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Case Report

OXCARBAZEPINE-INDUCED HYPONATREMIA IN METABOLIC ENCEPHALOPATHY: A CASE REPORT

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ABSTRACT

The 81-year-old woman in this instance had a 3-day history of diminished sensorium and was suffering from significant left ventricular dysfunction, osteoporosis, uterine malignancy, and a history of nephrectomy, among other chronic illnesses. Medication for heart failure, neuropathic pain, anemia, and fluid retention were all part of her treatment plan. Along with careful monitoring of electrolytes and renal function, the patient was treated with a mixture of pregabalin, clonazepam, carvedilol, atorvastatin, spironolactone, and other supplements. The patient's usage of oxcarbazepine, a medication known to create electrolyte imbalances and antidiuretic effects, is probably what caused her to develop hyponatremia. Using the Naranjo adverse drug response probability scale, a causality evaluation revealed a "probable" adverse drug response with a score of 7, indicating a probable connection between her electrolyte imbalance and oxcarbazepine.

Keywords: Oxcarbazepine, Hyponatremia, Case report, Syndrome of inappropriate antidiuretic hormone secretion.

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INTRODUCTION

Oxcarbazepine is an anticonvulsant that has been used for many years to treat seizures and trigeminal neuralgia [1]. Oxcarbazepine (10,11-dihydro-10-oxocarbamazepine) (OXC), a chemically similar substance to carbamazepine (CBZ), is created by modifying the chemical formula of CBZ. OXC's chemical structure indicates that it is a ketoanalog of CBZ [2]. Both CBZ and OXC can produce COIH (CBZ- and OXC-induced hyponatremia), with estimates ranging from 4% to 40% for CBZ and from 23% to 73% for OXC [3]. Hyponatremia is among the most common water-electrolyte disorders in the human body. If the blood sodium concentration threshold is <135 mmoL/L, hyponatremia can be identified [4]. Syndrome of inappropriate antidiuresis is the main cause of drug-induced hyponatremia caused by renal water retention (SIAD). SIAD is categorized as either syndrome of inappropriate antidiuretic hormone secretion (SIADH) or nephrogenic syndrome of inappropriate antidiuresis. While the latter is produced by intrarenal activation for water reabsorption and is distinguished by reduced plasma arginine vasopressin (AVP) levels, the former is characterized by unregulated AVP hypersecretion [5]. However, generally speaking, unfavorable medication responses might result in inadequate treatment results, longer hospital stays, and higher medical costs. The intensity and difficulties of adverse medication responses may be prevented by being aware of their nature and identifying them early for proper therapy [6].

