptoms of cerebral edema usually occur. However, the mechanism of acutely developed hyponatremic osmotic brain swelling is not fully understood. It is suggested to be due to the sustained hyponatremia which causes large reductions in brain intracellular organic osmolytes(6). The syndrome of inappropriate secretion of antidiuretic hormone (SIADH) is characterized by water intoxication and hyposmolarity associated with hyponatremia. This has to be kept in mind as a cause of euvolemic hyponatremia in cases without underlying endocrine or renal problems. Malignancy, diseases of central nerves system and lung, drugs, positive pressure ventilation or endocrine pathology may cause this condition. Criteria for the diagnosis of the syndrome of inappropriate secretion of antidiuretic hormone are as follows: hypotonic hyponatremia, urine osmolality greater than plasma osmolality, urine sodium excretion greater than 20 mmol/l, normal renal, hepatic, cardiac, pituitary, adrenal and thyroid function, absence of hypotension, hypovolemia, edema, drugs and correction by water restriction. In our patient we think that oxytocin infusion caused SIADH. The presence of euvolemic hyponatremia and increased osmolality in urine without increase in plasma and hypouricemia with increased urine excretion also supports the diagnosis. In our patient, there was no renal or pituitary pathology with normal thyroid and hepatic function. All these indicated that diagnosis of water intoxication associated with oxytocin infusion in our patient is more accurate.

Differential diagnosis includes very early-onset unusual eclampsia and new-onset (first seizure) epilepsy. In her follow-up me-

dical and laboratory examinations revealed no hypertension, no elevated liver enzymes, and no proteinuria. Her seizures stopped with infusion of hypertonic saline, and didn't repeated on one year follow-up. Diagnosis of epilepsy needs recurrent seizures without activation. Metabolic causes are very important in development of seizures. Treatment of hyponatremia that may be an activator for seizures in our patient stopped the seizures, and recurrent seizures did not developed. Therefore we excluded the diagnosis of epilepsy.

We evaluated the 28 papers reported between 1963 and 2005 in Pub-med, most of the patients reported were using oxytocin because of the therapeutic abortion and the dose was usually high. Clinical presentation was frequently generalized seizures and coma (6,7,8,9,10). Basic management consists of stopping the drug, fluid restriction, stabilization of the plasma electrolytes in normal limits and suppressive treatment for seizures. Recovery is usually rapid and complete (9,10), as in our patient. Oxytocin in a dose of more than 2 units should not be administered intravenously (I.V) in a single injection, as it may cause severe hypotension. If oxytocin is required, it can be injected either intramuscularly or by I.V pump or drip (13).

In conclusion, hyponatremia due to oxytocin infusion, causing seizures and unconsciousness should be remembered urgently in patients with therapeutic abortion. The early suspicion and therapy may improve the outcome and prevent more detailed costly examinations.

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