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Surgical management of a giant parathyroid adenoma through minimal invasive parathyroidectomy. A case report

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ABSTRACT

INTRODUCTION: Primary hyperparathyroidism is a common endocrine disorder mostly associated to parathyroid adenomas. Although those tend to be small in size, rare cases of giant parathyroid adenomas may be present.

CASE PRESENTATION: A 42 year old female was admitted in our department due to weakness and vague abdominal pain for the past 8 months. Preoperative laboratory exams indicated primary hyperparathyroidism as a cause to her symptomatology, with elevated values of parathormone and normal values of serum calcium. Ultrasound scan and 99m Tc-MIBI of her cervical region uncovered a giant 3 × 2 cm parathyroid adenoma, located in the lower left thyroid lobe. Despite its size, the gland was successfully removed through implementation of minimal invasive parathyroidectomy. She was uneventfully discharged on the 1st postoperative day.

DISCUSSION: Although a common reason for developing hyperparathyroidism, parathyroid adenomas may rarely present with exaggerated dimensions and weight. Physical examination is usually unremarkable, while patients may present with symptomatology associated with elevated calcium levels. Treatment of this medical condition consists of surgical removal of the pathologic parathyroid gland either by bilateral neck exploration or through minimal invasive parathyroidectomy. Preoperative localization plays an important role in the second case, since the method focuses on resection of a pre-op marked hyperactive parathyroid gland, through a small incision.

CONCLUSION: Clinicians must be alerted of hyperparathyroidism in patients presenting with calcium associated symptomatology. Diagnosis is straightforward through laboratory exams, while surgery offers the only permanent treatment option.

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1. Introduction

Primary hyperparathyroidism (PHPT) is a common endocrine disorder associated with elevated levels of serum calcium due to oversecretion of parathormone [1]. Parathyroid adenomas account for most cases of PHPT, with multiple adenomas, hyperplasia and parathyroid carcinomas concluding the most usual causes of this medical disorder [1]. Giant adenomas of the parathyroid glands are rarely encountered, while their surgical management poses a challenge. We present the case of a 42 year old female patient, who suffered from PHPT due to a giant sized parathyroid adenoma. Despite the size of the pathologic gland, she was successfully relieved of her medical condition through minimal invasive parathyroidectomy.

2. Case presentation

The case pertains to a 42 year old Caucasian female patient, who was admitted in our department due to general weakness, along with incidents of vague abdominal pain for the past 8 months. Her medical history included 2 cesarean sections, while she was a periodical smoker. Physical examination was proven unremarkable.

A complete laboratory scan was performed, which demonstrated normal hematocrite and hemoglobin values. Her thyroid hormones revealed an euthyroid state, with TSH, T3 and T4 being within normal limits. Parathormone was 151 pg/mL while serum calcium was detected at the highest normal levels for our laboratory (10.4 mg/dL with a normal range of 8.1–10.5 mg/dL), thus setting the basis for the diagnosis of normocalcemic hyperparathyroidism. Rest of her biochemistry results was insignificant.

An ultrasound scan of her neck revealed a normal sized thyroid gland, while an enlarged parathyroid was located on the left lower side of her cervical region, with its dimensions approximately

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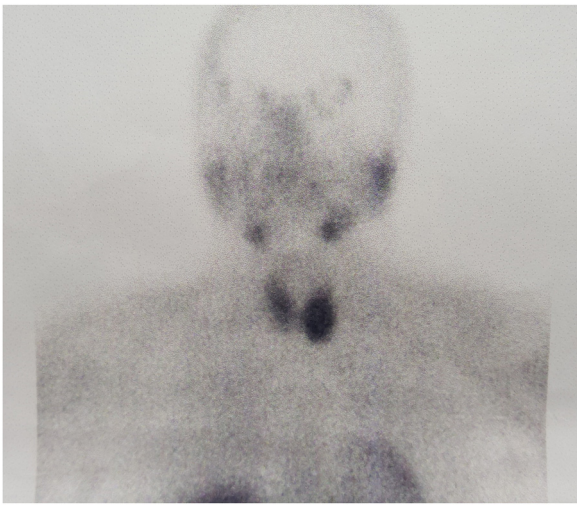


Fig. 1. 99 m Tc-MIBI parathyroid scintigraphy demonstrated increased radiotracer absorption from the lower left parathyroid gland.

