A Case Report of A Giant Parathyroid Adenoma Presenting with A Brown Tumor

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Case report

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Abstract

Background: Giant parathyroid adenoma presenting with a brown tumor is considered extremely rare.

Case Presentation: A 21-year-old woman presented to the clinic with persistent pain in her right knee. A radiographic examination showed an osteolytic lesion in her right tibia. Blood laboratory tests revealed that serum calcium and intact parathyroid hormone were increased significantly. Physical examination showed a 3-cm, firm, immovable lump in her neck. Ultrasonography of the patient's neck revealed a 3.5-cm, well-circumscribed mass with a homogeneous internal texture. Computed tomography also showed a localized tumor with clear margins. The 99mTc-MIBI scintigraphy showed a hot spot in the right inferior gland. Based on these findings we judged that she had giant parathyroid adenoma presenting with a brown tumor. We ruled out the possibility of carcinoma based on image studies. We performed a parathyroidectomy via a small incision. The excised parathyroid gland weighed 10.3 g. The patient's postoperative course was unremarkable.

Conclusions: Giant parathyroid adenoma presenting with a brown tumor is extremely rare. Accordingly, the differentiation between giant adenoma and parathyroid carcinoma is crucial. However, we could rule out the possibility of carcinoma based on imaging studies, including ultrasonography and computed tomography. As a result, we performed successful parathyroidectomy with a small incision.

Background

Primary hyperparathyroidism may be caused by giant parathyroid adenoma, a type of large, solitary adenoma. The median weight of adenomas is 0.61 g, and an adenoma in excess of 3.5 g is rare [1]. Primary hyperparathyroidism may also cause osteolytic lesions called brown tumors [2]. Currently, primary hyperparathyroidism is detected via a screening blood test. Therefore, it is unusual that a brown tumor is the first presentation of primary hyperparathyroidism.

Here, we report a rare case of giant parathyroid adenoma presenting with a brown tumor. Because of this rarity, the differentiation between parathyroid adenoma and carcinoma is essential.

Case Presentation

A 21-year-old woman presented to the orthopedic clinic with persistent pain in her right knee. She had reported enduring pain in her right knee as well as general fatigue over the last few years. Radiographic examination of her right knee revealed an osteolytic lesion in her tibia (Fig. 1). A bone biopsy was performed. A histological examination revealed that this lesion consisted of circular-shaped or spindle-shaped mononuclear cells and osteoclast-like giant cells. Cellular density was high with attendant hemorrhaging. These histological findings were compatible with a giant cell tumor. Her blood laboratory test revealed that serum calcium and intact parathyroid hormone (iPTH) concentrations were 14.7 mg/dL and 1360 pg/dL, respectively; these values were significantly higher than the normal range. Other thyroid

She was referred to our department with suspected primary hyperparathyroidism. Her medical and family history were unremarkable. Physical examination showed a 3-cm, firm, immovable lump in her neck. Ultrasonography of the patient's neck revealed a well-circumscribed, oval mass with a homogeneous internal texture (Fig. 2). The depth/width ratio of the tumor was 0.96. Computed tomography showed that a tumor was located near the left lobe of the thyroid (Fig. 3). The tumor was separate from the surrounding structure in both computed tomography and ultrasonography. ^{99m}Tc-MIBI parathyroid scintigraphy showed a hot spot in the left inferior gland (Fig. 4).

Based on these findings, we judged that the patient had a brown tumor. The causal lesion was the left inferior gland. Although physical examination showed a large, firm, immovable tumor, ultrasonography and computed tomography revealed that this tumor showed few signs of malignancy. Therefore, we diagnosed this lesion as adenoma. We judged that removal of the tumor with a small incision was possible.

We performed a parathyroidectomy via a 3-cm incision. The surgical specimen was 4.0 × 2.5 × 1.3 cm and weighed 10.3 g (Fig. 5). The patient's postoperative course was unremarkable. Her serum calcium and iPTH concentrations were normal three months after the operation.

Discussion

Here, we report a rare case of giant parathyroid adenoma presenting with a brown tumor. Because of this rarity, the differentiation between parathyroid adenoma and carcinoma is essential. To achieve this, careful analysis of ultrasonography and computed tomography images was performed, enabling us to perform successful parathyroidectomy with a small incision.

In our case, the excised parathyroid adenoma weighed 10.3 g. Spanheimer et al. investigated a series of 300 consecutive parathyroid adenomas [1]. They revealed that the 95% percentile of weight for these cases was 3.5 g. Therefore, the adenoma from our patient was considered giant parathyroid adenoma.

In cases of giant parathyroid adenoma, differentiation from parathyroid carcinoma is necessary. Parathyroid carcinoma is often accompanied by osseous symptoms [3] and shows as a palpable mass [4, 5]. Our case also exhibited these clinical findings; however, the findings of image studies in our case were incompatible with carcinoma. Our tumor was an oval-shaped mass with a well-circumscribed margin and separation from surrounding tissue [5]. The depth/width ratio was 0.96, which represents adenoma, rather than carcinoma [6]. Although the giant parathyroid adenoma measured 4.0 cm in our case, we were able to successfully use a minimal excision technique [7].

Parathyroid adenoma and carcinoma can lead to hyperparathyroidism, which may cause osseous lesions, including brown tumors [2]. Hypersecretion of PTH activates osteoblasts, which can result in the acceleration of bone absorption. Chronic hypersecretion in a localized area can precipitate the formation of a lytic bone lesion. A histological examination shows the appearance of giant multi-nuclear cells, the

proliferation of fibroblasts, and the accumulation of hemosiderin. The pigments in hemosiderin cause these lesions to appear brown, hence the name 'brown tumor' [2].

Brown tumors are a rare manifestation of hyperparathyroidism. It has been documented that only 2 – 5% of patients with primary hyperparathyroidism develop this type of tumor [2, 8, 9]. Currently, asymptomatic patients with primary hyperparathyroidism are likely to be detected via laboratory tests [10, 11]. Therefore, a brown tumor tends to be the initial presentation in the younger patients, similar to our case. Moreover, younger patients are less likely to receive screening blood tests [12–14].

In conclusion, we report a rare case of giant parathyroid adenoma presenting with a brown tumor. Because of this rarity, the differentiation between parathyroid adenoma and carcinoma is essential. Accordingly, careful analysis of ultrasonography and computed tomography images was performed, which enabled us to perform successful parathyroidectomy with a small incision.

Declarations

Declarations

Ethics approval and consent to participate

This study was ethically approved by our institution. We obtained written informed consent for publication from the patient.

Consent for publication

We obtained written informed consent for publication from the patient.

Availability of data and materials

The datasets used and/or analyzed during this study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

KE analyzed and interpreted the patient data and was a major contributor in writing the manuscript. SF and EO analyzed and interpreted the patient data. YK performed the histological examination. KT revised manuscript.

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Figures

Figure 1

Plain radiographs of the right tibia. Arrows indicate the osteolytic lesion. This lesion was proven to be a brown tumor.

Figure 2

Ultrasonography of the patient's neck revealed a well-circumscribed mass with a homogeneous internal texture.

Figure 3

Computed tomographic image. Arrows indicate a well-circumscribed tumor corresponding with a giant parathyroid adenoma.

Figure 4

Images of 99mTc-MIBI parathyroid scintigraphy. Arrows demonstrate increased radiotracer accumulation in the left lower parathyroid gland.

Figure 5

Surgical specimen of the left inferior giant parathyroid adenoma. The maximal size was 4.0 cm, and the weight was 10.3 g. The scale denotes 1.0 cm.