Severe Hypocalcaemia following Coronary Artery Bypass Grafting Due to Hypoparathyroidism

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ABSTRACT
A 55 years old man was extubated on first postoperative day following coronary artery bypass grafting at 7:30 am. The same day at 5 pm, he became drowsy but arousable only on painful stimuli with severe generalized hypertonia and bilateral upgoing plantars. He was reventilated and a provisional diagnosis of cerebrovascular accident was made. CT scan of brain was normal except for bilateral basal ganglia calcification. On further investigations, he was found to be severely hypocalcaemic due to hypoparathyroidism. All symptoms resolved on the treatment of his hypocalcaemia. There was no history of neck surgery in this patient and the case additionally highlights important interaction between parathyroid hormone (PTH) in calcium metabolism.

Key words: Coronary artery bypass grafting. Hypocalcaemia. Hypoparathyroidism. Drowsiness. Basal ganglia calcification.

INTRODUCTION
It is known that metabolic derangement can give rise to avoidable postoperative complications. Hypocalcaemia is a common problem with potentially serious consequences. Postoperative hypocalcaemia resulting from inadequate parathyroid hormone (PTH) secretion can cause neurologic complications and respiratory compromise. Hypoparathyroidism is a well-recognized complication after thyroid and parathyroid surgery. Transient hypoparathyroidism occurs in 10% of patients who undergo total thyroidectomy.

This case report describes postoperative severe hypocalcaemia leading to neurologic manifestations.

CASE REPORT
A 55 years old male, known case of ischaemic heart disease and old inferior wall myocardial infarction was admitted for elective coronary artery bypass grafting for triple vessel disease on coronary angiogram. On examination of the hands, there was bilateral contracture of both the palmer creases (Figure 1). Rest of the physical examination was normal. His routine biochemical work-up was done and revealed no abnormality. Patient was operated and four grafts including the left internal mammary graft were applied.

He was extubated after 12 hours of the procedure at 7:30 am. On the first postoperative day, he progressively became drowsy and arousable only on painful stimuli with generalized rigidity of the body. All the body reflexes were exaggerated with bilateral up going plantars and sustained ankle clonus. Initially, a cerebrovascular event was on provisional diagnosis. CT scan of brain was done which came out to be normal except for bilateral basal ganglia calcification (Figure 2). Serum electrolytes studies were done which showed low serum calcium of 6.9 mg/dl which was corrected. Patient's symptoms gradually improved but his serum calcium remained in the lower range despite replacement (Table I).

On the third postoperative day, patient's condition again deteriorated, he became irritable and hypotensive with decreased oxygen saturation, so he was intubated and re-ventilated. His serum calcium was still lower with a reading of 3.6 mg/dl. Acute exacerbation of hypocalcaemia secondary to electrolyte derangement was considered. On testing the levels of magnesium and phosphorus, there was hypomagnesaemia with hyperphosphataemia. These disturbances plus the bilateral...
The suspicion of hypoparathyroidism as the cause for the hypocalcaemia, so parathyroid hormone, vitamin D and urinary spot calcium were tested. The reports showed a very low parathyroid hormone level with normal vitamin D levels and high urinary calcium.

After confirmation of the cause of hypocalcaemia, and correcting all the biochemical abnormalities, patient’s condition started improving. Upon further tailored interview of the family members of the patient, this patient was reported to suffer from hyperirritability, fatigue, anxiety and hypertonia in the past which were attributed to stress/depression, so no further investigations were carried out. In the pre-operative history, these symptoms were not mentioned by the patient or family because for them these were a part of his personality. After two days, he was weaned off the ventilator. He had a depressed look so an anti-depressant fluoxetine 20 mg started. Patient developed fine rest tremors of both the hands which was attributed to drug induced parkinsonism. These tremors were improved after stopping fluoxetine. After few days patient was discharged home with oral replacement of calcium.

**DISCUSSION**

This case demonstrates the effects of severe hypocalcaemia in a patient who had undergone a major surgery. To our knowledge, this is the first reported case of a patient having no past history of neck surgery developing life-threatening prolonged hypocalcaemia after coronary artery bypass grafting.

Hypoparathyroidism is a condition of parathyroid hormone (PTH) deficiency.

Primary hypoparathyroidism is a state of inadequate parathyroid hormone (PTH) activity. In the absence of adequate PTH activity, the ionized calcium concentration in the extracellular fluid falls below the reference range. Secondary hypoparathyroidism is a physiologic state in which PTH levels are low in response to a primary process that causes hypercalcaemia. The maintenance of ionized calcium concentrations in the intracellular and extracellular fluids is highly regulated modulating the functions of bone, renal tubular cells, clotting factors, adhesion molecules, excitable tissues, and a myriad of intracellular processes.

Hypoparathyroidism results in hypocalcaemia, which may be variably symptomatic, including paresthesias, hyperirritability, fatigue, anxiety, mood swings and/or personality disturbances, seizures, hoarseness (due to laryngospasm), wheezing and dyspnea (due to bronchospasm), muscle cramps, diaphoresis, and biliary colic, hypomagnesemia, hypokalemia, and alkalosis.

Tetany develops if hypocalcaemia is severe. In some patients, laryngospasm and bronchospasm may be life threatening.

Hypocalcaemia of primary hypoparathyroidism may cause extrapyramidal choreoathetoid syndromes in patients with basal ganglia calcifications.

Chronic hypocalcaemia, as observed in primary hypoparathyroidism, is also associated with ocular cataracts; abnormal dentition; and dry, puffy, coarse skin. In severe hypocalcaemia, a prolongation of the QT interval is observed on ECG, and congestive heart failure may develop. Correction of hypocalcaemia reverses the cardiac effects of hypoparathyroidism.

Most people have four parathyroid glands; consequently, primary hypoparathyroidism is uncommon. Hypocalcaemia from hypoparathyroidism requires all four parathyroid glands to be affected. Primary hypoparathyroidism may be permanent or reversible. Permanent primary hypoparathyroidism may be congenital or acquired.

The most common cause of primary hypoparathyroidism is excision of all parathyroid glands via surgery in the treatment of thyroid, laryngeal, or other neck malignancy.
Extensive irradiation to the face, neck, or mediastinum may cause destruction of the parathyroid glands, with ensuing primary hypoparathyroidism and hypocalcaemia. The first two causes of hypoparathyroidism were not present in this patient. Other causes include autoimmune hypoparathyroidism that may exist alone or in sporadic or familial forms.

Numerous conditions are described in the literature that result in congenital agenesis or hypoplasia and, therefore, can produce primary hypoparathyroidism with symptomatic hypocalcaemia at birth or in the newborn period. At present, we have not been able to confirm the cause of hypoparathyroidism in this patient.

Currently, treatment of patients with hypoparathyroidism involves correcting the hypocalcaemia by administering calcium and vitamin D. Patients with primary hypoparathyroidism have a lifelong risk of symptomatic tetany. Without access to calcium, a patient may die. All such patients should wear a chain or bracelet that identifies them as having primary hypoparathyroidism.

Calcium is vital for cellular processes, none more so than in maintaining normal cardiac function. It is, therefore, important for levels to be normalized before any surgery but perhaps of particular importance in cardiac surgery.

REFERENCES