

Elderly with refractory chronic severe hyponatremia and anesthesia management dilemma: a case report with literature review

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Abstract

Hyponatremia is a common electrolyte disorder, especially in the frail elderly population. With the increasing number of surgeries in the aging population, hyponatremia is frequently encountered by anesthesiologists and surgeons. Unfortunately, management of hyponatremia is often complex in the elderly population as it is often multifactorial, and they are physiologically susceptible. While it is well known that preoperative hyponatremia is associated with increased perioperative morbidity and mortality, a lack of recommendations or guidelines adds to the dilemma in managing such cases. The most common cause of chronic hyponatremia in the elderly is the syndrome of inappropriate antidiuretic hormone (SIADH), which can be resistant to conventional treatment.

On the other hand, paraneoplastic SIADH leading to hyponatremia is rare, and surgery may be the only option available for its correction. We present a case of a 78-years-gentleman to highlight such a dilemma. He was diagnosed with renal cell carcinoma and had chronic refractory severe hyponatremia despite treatment with fluid restriction, low dose hydrocortisone, tolvaptan, and 3% sodium chloride.

Introduction

Serum electrolytes estimation as a part of the preoperative investigation is required chiefly for major urological surgeries. A serum Na⁺ concentration of <135 meq/L is defined as hyponatremia.¹ Age is a strong independent risk factor for hyponatremia,

and elderly patients represent a high-risk group.² Dysnatraemia affects the central nervous system or cardiovascular system's function and is associated with significant postoperative morbidity and mortality.³ Although routine preoperative testing in the elderly is not beneficial,^{4,5} indicated that preoperative laboratory testing in the elderly helps predict postoperative adverse events.⁶ Despite the fact that hyponatremia occurs in nearly 14% of the elderly in clinical practice,⁷ literature regarding the management of major surgery with refractory hyponatremia is sparse. We present case management of elderly gentlemen with chronic severe refractory hyponatremia posted for laparoscopic nephrectomy.

Case Report

A 78-years-old gentleman weighing 50 kg came to the urology outpatient department with the complaint of fever for one month and mild hematuria. Work-up revealed a right renal mass for which laparoscopic nephrectomy was planned. He is a known case of diabetes mellitus and hypertension for the past 30 years and is on oral hypoglycemics and calcium channel blockers. He is also having a diabetic ulcer over his right foot. On arrival, his blood sugar was 168 mg/dL, blood urea 52 mg/dL, serum creatinine was 1.1 mg/dL with estimated glomerular filtration rate 39.14 mL/min/1.73 m², serum sodium 125 meq/L and hemoglobin 10 gm/dL. He was evaluated for hyponatremia; an endocrinologist consultation was obtained. His thyroid-stimulating hormone and cortisol level was normal; calculated serum osmolality was 269 mOsmol/kg. Urine osmolality could not be done due to logistic issues, but specific gravity was normal. His serum sodium level did not improve even after fluid restriction, Tolvaptan treatment for six days, low-dose hydrocortisone, and even with 3% sodium chloride of 20 mL/h for three days. However, no hyponatremia-related symptoms and signs were present during the preoperative period.

As the case needed to be expedited, the patient was taken for surgery with risk explained for severe hyponatremia. General anesthesia was induced with injection propofol and fentanyl and maintained on desflurane. Tracheal intubation was facilitated by injection vecuronium. Hemodynamically, the patient was stable intraoperatively. Therefore, only normal saline was used as the intraoperative and immediate postoperative fluid. Ultrasound-guided right quadrates lumborum block was

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Ethical statement and consent: informed written consent was obtained from the patient for publishing the report. In our institute, a case report does not require ethical approval.

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performed before extubating the patient. His visual analog scores for pain remained <4/10 for the first 24 h and serum sodium 127 meq/L on the first postoperative day. Paracetamol was used as a rescue analgesic for the next two days and his serum sodium improved to 136 meq/L over the next 72 h. No complication was noted, and the gentleman was discharged home.

Discussion and Conclusions

The present case highlights a frequently encountered clinical dilemma in perioperative patients. As the numbers of aged populations increase and older adults often need anesthesia services for multiple illnesses and comorbidities, more such patients will be encountered in the coming days. Therefore, it has become essential to focus on the perioperative management of chronic hyponatremia in elderly patients.

