

Case Report

A Case of Milk Alkali Syndrome: The Forgotten Diagnosis of Generalized Weakness and Altered Consciousness

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Abstract:

This case reports outlines a 76-year-old male's progression from papillary thyroid carcinoma diagnosis to the development of Calcium-Alkali Syndrome (CAS) following thyroidectomy. Initially presenting with thyroid mass, surgery was followed by generalized weakness and altered sensorium, investigations that revealed elevated calcium levels, metabolic alkalosis and renal impairment. Diagnosis pointed to CAS, likely triggered by prescribed calcium and calcitriol post-surgery. Cessation of supplements and hydration resulted in resolution. While post-thyroidectomy hypocalcemia is anticipated, CAS poses challenges, especially with increasing calcium supplement use. This emphasizes the need for vigilant monitoring of electrolyte imbalances, particularly in regions with limited follow-up practices. Clinicians should balance preventing hypocalcemia without risking hypercalcemia, stressing the importance of timely identification and tailored interventions to prevent CAS complications. This case underscores the significance of recognizing CAS as a potential postoperative complication, urging vigilant monitoring and tailored management in similar clinical settings.

Key words: Calcium-Alkali syndrome, Papillary thyroid carcinoma, Thyroidectomy, Calcium, Altered, Consciousness, generalized weakness, Metabolic alkalosis.

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Introduction:

Calcium-alkali syndrome (CAS) is a rare but potentially serious condition characterized by hypercalcemia, metabolic alkalosis and renal impairment resulting from excessive intake of calcium and absorbable alkali. We present the case of a 76-year-old gentleman with a history of long-standing diabetes and hypertension, who underwent treatment for papillary carcinoma of the thyroid. This report outlines the progression of his condition, from the initial diagnosis of thyroid carcinoma to the subsequent development of CAS post-thyroidectomy. The aim is to underscore the importance of recognizing CAS as a potential complication in patients undergoing extensive treatments, highlighting the need for vigilance and tailored management strategies in such clinical scenarios.

Case description:

A 76-year-old retired police officer, has a history of diabetes for 10 years and hypertension for 5 years presented to us with 3 days history of generalized weakness and altered consciousness. Two months ago, he began experiencing difficulty swallowing, particularly with solid foods, along with a progressively increasing swelling in his neck. A CT scan at that time revealed a mass in the left lobe of his thyroid, indicative of carcinoma, and accompanying cervical lymphadenopathy. Further examinations via fine-needle aspiration cytology (FNAC) from the thyroid mass confirmed Papillary carcinoma grade 2, and a biopsy of a lymph node also confirmed metastatic papillary carcinoma. Consequently, he underwent a total thyroidectomy along with neck dissection. His recovery period after the surgery was uneventful, and upon discharge, he was prescribed antibiotics, calcium tablets (500 mg three times daily) and calcitriol.

However, a month after the operation, he presented with a three-day history of lethargy and dehydration. He was drowsy with GCS 11/15 (E3V3M5) and his pupils were 2mm reactive bilaterally. He had shown minimal movements of her limbs upon call. His initial vital signs were blood pressure of 100/60 mmHg, heart rate of 99 beats per minute, the temperature of 36.4°C, respiratory rate of 12 breaths per min, oxygen saturation of 99% under room air and capillary

blood sugar of 5.5mmol/L. Neurological examination showed generalized muscle weakness and symmetrical hyporeflexia involving all 4 limbs. There were no focal signs or meningeal signs. Other systems were unremarkable.

Notably, there were no reported symptoms of fever, cough, shortness of breath, palpitations, vomiting, diarrhea, tingling and numbness, joint pain.

Further investigations revealed a hemoglobin level of 12.4 gm/dl, an elevated TSH level of 73.38 mIU/ml, and a serum calcium level of 16.99 mg/dl. Vitamin D, PTH (parathyroid hormone), and serum phosphate were found to be low at 27.46 ng/ml, 0.74 pg/ml, and 1.12 mg/dl, respectively. S. creatinine was 2.1 mg/dl. Serum albumin, however, was within normal range. An arterial blood gas analysis (ABG) demonstrated features consistent with metabolic alkalosis. Considering these findings, Calcium-alkali syndrome was diagnosed.