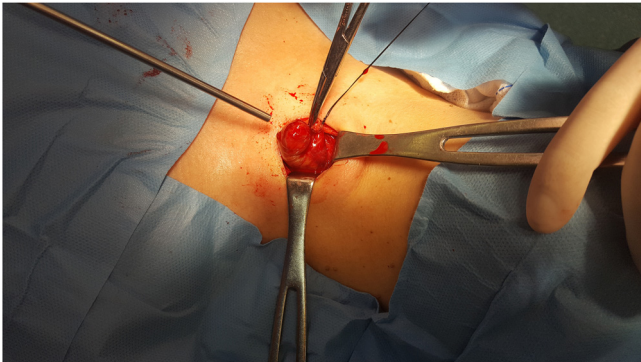


Fig. 2. A giant parathyroid adenoma resected through implementation of minimally invasive parathyroidectomy. The gland was removed through a small left-sided thyroid incision.

3 × 2 cm. Further examination with 99 m Tc-MIBI parathyroid scintigraphy depicted large concentrations of radiotracer on the same location, signifying a possible parathyroid adenoma as the cause of her hyperparathyroidism (Fig. 1). After written consent, patient was taken to the operating room.

Resection of the giant gland was performed by an experienced in thyroid surgery general surgeon through implementation of minimal invasive parathyroidectomy (MIP). A small left-sided thyroid incision was performed, approximately 2 cm in length. After lateral retraction of the sternothyroid muscle and manipulation of the left thyroid lobe, the gross parathyroid adenoma was located, attached on the posterior side of the left lower lobe of her thyroid (Fig. 2). Careful resection of the gland was performed with identification of the left recurrent laryngeal nerve. The excised specimen was sent for pathologic examination, which was indeed significant for a giant 3 × 2 cm parathyroid adenoma (Fig. 3).

Postoperatively period was uneventful for the patient, with a slight decline in calcium (9,5 mg/dL), while her parathormone (PHT) levels returned within normal limits approximately 8 h after surgery. She was discharged on the next day, while at 3 month follow up she reported no further symptoms.



Fig. 3. Excised specimen of a giant 3 × 2 cm parathyroid adenoma.

3. Discussion

Primary hyperparathyroidism is a common endocrine disorder characterized by persistent hypercalcemia along with elevated values of PHT [1]. Its prevalence is approximately 0.5%, while it shows no gender predisposition [2,3]. Parathyroid adenomas are the leading cause of PHPT, accounting for approximately 80% of cases. Other causes are multiple adenomas, hyperplasia and parathyroid cancer, with the latter estimated only in 1% of patients [1,2]. Other uncommon causes of PHPT are isolated familial hyperparathyroidism and hyperparathyroidism-jaw tumor syndrome [4].

Patients' physical examination of the cervical region is usually unremarkable, while the elevated levels of serum calcium account for a number of nonspecific skeletal, neurological, renal and gastrointestinal symptoms [1,5]. Symptomatology usually includes neuromuscular weakness, fatigue, decreased concentration and memory loss. Patients can also present with muscle and joint pain and peptic ulcers, while PHPT may also lead to the development of nephrolithiasis and nephrocalcinosis. Cases of acute incidents of pancreatitis have also been described due to PHPT [6]. Dehydration or fluid loss can lead to sudden increase of serum calcium, causing a rare condition known as hypercalcemic crisis. Main symptoms include acute abdominal pain, nausea, vomiting,

and constipation, while cardiac or renal impairment can also be observed [1,7].