The Elderly are more prone to develop hyponatremia due to impaired renal water excretion, decreased glomerular filtration, comorbidities often requiring polypharmacy related to hyponatremia.^{2,8} Even rare

idiopathic syndrome of inappropriate antidiuretic hormone secretion (SIADH) is more frequently observed in the elderly.⁹ Our patient was on a calcium channel blocker and Insulin. Persistent hyponatremia, even after blood sugar was controlled, ruled out pseudo hyponatremia. SIADH can be diagnosed with decreased blood osmolality (<280 mOsm/kg) with inappropriately increased urine osmolality (>150 mOsm/kg); normal thyroid and adrenal function along with urine sodium usually over 20 meq/L. Normal urine specific gravity, absence of heart failure, and cirrhosis pointed towards our patient's possible differential diagnosis of SIADH, reset osmostat syndrome, and renal salt wasting. Malignancy can be associated with hyponatremia due to poor diet, adrenal dysfunction, renal or cerebral salt wasting, and SIADH via ectopic arginine vasopressin (AVP) production or chemotherapy-induced AVP stimulation.¹⁰ Further, paraneoplastic syndrome is a crucial aspect to consider. The tumors most commonly resulting in hyponatremia of the SIADH type are lung, breast, and head and neck tumors.¹¹ Although hyponatremia is reported in patients with localized renal cell carcinoma, a serum sodium level of ≤ 125 is rarely reported.¹²

The prevalence of chronic hyponatremia is dependent on the level of serum sodium used to define the disorder and the setting in which the measurement is made. Caird *et al.* noted that approximately 7% of patients aged >65 years had serum sodium concentrations <137 mEq/L.¹³ When a serum sodium concentration <135 mEq/L is used as a cutoff, it is 20% among long-term care facility residents.¹⁴

There is often a mismatch between the severity of the symptoms and the degree of hyponatremia partly because the speed of onset of hyponatremia is of greater prognostic significance than the degree of hyponatremia itself.¹⁵ Many patients with long-standing hyponatremia may appear to be clinically asymptomatic. However, even in these asymptomatic patients, laboratory studies indicate that cell functions are affected.^{16,17} Low sodium concentration should be corrected even in *asymptomatic elderly individuals* because it is related to increased mortality and morbidity.^{18,19} In acute symptomatic hyponatremia, hypertonic saline solution (3%) is commonly used to increase serum sodium levels acutely. Hypertonic saline is usually not indicated in chronic, mild, asymptomatic hyponatremia, but profound hyponatremia (Na^+ 125 meq/L) needs aggressive therapy with or without vasopressin receptor antagonists.²⁰ Interestingly, even after a tar-

get of 7 meq/L corrections per day for three days, his serum Na^+ level did not improve. Hypovolemic hyponatremia is treated with adequate fluid resuscitation with normal saline to suppress the hypovolemic stimulus for ADH release.²¹ In patients with SIADH and discontinued suspected drugs and decreased water consumption, careful administration of hypertonic fluids may be needed. Other options are vaptans (vasopressin-2 antagonists) that selectively antagonize the antidiuretic effect of vasopressin, leading to increased water diuresis used in hospitalized patients with chronic symptomatic euvolemic hyponatremia.²² Administration of low-dose hydrocortisone (10 mg/day or less) can be tried in hyponatremic elderly individuals with diagnostic uncertainty,²³ challenging to distinguish between hyponatremia due to disorders pituitary-adrenal axis and SIADH in elderly individuals. Our patient did not respond to any one of these medications used preoperatively. However, his serum sodium normalized over postoperative 72 h, which indicated the possible diagnosis of paraneoplastic SIADH, ruling out reset osmostat syndrome and renal salt wasting.

In conclusion, refractory hyponatremia in elderly cancer patients might be due to paraneoplastic SIADH and was corrected by surgical removal of the tumor. Although our single case cannot conclude the feasibility, anesthetic management of chronic asymptomatic yet severe hyponatremia might be expedient. Clear consensus and guidelines are lacking for accepting an urgent or expedited case despite chronic hyponatremia being a common clinical scenario in the elderly; perioperative physicians should focus on reducing the dilemma. However, we will need randomized controlled studies for the same.

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