

Tetany: A diagnostic dilemma

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Abstract

Tetany is a disorder of increased neuronal excitability usually associated with hypocalcemia. We report a patient with typical tetanic cramps and carpopedal spasm in the postoperative period, despite normal serum concentrations of calcium, which responded to intravenous infusion of calcium.

Key words: Alkalosis, hyperventilation syndrome, hypocalcemia, hypomagnesemia, tetany

Introduction

The care of postoperative patients may present unique challenges to anesthesiologists, such as those in the form of various metabolic problems. Tetany is a disorder characterized by enhanced neuromuscular excitability that is caused by various metabolic abnormalities. Irrespective of the causative factors, the variable clinical presentation can range from asymptomatic patients to life-threatening emergencies. We, as anesthesiologists, should be able to not only recognize these metabolic abnormalities but also provide effective treatment. Tetany in various settings has been reported in literature, but its occurrence in a postoperative case, after a minor surgical procedure, has not been reported previously.

Case Report

A 22-year-old (weight 60 kg, height 157 cm) American Society of Anesthesiologists (ASA) physical status 1, male patient presented for incision and drainage of an abscess over his left elbow. There was no history of addiction or self-medication with any drugs. Past surgical

interventions included external fixation for fracture of both bones of the left forearm along with left brachial artery repair under general anesthesia. Previous surgery and postoperative recovery had been uneventful. General physical examination was unremarkable, except for the abscess over his left elbow.

The patient was premedicated with Diazepam 10 mg orally two hours prior to the surgery. Preoperatively, he had a heart rate (HR) of 72 beats per minute, respiratory rate (RR) of 14 breaths per minute, and BP 110/70 mm Hg. Anesthesia was induced with glycopyrrolate 0.2 mg, ketamine 100 mg, and propofol 100 mg intravenously. Anesthesia was maintained with a mixture of oxygen: Nitrous oxide (40:60) and 1.5% isoflurane, on spontaneous ventilation using a face mask. Duration of the surgery was 15 minutes. He was transferred to the post anesthesia care unit (PACU) after he regained consciousness and had stable vital signs.

Within half an hour of admission to PACU, the patient complained of pain, and became restless and tachypneic (RR = 34/min). He complained of a tingling sensation all over the body and painful spasms. He was given oxygen by face mask. Electrocardiography (ECG) and pulse oximetry (SpO₂) monitoring was initiated. His restlessness and tingling sensations continued to worsen. He complained of inability to move his right hand and soon developed carpal spasm of the right hand. Blood samples were collected immediately for arterial blood gas (ABG) analysis and to determine the serum electrolytes, calcium, albumin, and magnesium (Mg) levels. A 12-lead ECG was also taken.

The patient was given 20 ml of calcium gluconate 10% as a slow intravenous infusion over 15 minutes. He showed dramatic improvement in symptoms after the infusion and

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his vital signs returned to the preoperative values. He was admitted to the PACU for overnight observation. The ABG revealed alkalosis with a pH 7.49, $p\text{CO}_2$ 22 mm Hg, HCO_3^- 20 meq/L and low serum ionized calcium of 0.70 mmol/L. The serum calcium level was reported as 8 mg%, with an albumin of 2 mg % (corrected calcium of 9.6 mg %). The serum electrolytes and magnesium levels were within the normal range. The patient was discharged the next day from the hospital and was prescribed oral calcium supplements. He was referred to the endocrinology department for further workup of the episode of tetany.

Discussion

Tetany is a disorder with an extremely variable clinical presentation. It includes enhanced neuromuscular activity and associated sensory disturbance.^[1] Mild symptoms may include circumoral numbness, muscle cramps, or paresthesias of hands and feet. In severe cases, patients may present with laryngospasm, generalized muscle cramps, seizures, or even myocardial dysfunction. Trousseau sign and Chvostek sign are clinical tests to unmask latent tetany. The increased excitability of the peripheral nerves is due to either a low serum calcium (true hypocalcemia denotes a decrease in the ionized calcium level even though the total serum calcium level may be normal) or alkalosis in which the proportion of the serum calcium in the ionized form is decreased.

Our patient developed tetany even though his total serum calcium was 9.6 mg/dl, which is within the normal range. However, the ionized calcium level on the ABG was low. The etiology of tetany in our patient was probably multifactorial. The patient was hyperventilating due to pain and anxiety in the PACU. The hyperventilation caused alkalosis and decrease in the ionized fraction of serum calcium, which manifested as carpal spasm in the patient. Edmondson *et al.* have demonstrated that hypocalcemia in combination with alkalosis always produced tetany.^[2]

The patient hyperventilated in the PACU, but did not show any signs of preoperative anxiety. He had undergone a previous major surgical procedure without any excessive anxiety, which rules out

the diagnosis of hyperventilation (HV) syndrome as the cause of tetany. Tetanic patients with and without HV are characterized by a significant hypocalcemia, but a significant hypomagnesemia is exclusively found in tetanic patients with HV attacks.^[3]

Magnesium deficiency could have been a contributory factor but there was no clinical evidence to suspect magnesium deficiency. Magnesium deficiency is usually caused by long-standing etiological factors, which may include inadequate intake during starvation or increased requirement during early childhood, pregnancy, or lactation. Hypomagnesemia may also be caused by malabsorption from the gastrointestinal tract, loss from the kidneys during use of diuretics, or due to a combination of the two, as in alcoholism. Acute hypomagnesemia can occur without previous magnesium deficiency after epinephrine, cold stress, and stress of serious injury or extensive surgery.^[4] In this case, the surgical procedure was minor.

Hypokalemia in the absence of alkalosis has also been reported to cause tetany,^[5] but our patient did not have hypokalemia. Usually hypokalemia manifests as tetany in association with alkalosis.^[5]

In conclusion, tetany can be a manifestation of multiple disorders, viz. hypocalcemia, alkalosis, hypomagnesemia, hypokalemia, and HV syndrome. The clinician should have a high index of suspicion and must investigate and treat the underlying cause rather than treating just the clinical manifestation.

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