CASE DESCRIPTION

An 81-year-old female patient was admitted to the neurology department with the complaints of decreased sensorium for 3 days. She had a medical history of nephrectomy 10 years back, uterine cancer for 7 years, osteoporosis pelvic fracture, coronary artery disease (CAD), and severe left ventricular (LV) dysfunction, and is on medication. Tab. Pregabalin 50 mg 1-0-1, Tab. Clonazepam 0.25 mg 0-0-1, Tab. Ferrous ascorbate acid+Zinc sulfate 0-0-1, Tab. Carvedilol 3.125 mg 1-0-1, Tab. Atorvastatin+Clopidogrel 10 mg 0-0-1, Tab. Torsemide+Spironolactone 10/50 mg ½-0-0, Tab. Oxcarbazepine 450 mg 1-0-0, Tab. Calcium+Vitamin D3 1-0-0, Tab. Mecobalamine, Pyridoxine, Folic Acid, and Vitamin D3 1-0-0. Her vitals show decreased blood pressure on the day of admission, and other vitals were found to be normal (Table 1). Her hematology report shows decreased hemoglobin, packed cell volume, eosinophils, and basophils, and increased red cell distribution width and monocytes. Renal function test shows increased blood urea, creatinine, and potassium and decreased calcium, sodium, and chloride (Table 2). The patient was diagnosed to have metabolic encephalopathy, hyponatremia, CAD-severe LV dysfunction, uterine cancer, and osteoporosis pelvic fracture. Treatment involves Inj. Esomeprazole 40 mg OD, Inj. Calcium gluconate 10 mL stat, Cap. Racecadotril 100 mg BD, Cap. Bifilac TDS, Tab. Pregabalin 75 mg BD, Tab. Ferrous Ascorbate+Folic acid 100/1.5 mg OD, Tab. Mecobalamin+Pyridoxine hydrochloride+Folic acid+Vitamin d3 1500 mcg/20 mg/5 mg/2000 IU OD, Tab. Torsemide+Spironolactone 10/50 mg OD, Tab. Oxcarbazepine 450 mg OD, Tab. Atorvastatin 10 mg OD, Tab. Amitriptyline 10 mg OD, Tab. Clonazepam 0.5 mg OD, Tab. Aceclofenac+Thiocolchicoside+Paracetamol 10/8/325 mg, Tab. Calcium+Vitamin d3+Methylcobalamin+l-Methylfolate Calcium+Pyridoxal-5-Phosphate 1250 mg/500 mg/2000 IU/1500 mcg/1 mg/20 mg, Tab. Carvedilol 3.125 mg, Tab. Taurine+Acetylcysteine 500 mg/150 mg BD, Tab. Ofloxacin+Tinidazole 200 mg/600 mg BD, Calcium polystyrene sulfonate powder, and Inj. Ondansetron 4 mg 1-0-1.

DECHALLENGE

The patient was on Tab. Oxcarbazepine 450 mg OD, which was identified as the cause of hyponatremia. To address this, the medication was discontinued..

DISCUSSION

In this case, the patient was prescribed the following treatment regimen, which reflects a multidisciplinary approach to managing complex, potentially interrelated conditions, which includes Tab. Pregabalin 50 mg (1-0-1) that is given for neuropathic pain. Tab. Clonazepam 0.25 mg (0-0-1) is given for insomnia. Tab. Ferrous Ascorbate+Folic Acid+Zinc Sulfate (0-0-1) is given for anemia, especially in cases where iron, folic acid, and zinc deficiencies or increased requirements, possibly due to chronic illness, malabsorption, or poor diet, Tab. Carvedilol 3.125 mg (1-0-1) is given for the management of heart failure and hypertension. Tab. Atorvastatin + Clopidogrel 10/75 mg (0-0-1) is given for CAD severe LV dysfunction, and Tab. Torsemide

Table 1: Baseline data

Parameters	D1	D2	D3	D4	D5	D6	D7	Reference range
Blood pressure	100/50	130/80	120/60	130/70	110/60	130/70	110/70	120/80 mmHg
Pulse rate	93	109	88	100	92	98	100	60–100 beats/min
Temperature	98.6	97	97.6	98.1	97.4	97.6	97.6	97–99 F
Respiratory rate	24	22	22	20	22	20	20	12–20 breaths/min
SpO_2 (%)	100	100	97	97	99	98	97	95–100

Table 2: Hematological report

S. No.	Parameter	D1	D2	D3	Normal level (%)
	Complete blood count				
1	RBC	3.65	3.79	4.0	4.2–5.4 million cells/cumm
2	Hemoglobin	10.1	10.6	11.2	12–16 g/dL
3	PCV	30.8	31.6	33.5	35.5–44.9
	Differential count				
4	Monocyte	18.7	14.8	8.28	2–8
5	Eosinophil	0.6	0.8	-	1–4
	Renal function test				
6	Blood urea	57	65	67	5–20 mg/dL
7	Serum creatinine	1.6	1.7	1.6	0.6–1.1 md/dL
	Liver function test				
8	Albumin	-	-	1.9	3.5–5.4 g/dL

S. No.	Parameter	D1	D2	D3	D4	D5	D6	D7	Normal value
	Electrolytes								
9.	Sodium	115	123	126	136	135	137	138	135–145 mEq/L
10.	Potassium	5.5	5.2	4.3	3.4	3.8	3.3	3.4	3.6–5.2 mmoL/L
11.	Chloride	91	96	-	110	109	106	104	96–106 mEq/L

Table 3: Progress chart

S. No.	Date	Complaints
1.	7/12/23–2nd day	Loose stools–greenish color-multiple episode
2.	8/12/23–3rd day	Loose stools 4 episodes at night, swelling both limbs
3.	12/12/23–7th day	Leg pulling sensation

Table 4: Naranjo scale (adverse drug reaction probability scale) [7].

