Hyperparathyroid Crisis Caused by a Functional Parathyroid Cyst: a Case Report

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Abstract: Primary hyperparathyroidism (PHPT) is a disorder of one or more of the parathyroid glands, which results in hypercalcemia. Hyperparathyroid crisis is a rare condition that sometimes occurs when people with PHPT experience another illness, like vomiting or diarrhea, which causes excessive fluid loss or severely limits the amount of fluid they can consume. Parathyroid adenoma and hyperplasia are the most common causes of PHPT. In clinical practice, functional parathyroid cysts are a very rare cause of PHPT. We report a rare case of a functional parathyroid cyst as a cause of hyperparathyroidism or even hyperparathyroid crisis. After surgery, the patient's blood calcium and PTH level returned to normal ranges. Histological examination showed in fibrous cystic wall, some of the inner wall of the capsule were covered with a single layer of flat epithelium, some were not covered with cells, and a small cluster of parathyroid tissue was extruded and deformed in the wall of the capsule.

Key words: Hyperparathyroid crisis; Primary hyperparathyroidism, Functional parathyroid cyst

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Hypercalcemia is the most common result of primary hyperparathyroidism. A patient with noticeable elevated serum calcium level (≥3.75 mmol/L) is in critical condition, and may die of kidney failure or circulatory failure. During parathyroid crisis, blood PTH and calcium levels rise sharply to very high levels, causing severe symptoms of hypercalcemia. Most notably, there is a significant change in thinking and alertness, ranging from confusion to coma. Hyperparathyroid crisis is an emergency and must be treated quickly by replacing lost body fluids and removing the overactive parathyroid tissue. Parathyroid cysts can be subdivided into functional and nonfunctional cyst, depending on whether is accompanied by hyperparathyroidism [1,2]. Functional parathyroid cysts are a rare cause of primary hyperparathyroidism. Up to now, about 300 patients with parathyroid cysts showing hypercalcemia had been reported respectively according to literature [3]. Parathyroid cysts can be diagnosed by sonography. However, it is often misdiagnosed as thyroid cysts. We report a case of hyperparathyroid crisis caused by a functional parathyroid cyst.

CASE REPORT

A 72-year-old man was admitted to emergency room of our hospital with one-day history of coma. Admission examination: T 36.8 ℃, P 80 bpm, R 20 bpm, BP 110/70 mmHg, with a 40×40 mm palpable mass on neck, no response to call, pupillary light reflex (+), normal muscle tension of the extremities and tendon reflex. Laboratory tests: serum calcium was elevated at 4.11 mmol/L (normal range: 2.25-2.75 mmol/L) and phosphate was low at 0.91 mmol/L (normal range: 0.97-1.61 mmol/L) suggesting a diagnosis of hypercalcemia. Parathyroid hormone (PTH)
was elevated at 4984 pg/ml (normal range: 15-65 pg/ml) suggesting a diagnosis of primary hyperparathyroidism. The clinical diagnosis was hyperparathyroid crisis. Thyroid ultrasonography was performed and showed a thin-walled cystic lesion of 40×30 mm in size on the dorsal side of the right lobe of his thyroid gland, with well-defined border and thicken separation, the shape is regular, elliptical, the boundary is clear, the interior is mainly anechoic, with a little hypoechoic (Fig. 1). Color Doppler showed abundant blood flow on the wall and thicken separation of the cystic lesion. CT scan of the neck suggested the cyst was located behind the right lobe of the thyroid gland (Fig. 2, arrow). After medical treatment a neck exploratory operation was performed. The operation showed a cystic mass of 40×30mm in size on the dorsal side of right lobe of the thyroid gland without vessels invasion and lymphatic metastasis. Histological examination showed in fibrous cystic wall, some of the inner wall of the capsule were covered with a single layer of flat epithelium, some were not covered with cells, and a small cluster of parathyroid tissue was extruded and deformed in the wall of the capsule. (HE, original magnification×100). (Fig.3).