Evaluation of PTH and calcium levels plays an important role in the diagnostic management of hyperparathyroidism (HPT). While classic primary hyperparathyroidism is defined by the presence of increased values of PHT and serum calcium, patients can also present with elevated values of PTH and normalized calcium. This condition is known as normocalcemic hyperparathyroidism, which must be differentiated from secondary hyperparathyroidism [8]. Most common causes of secondary HPT include vitamin D deficiency, renal insufficiency and intestinal malabsorption of calcium [9]. Patients with high preoperative calcium values require close postsurgical observation, since a feedback effect causes the non-pathologic parathyroid glands to cease their normal function. Resection of the pathologic gland may result to transient hypocalcemia, due to sudden decrease in calcium levels [1,10]. Our patient was diagnosed with normocalcemic primary PHPT, with an elevated PTH value and normal serum calcium at 10.4 mg/dL. A postoperative measurement approximately 8 h after surgery, revealed slightly lower calcium of 9.5 mg/dL, indicating normal preoperative function of the three non-pathologic parathyroid glands.

While diagnosis of PHPT is set with clinical and laboratory criteria, there is a number of imaging modalities, mostly used for preoperative management of PHPT and localization of the pathologic glands' location. U/S scan of the neck can be used to locate the parathyroid gland prior to surgery, with an approximate sensitivity and specificity of 75% and 85% respectively [11]. MRI and four dimensional CT scan (4D-CT) can be used to detect ectopic parathyroid tissue, while 99m Tc-MIBI parathyroid scintigraphy utilizes the absorption of radiotracer from hyperactive parathyroid tissue, in order to localize abnormal parathyroids [12,13].

Giant parathyroid adenomas are a rare cause of PHPT, while there is a controversy regarding their definition, in accordance to their weight. Various cases with gland weight up to 110 g are reported, while in a recent publication by Spanheimer et al., giant parathyroid adenomas were characterized by an increased weight >3.5 g [14–16]. Our excised specimen dimensions were 3.3 × 2 × 1.4 cm, while it demonstrated a total weight of 5.39 g, indicating a 'true' giant parathyroid adenoma.

Surgical treatment of PHPT consists on resection of the pathologic parathyroid tissue, either through bilateral exploration of the neck, or through minimal invasive parathyroidectomy (MIP) [17,18]. The goal of the first method is to locate all four parathyroid glands through a thorough exploration of the thyroid, and excise the presumed pathologic ones, depending on their size. Minimal invasive parathyroidectomy focuses on excision of a single hyperactive parathyroid through minimal invasive means [17]. Application of MIP usually involves local anesthesia and unilateral exploration of the neck through a small cervical incision. Preoperative marking and localization of the target parathyroid is essential in this method to avoid unnecessary damage to nearby tissues. Resection of the pathologic parathyroid can be confirmed with measurement of intraoperative parathormone (ioPTH). PTH has a very short half life, thus excision of the pathologic gland leads to rapid normalization of PHT within minutes [5]. In our patient no measurement of ioPTH was performed, although the size of the resected gland and postoperative decline of PTH levels confirmed the successful treatment.

4. Conclusion

Hyperparathyroidism is a common endocrine disorder, which must be suspected in patients presenting with vague weakness and calcium related symptomatology. Elevated levels of calcium and PTH confirm the diagnosis, while surgery is the treatment of

choice. Despite the gross size of our patient's adenoma, she was successfully treated using minimally invasive techniques.

Conflict of interest

All authors declare that they have no conflict of interest.

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None.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

GS wrote the manuscript, acquired and analysed the data, reviewed the literature, while he supervised the manuscript preparation process. KG, SS, DP, analysed the data and reviewed the literature. GD performed the operation with the help of GS and KG. He also supervised the manuscript preparation process.

Guarantor

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The work has been reported in line with the SCARE criteria [19].

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