Naranjo adverse drug reaction probability scale				
Question	**Yes**	**No**	**Do not now**	**Score in our case**
1. Are there previous conclusive reports on this reaction?	+1	0	0	+1
2. Did the adverse event appear after the suspected drug was administered?	+2	−1	0	+2
3. Did the adverse reaction improve when the drug was discontinued or a specific antagonist was administered?	+1	0	0	+1
4. Did the adverse event reappear when the drug was re-administered?	+2	−1	0	0
5. Are there alternative causes (other than the drug) that could on their own have caused the reaction?	−1	+2	0	+2
6. Did the reaction reappear when a placebo was given?	−1	+1	0	0
7. Was the drug detected in blood (or other fluids) in concentrations known to be toxic?	+1	0	0	0
8. Was the reaction more severe when the dose was increased or less severe when the dose was decreased?	+1	0	0	0
9. Did the patient have a similar reaction to the same or similar drugs in any previous exposure?	+1	0	0	0
10. Was the adverse event confirmed by any objective evidence?	+1	0	0	+1
Total score				7

+ Spironolactone 10/50 mg (½-0-0) is given in this patient for heart failure and fluid retention, Tab. Calcium + Vitamin D3 (1-0-0) is given for osteoporosis, Tab. Mecobalamin, Pyridoxine, and Folic Acid, Vitamin D3 (1-0-0) is given for health, Tab. OXCARBAZEPINE 450 mg (1-0-0) is given for neuropathic pain. Women are more likely to get hyponatremia with oxcarbazepine. While oxcarbazepine, which is structurally linked to CBZ, improves the sensitivity of the ADH receptors, hyponatremia is likely caused by the drug's antidiuretic effects through activation of the vasopressin-2 receptor/aquaporin-2 pathway [1,8]. A potential adverse response with a severity of 7 was indicated by the causality evaluation using the World Health Organization Naranjo adverse reaction probability scale (Tables 3 and 4).

Definite: ≥9; probable: 5–8; possible: 1–4; Doubtful: ≤0.

CONCLUSION

This case highlights the complex clinical management of an elderly patient with multiple comorbidities and polypharmacy. The patient developed hyponatremia, which was likely linked to her use of oxcarbazepine, a medication known to induce antidiuretic effects through the vasopressin-2 receptor pathway. The Naranjo adverse drug reaction probability scale indicated a "probable" adverse drug reaction with a score of 7, supporting the potential role of oxcarbazepine in the patient's electrolyte disturbance. This underscores the importance of

careful monitoring for adverse effects in elderly patients, particularly those on complex medication regimens. Furthermore, it emphasizes the need for vigilant evaluation of drug interactions and side effects, especially in polypharmacy scenarios, to minimize risks and ensure optimal patient care.

PATIENT CONSENT AND ETHICAL COMMITTEE APPROVAL

This study was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from the participant involved in the study. The case report was reviewed and approved by the Institutional Review Board of the Institutional Ethics Committee of Vivekananda Medical Care Hospital, under approval number EC/NEW/INST/2024/TN/0529.

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AUTHOR'S CONTRIBUTIONS

Dr. Amritha C Sashikar identified adverse drug reactions and dechallenged the drug. Dr. P. Dhivyaprasath conceived the idea, while Angelin Grace T and Ann Jency A collected the data, participated in patient treatment and follow-up, and edited the manuscript. All authors have read and approved the final manuscript.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

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