



Seizure Due To Hypocalcemia Caused by Late Onset Hypoparathyroidism after Thyroid Surgery

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Abstract

The most common complication of thyroid surgery is hypocalcemia. Fortunately, it is often slight and transient, but sometimes it can be critical and persistent. There have been a number of reports of seizures caused by hypocalcemia following thyroid surgery. In this report, we reported a female patient who presented with tonic-clonic seizures due to hypocalcemia twenty years after thyroid surgery. A 63-year-old female patient was brought to emergency department with tonic-clonic seizures she experienced for the first time in her life. The patient's medical history included subtotal thyroidectomy that was performed 20 years ago, although subtotal thyroidectomy, she had hypoparathyroidism and post-surgery calcitriol and calcium supplementation, and inconsistent follow-up and use of the prescribed supplements. Chvostek's and Trousseau's signs were present, which indicated hypocalcemia. Laboratory examination included a calcium level of 5.6 mg/ dL , an albumin level of 4.3 gr /L, a phosphorus level of 7.5 mg/ dL, a parathyroid hormone (PTH) level of 9.0 pg / mL (indicative of iatrogenic hypoparathyroidism). Parenteral calcium supplementation (200 mg calcium within 50 –100 mL 5% dextrose, intravenously, for 5-10 min) was initiated, followed immediately by oral calcium supplementation 3 g/ d, calcitriol 0.5 µg/ day, and conventional vitamin D (1000 IU/day). During the 6 months of the outpatient follow-up, the patient did not have any other seizures and at the seventh month of the follow- up, her calcium level was measured and found to be 8.8 mg/ dL. We described a patient that presented with tonic-clonic seizures due to postoperative chronic hypoparathyroidism that was not detected before. Hypocalcemia should be considered in all the patients that present with seizure and a history of neck surgery or radiation therapy.

Key Words: Hypocalcemia, seizure, hypoparathyroidism

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Introduction

Hypocalcemia is the most common complication of thyroid surgery; it is usually mild, but in some cases it can be severe. One study reported that although the incidence of hypocalcemia following thyroid surgery was 36%, the incidence of symptomatic hypocalcemia was only 19% [1]. In addition, hypocalcemia can be transitory; it can last <6 months (most often), or can be permanent (>6 months) [1-3]. Postoperative hypoparathyroidism is caused by injury or devascularization of a parathyroid glands, accidental removal of ≥ 1 parathyroid glands, and hematoma formation [1,3-7].

Calcium plays an important role in cell metabolism and stabilization of cell membranes, and it is a cofactor of various enzymes; therefore, in cases of hypocalcemia, the neuromuscular irritability and changes in mental status are common. In peripheral cells, calcium is involved in the contraction of muscle cells, and it regulates the excretion of hormones and neurotransmitters. It also affects the heart conduction system [8]. Typical symptoms of hypocalcemia include the symptoms and signs of neuromuscular irritability (including perioral and peripheral paresthesia), muscle cramps, depression, confusion, and tetany; in rare instances, seizure, laryngeal and bronchial spasms, cardiac failure, and cataract are observed [9]. Electrocardiography shows a prolonged QT interval in hypocalcemic patients.

There have been a few reports of seizures caused by hypocalcemia following a thyroidectomy [10-13]. Although tetany occurs during the early post-thyroidectomy period, seizures have been reported to persist for as long as 15 years, and in 1 a case for 61 years [14-17]. Herein we report a female patient that presented with tonic-clonic seizures due to post-thyroidectomy hypocalcemia observed 20 years later than the surgery she had.

Case

A 63-year-old female patient who had tonic-clonic seizures for the first time was brought to the emergency department by her relatives. She had tonic-clonic seizures for the first that were characterized by diffuse tonic contraction and clonic jerks, loss of consciousness, and foam coming from mouth. The patient's family history of epilepsy was absent. The patient's medical history included subtotal thyroidectomy for nodular goiter that was performed 20

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years earlier, her thyroid pathology result was benign. Although she had undergone subtotal thyroidectomy, she suffered from hypoparathyroidism. So, she was administered calcitriol and calcium supplementation, and inconsistent follow-up and use of the prescribed supplements. After the treatment, the patient's consciousness was improved, but she was somnolent. Her blood pressure was 130/80 mmHg and heart rate was 98 bpm, and Chvostek's and Trousseau's signs were present, which indicated hypocalcemia. She did not have any vocal cord problem.

Capillary blood glucose was 118 mg/dL, which ruled out hypoglycemia, and electrocardiography showed a prolonged QT interval. In laboratory evaluation while serum creatinine, sodium, potassium, magnesium, albumin, alkaline phosphatase, thyroid-stimulating hormone (TSH), free thyroxine (FT4), 25 hydroxy-vitamin D (25-OH-D) were normal range, serum calcium level and parathyroid hormone (PTH) were low, phosphorus level was high (Table 1).

