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Clinical Presentation and Surgical Approach with Review of Literature in Cases of Giant Parathyroid Adenoma

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Background: Giant parathyroid adenomas weighing more than 3.5 grams are a rare type of parathyroid adenoma. They manifest as primary hyperparathyroidism with significantly elevated laboratory findings and more severe clinical presentation due to the large tissue mass. This is the first reported instance of a giant adenoma at M.G.M. Medical College and Hospital in Aurangabad.
Case Presentation: A 49-year-old Indian woman presented with a history of multiple fractures over time and complained of generalized fatigue. Investigations revealed hypercalcemia with elevated parathyroid hormone levels. Subsequently, a sestamibi scintigraphy parathyroid scan was conducted to confirm the diagnosis of a giant parathyroid adenoma. Following this, a focused surgical neck exploration was performed, and a large parathyroid adenoma weighing 6.2 grams was successfully excised.

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Conclusion: Giant parathyroid adenoma is an uncommon cause of primary hyperparathyroidism and typically presents symptomatically with elevated calcium and parathyroid hormone levels. Diagnosis of giant parathyroid adenoma involves imaging and laboratory studies, with management usually involving surgical intervention aimed at complete resection. Patients typically experience a full recovery with no long-term complications or recurrence.

Keywords: Giant parathyroid adenoma; parathyroidectomy; primary hyperparathyroidism; parathyroidectomy with hemithyroidectomy; atypical parathyroid adenoma.

ABBREVIATIONS

CBC : Complete blood count.
CT : Computed tomography.
FNA : Fine-needle aspiration.
FNA-C : Fine-needle aspiration cytology.
GPTA : Giant parathyroid adenoma.
MIBI : 99mTc-sestamibi scintigraphy.
MIP : Minimally invasive parathyroidectomy.
NIH : US National Institutes of Health.
PHPT : Primary hyperparathyroidism.
PTA : Parathyroid adenoma.
PTH : Parathyroid hormone.
TSH : Thyroid-stimulating hormone.

1. INTRODUCTION

This report highlights the rare occurrence of giant parathyroid adenomas (GPTAs), characterized by a weight exceeding 3.5 grams, with some reported as heavy as 110 grams [1,2]. Normal parathyroid glands weigh approximately 50 to 70 milligrams (mg) [3]. Parathyroid adenomas (PTAs) are usually all measuring less than 2 cm and weighing less than 1 gram [3]. Giant PTAs are uncommon; typically, PTAs measure less than 2 cm and weigh less than 1 gram [3].

Primary hyperparathyroidism (PHPT) is the most common presentation in cases of both PTAs and GPTAs. Notably, PHPT itself is the third most common endocrine disorder [4].

The most common cause of PHPT is PTAs (85% of cases), the majority of which are solitary PTAs. GPTAs comprise a small subgroup within solitary PTAs [5]. Although parathyroid hyperplasia or carcinoma can also cause PHPT, PTAs are the leading cause [5].

The literature review included in this case report likely examines the clinical characteristics and typical presentation of giant parathyroid adenomas (GPTAs), as well as the methods for diagnosis and treatment. This comprehensive analysis provides insights into the rarity of GPTAs, their symptoms, diagnostic challenges, and the various treatment modalities available for effectively managing these cases.

2. CASE PRESENTATION

A 49-year-old woman presented to MGM Hospital casualty with a complaint of left forearm pain sustained from a fall at home 25 days prior. The injury was managed conservatively with a cast. She also reported pain in her right wrist and right leg for the past 10 days. Additionally, she has a history of a similar left ankle fracture one year ago. She denied any past co-morbidities or surgeries.

Examination revealed swelling in the left forearm and right leg, with tenderness in the left forearm, right wrist, left knee, and right leg. The remainder of the physical and neurological examinations were unremarkable. On admission, her vital signs (pulse, blood pressure, and temperature) were within normal limits.