The serum PTH level of the patient had fallen to 1143 pg/ml (4984 pg/ml, pre-op) in 10 minutes after surgery. The serum PTH and calcium were 41.7 pg/ml and 1.87mmol/L (4.11mmol/L, pre-op) separately on the 3rd day after surgery.

DISCUSSION

Parathyroid cyst is a rare lesion of parathyroid glands. It can be subdivided into functional and nonfunctional cyst, depending on whether is accompanied by hyperparathyroidism [1,2]. Most of parathyroid cysts were due to parathyroid adenoma cystic degeneration or intracystic hemorrhage [4,5,6]. About 95% of the cysts were located in the inferior border of the thyroid, and were more common in the left and lower parathyroid glands [6]. Nonfunctional parathyroid cysts account for 85%, which are more likely to be found in women. The neck masses of patients are found inadvertently, with no symptoms [2,4,7]. Functional parathyroid cysts account for 15%, which are more common to be found in men. There are four criteria to define a functional parathyroid cysts: (1) Preoperative clinical and biochemical evidence of hyperparathyroidism, (2) intraoperative evidence of normal remaining parathyroid glands, (3) histologic identification of parathyroid tissue within the cyst wall, and (4) postoperative correction of hypercalcemia[8]. The case, which we reported, met all these criteria. At higher levels of PTH and blood calcium, there may be weakness, loss of appetite in the early stage; bone pain, fractures, kidney stones in the late stage. Primary hyperparathyroidism (PHPT) is a disorder of one or more of the parathyroid glands. The parathyroid gland(s) becomes overactive and secretes excess amounts of parathyroid hormone (PTH). As a result, the blood calcium rises to a level that is higher than normal (called hypercalcemia). An elevated calcium level can cause many short-term and long-term complications. Hyperparathyroid (or parathyroid) crisis is a rare condition that sometimes happens when people with PHPT experience another illness. During hyperparathyroid (parathyroid) crisis, blood PTH and calcium levels rise sharply to very high levels, causing severe symptoms of hypercalcemia, like vomiting or

Figure 1 A sagittal view of ultrasound scan demonstrated a thin-walled cystic lesion of 40×30mm in size on the dorsal side of the right lobe of his thyroid gland, with well-defined border and thicken separation. B Abundant blood flow signals were seen on the wall and thicken separation.

Figure 2 CT scan of the neck revealed the cyst was located behind the right lobe of the thyroid gland.

Figure 3 Histological examination showed in fibrous cystic wall of parathyroid cysts, some of the inner wall of the capsule were covered with a single layer of flat epithelium, some were not covered with cells, and a small cluster of parathyroid tissue were extruded and deformed in the wall of the capsule. (HE, original magnification×100).
diarrhea, which causes excessive fluid loss or severely limits the amount of fluid they can consume. Functional parathyroid cysts present hyperparathyroidism (serum calcium levels above or equal to 2.75 mmol/L, which we called hypercalcemia, and PTH above or equal to 65 pg/ml). When serum calcium levels are above or equal to 3.75mmol/L, which we called hypercalcemic crisis, also known as hyperparathyroid crisis. Just like the case we reported. Hyperparathyroid crisis is a very dangerous situation. If the patient doesn’t receive treatment timely, he may get coma even die of multiple organ failure[9].

Parathyroid cyst is a rare cause of hyperparathyroid crisis. So far, only one case report has been published in literature [10]. Neck ultrasonography plays an important role in diagnosis of parathyroid lesions. Continuous observation of serum calcium and PTH levels may offer more useful information in differential diagnosis of parathyroid cyst and thyroid cyst. Therefore, for patients with unknown-reason coma, it’s necessary to take ultrasound scans, serum calcium and PTH tests to check whether they have hyperparathyroid crisis. One would think that a Parathyroid ultrasonography would be performed in a patient who presents as hyperparathyroid crisis with elevated serum calcium and PTH level and another illness such as vomiting, diarrhea or even coma. Therefore, parathyroid ultrasound is an important method for diagnosis of parathyroid diseases.

Conflicts of Interest
The authors declare that there is no conflict of interest.

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