Table 1. Laboratory Parameters

Laboratory Parameters	Patient's result	Normal range
Glucose (mg/dL)	118	80-100
Creatinine (mg/dL)	0.9	0.5-0.9
Sodium(mmol/L)	139	136-145
Potassium (mmol/L)	3.6	3.5-5.1
Calcium (mg/dL)	5.6	8.8-10.2
Albumin (gr/L)	4.3	3.5-5.4
Phosphorus (mg/dL)	7.5	2.5-4.5
Alkaline Phosphatase (U/L)	65	35-105
Parathormone (PTH)(pg/mL)	9.0	10-72
25-hydroxy-vitamin D (25-OH-D) (ng/mL)	23	30-100
Magnesium (mg/dL)	1.8	1.6-2.4
Thyroid-stimulating hormone(TSH):(μIU/ mL)	3.59	0.35-4.94
Free thyroxine (FT4) (pmol/L)	14.8	9-19

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Based on these findings, the patient was diagnosed as had a hypocalcemic seizure due to iatrogenic hypoparathyroidism. We ruled out hypoglycemia, hyponatremia and intracranial lesion by performing cranial tomography.

Parenteral calcium supplementation (200 mg calcium within 50 –100 mL 5% dextrose, intravenously, for 5-10 min) was initiated, followed immediately by oral calcium supplementation 3 g /day, calcitriol 0.5 µg/day and conventional vitamin D (1000 IU/day). The patient was referred to a neurologist, who also thought her seizures were due to hypocalcemia, and no additional evaluations were performed. The patient was scheduled to be followed-up by the endocrinology and metabolism department, so she was hospitalized. During the follow-up daily visits, bone mineral density screening was done and findings were found to be consistent with osteoporosis (femur total T-score: –3.1; lumbar total T-score: –3.5). In addition, the patient was scheduled to receive bisphosphonate therapy once her calcium level returned to normal. During hospitalization, thyroid ultrasonography was done, and it showed multinodular goiter. The subsequent fine-needle aspiration biopsy showed benign cytology. After one week of hospitalization, the patient was discharged with oral calcium and calcitriol replacement therapy. During the six months of outpatient follow-up, the patient did not have any other seizures and in the seventh month of follow-up her calcium level was measured 8.8 mg /dL and serum phosphorus level was 4.2 mg/dL. Cranial Magnetic Resonance Imaging (MRI) was not performed; because it was not necessary based on neurology counseling. Her cognitive function was improved.

Discussion

Hypoparathyroidism is a life-threatening disorder. The most common cause of hypoparathyroidism is iatrogenic hypoparathyroidism secondary to neck surgery (injury to the parathyroid glands), followed by idiopathic hypoparathyroidism. Hypoparathyroidism is biochemically characterized by hypocalcemia, hyperphosphatemia, and a very low or undetectable PTH level [18]. Postoperative measurement of the calcium level alone is not sufficient, so postoperative intact parathormone (iPTH) level must also be monitored closely because the decrease in calcium levels can take 48 hours or more, whereas half time of iPTH is only 2-5 min [1-4]. Early postoperative low iPTH is associated with postoperative hypocalcemia. The incidence of postoperative hypocalcemia is reported to be 1.7%-68 % [1-5].

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The acute clinical signs and symptoms of hypoparathyroidism are the same as those of hypocalcemia, ranging from paresthesia to intractable generalized tonic-clonic seizures that can be mistaken for epilepsy [18]. Kline et al. [19] reported a 46-year-old male with idiopathic hypoparathyroidism that presented with non-convulsive status epilepticus secondary to hypocalcemia. In a review of patients with metabolic status epilepticus, DeLorenzo et al. [20] reported a mortality rate in patients with hypocalcemia as high as 40%. McFarlane et al. [21] and Farrugia et al. [22] previously described patients with hypoparathyroidism and generalized tonic-clonic seizures, as in the presented patient. Since the early 1960s, it has been known that severe hypocalcemia is highly epileptogenic and produces marked EEG changes [23].

Herein we described a patient that presented with tonic-clonic seizures due to postoperative chronic hypoparathyroidism that was not diagnosed before. Despite subtotal thyroidectomy, postoperative hypoparathyroidism might result from an irreversible destruction of the parathyroid glands via disconnection of the blood supply to the parathyroid or removal of the glands or subnumerous parathyroid glands. Another cause of hypoparathyroidism is post-radiation idiopathic-autoimmune hypoparathyroidism [24]. A low serum ionic calcium level can induce spontaneous or stimulus-sensitive cortical discharges. When cortical neurons discharge repetitively, and the discharges spread throughout the motor cortex, focal seizures occur. When seizure discharges involve the entire brain, generalized seizures may occur [25]. Hypocalcemia occurs in a certain percentage of patients following thyroid surgery, but only a few patients, primarily those that are elderly, develop central nervous system symptoms [10,11].

Blanchard [10] posited that by aging cerebrovascular insufficiency or an infarction of the brain might increase the responsiveness of neurons to hypocalcemia enough to precipitate seizures. Hashimoto et al. reported that elderly patients with chronic diseases such as lacunar infarction easily develop a myoclonic state, even when metabolic abnormality is very mild or non-existent based on routine testing [26].

Conclusion

In order to prevent hypoparathyroidism, surgeons must explore parathyroid glands during surgery and consider autotransplantation of the parathyroid glands. To prevent the long-term complications of iatrogenic chronic hypocalcemia (heart failure, epilepsy, behavioral

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disorders, basal ganglia calcification, and cataract), due to the lack of pathognomonic symptoms the PTH level during the postoperative period should be measured and replacement therapy should be initiated when necessary. Hypocalcemia should be considered in all patients that present with seizure and have a history of neck surgery or radiation therapy.

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