Further investigation included a series of X-rays to assess various joints. These revealed right and left distal radius fractures, as well as a proximal one-third tibia and fibula fracture. Due to the patient's history of multiple fractures and giddiness, serum calcium and parathyroid hormone (PTH) levels were measured. These tests showed elevated levels (serum calcium: 13 mg/dL and PTH: 583 pg/mL) [1]. Her complete blood count (CBC) and liver function tests were within normal limits. Microbiology laboratory tests were also normal. Sestamibi scintigraphy, a parathyroid scan was done, which suggested a parathyroid adenoma measuring 22 x 16 x 22 mm at the lower pole of the right thyroid lobe.

Due to elevated serum calcium and PTH levels, the patient was scheduled for surgery. The procedure involved excision of a right-sided parathyroid adenoma with a concomitant right-sidedhemithyroidectomy.

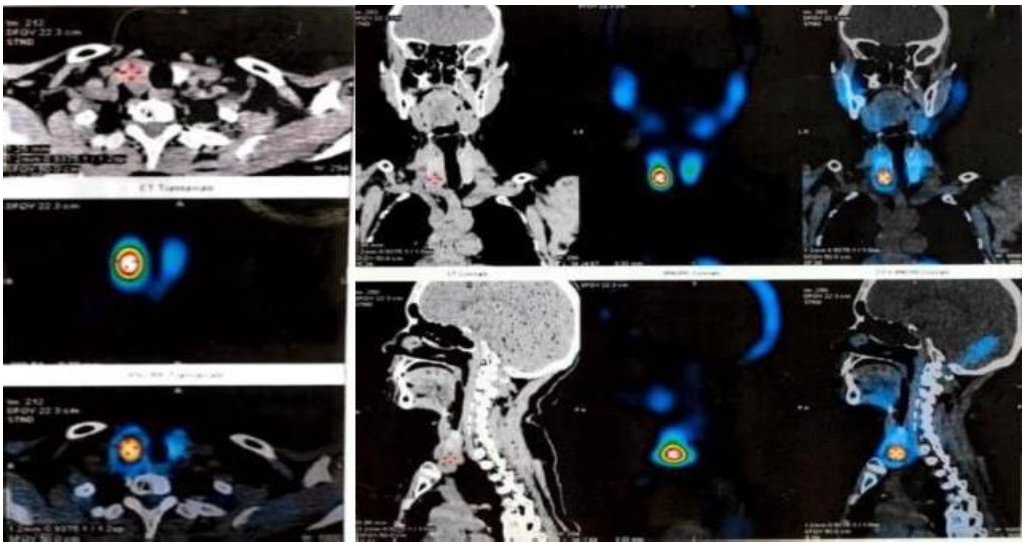

Fig. 1. Early and late 99mTc-sestamibi scintigraphy parathyroid scan

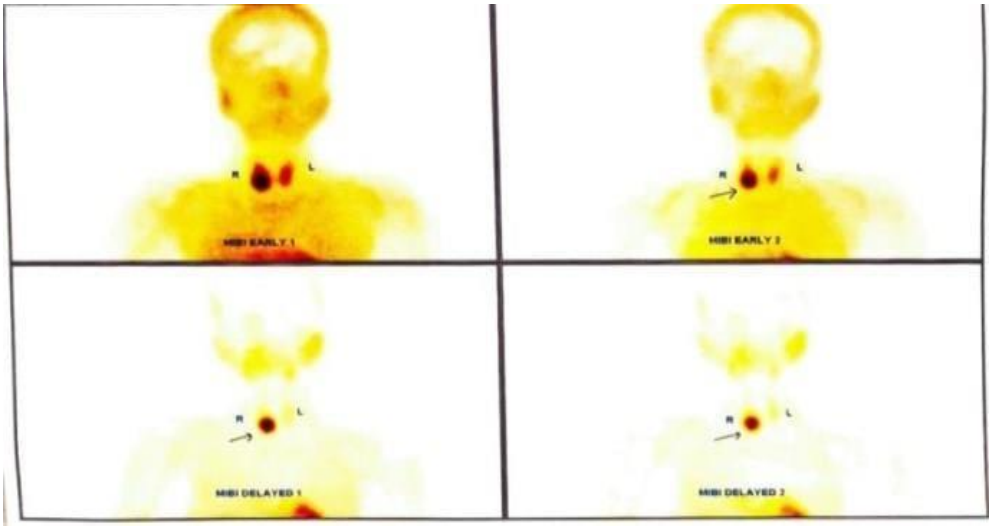

Fig. 2. Surgical Intervention

Fig. 3. Excised giant parathyroid adenoma

Under general anesthesia and aseptic precautions, the surgical field was painted and draped with the patient in a supine position. The head was extended and tilted to the left. A transverse incision was made just above the right clavicle. The upper skin flap was elevated to expose the thyroid gland, while the lower flap extended down to the sternal notch. The deep fascia and strap muscles were divided, followed by blunt dissection to identify the parathyroid adenoma. The adenoma measured approximately 4 x 3 cm and was located at the lower pole of the thyroid gland.