Case management:

Treatment commenced with appropriate hydration using normal saline, while calcium tablets and calcitriol were discontinued along with treatment of diabetes, hypertension, ischemic heart disease. After 2 weeks patients S.calcium, PTH, Phosphate and creatinine value returns to normal.

Details of the laboratory findings are in Table 1.

Table-1. Laboratory findings

Investigation	During admission	2 days after admission	4 days after admission
S. Calcium (8.5-10.5 mg/dl)	16.7	13.0	9.9
S.albumin(35-50 gm/l)	38.3	35	31
S. ElectrolytesNaKCLHCO3	1304.28928	1344.59728	
S.Magnesium (1.7-2.7 mg/dl)			
S.creatinine (0.6-1.3 mg/dl)	2.1	1.99	1.59
PTH(14.5-87.1 pg/ml)	0.74		
Vitamin D(Ng/ml)	27.5		
S. Phosphate(2.6-4.5 mg/dl)	1.12		
S.calcitonin(1-11.8 pg/ml)	1.38		

Discussion:

Papillary carcinoma of the thyroid is a prevalent endocrine malignancy, often managed with surgical interventions such as total thyroidectomy and neck dissection, as was performed in this case¹). While surgical resection remains the primary treatment, post-thyroidectomy complications are not uncommon. Hypocalcemia due to inadvertent parathyroid damage during surgery is a recognized complication². The emergence of CAS following thyroidectomy in our patient is a relatively rare occurrence.

Calcium Alkali Syndrome which is now responsible for more than 10% cases of hypercalcemia and it is the third most common cause of hypercalcemia in hospitalized patients following hyperparathyroidism and malignancy. CAS, characterized by hypercalcemia, metabolic alkalosis, and renal impairment, typically arises from excessive calcium and alkali intake, often through supplementation and antacid use^{3,4}. Historically, the syndrome was commonly seen when Dr. Bextram Sippy introduced peptic ulcer disease treatment consisting of milk and cream combined with absorbable alkali. But the incidence fell after the widespread use of H2 blocker and PPI^{5,6}.

In the recent times the number of cases increases due to the use of over-the-counter calcium supplementations for the prevention of osteoporosis in postmenopausal female and also due to calcium containing antacids³. In Asia, chewing betel nuts is a popular cultural activity and it is mixed with oyster shell paste containing calcium carbonate to neutralize the bitter taste of the betel nuts^{7,8}. In this scenario, the simultaneous prescription of calcium tablets and calcitriol after the thyroidectomy likely played a role in the onset of hypercalcemic crisis. The observed elevation in calcium levels aligns with established reports linking excessive calcium intake to such a crisis^{3,6}. Although postoperative hypocalcemia is a more anticipated concern following thyroid surgery, the occurrence of hypercalcemia poses a significant challenge. Recommending calcium supplementation after total thyroidectomy is a common practice⁹). However, managing the balance between preventing hypocalcemia and averting the risk of hypercalcemia becomes notably intricate in these cases.

Recognition of CAS in the postoperative phase necessitates a high index of suspicion, especially in individuals receiving calcium and vitamin D supplementation. Prompt identification and management are crucial to prevent complications such as serious renal dysfunction and cardiovascular disturbances associated with CAS (3). In this case, cessation of calcium supplements and calcitriol, alongside appropriate hydration with normal saline, led to the resolution of MAS.

Though CAS syndrome is not uncommon but it is often overlooked in developing countries where regular and routine follow up are not always practice. Sometimes patient continues to take calcium supplementations without consulting with physicians.

Conclusion

The occurrence of CAS in the post-thyroidectomy phase emphasizes the need for clinicians to remain vigilant about potential electrolyte imbalances in patients receiving calcium supplementation. Tailored management strategies, including careful monitoring of serum calcium levels, are imperative in mitigating the risk of CAS and its associated complications in similar clinical scenarios.

Learning Points:

1. Altered sensorium and generalized weakness is crucial for early diagnosis in a patient with calcium supplement .
2. Careful monitoring of serum calcium level after thyroidectomy is imperative in mitigating the risk of CAS.
3. Early initiation of treatment is necessary to prevent complications of CAS.

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