Due to the ill-defined border of the parathyroid adenoma and the enlarged thyroid gland, a right hemithyroidectomy was performed to ensure complete removal of the adenoma. The parathyroid tissue and thyroid gland were meticulously dissected from surrounding structures, with careful preservation of the recurrent laryngeal nerve. The resected specimen was sent for histopathological examination. Additionally, intraoperative serum calcium levels were measured.

Hemostasis was achieved, and a negative suction drain was placed in the surgical site. The incision was closed in layers using a subcuticular technique with Ethilon 3-0 sutures. The patient was extubated and transferred to the ward for recovery.

3. DISCUSSION

This case study details the presentation, diagnosis, and management of a 49-year-old woman with a giant parathyroid adenoma (GPTA), providing a comprehensive view of this rare clinical entity in comparison with existing literature.

The patient presented with left forearm pain following a fall, alongside a history of multiple fractures, including a left ankle fracture one year prior. She also reported generalized pain in her right wrist and right leg. This constellation of symptoms, particularly the recurrent fractures, raised suspicion of an underlying metabolic disorder, notably primary hyperparathyroidism (PHPT) [6,7]. PHPT often presents with bone-related symptoms such as fractures and generalized pain, which are directly related to the effects of hypercalcemia on bone resorption.

Neagoe et al. [3] describe similar presentations in their review of GPTAs, highlighting recurrent fractures, kidney stones, and neuropsychiatric symptoms as common clinical manifestations. The patient's elevated serum calcium (13 mg/dL) and PTH levels (583 pg/mL) further supported the diagnosis of PHPT. According to Madkhali et al. [4] elevated serum calcium and PTH are hallmarks of PHPT, a finding consistent with the patient's laboratory results.

The diagnosis was confirmed through sestamibi scintigraphy, which identified a parathyroid adenoma measuring 22 x 16 x 22 mm at the lower pole of the right thyroid lobe. Sestamibi scintigraphy is a widely utilized imaging modality for localizing parathyroid adenomas, as noted by Spanheimer et al. [1] who reported its high sensitivity and specificity, particularly for larger adenomas.

Garas et al. [5] emphasize the role of combined imaging techniques, such as ultrasound and MIBI scan, in accurately localizing GPTAs. This approach was validated in our case, where the MIBI scan effectively pinpointed the adenoma's location, facilitating targeted surgical intervention.

The patient underwent excision of the right-sided parathyroid adenoma along with a right-sided hemithyroidectomy [8-12]. The decision to perform a hemithyroidectomy in addition to the adenoma excision was due to the adenoma's ill-defined borders and the need to ensure complete removal. This comprehensive approach is consistent with the surgical management of GPTAs described by Neagoe et al. [3] where larger adenomas or those with complex anatomical presentations often necessitate more extensive surgery.

The procedure was performed under general anesthesia with meticulous care to preserve the recurrent laryngeal nerve, a critical consideration in thyroid and parathyroid surgeries to prevent vocal cord paralysis. This aspect of the surgery aligns with the best practices highlighted by Sahsamanis et al. [13] which stress the importance of nerve preservation during such procedures.

Postoperative monitoring included measuring intraoperative serum calcium levels to assess the immediate biochemical response to adenoma removal [14-18]. The patient’s postoperative course was uneventful, with normalization of serum calcium and PTH levels. This favorable outcome aligns with findings by Abdel-Aziz et al. [19] who reported high success rates and

excellent postoperative outcomes in patients undergoing parathyroidectomy for GPTAs.

The risk of postoperative hypocalcemia, a common complication following parathyroidectomy, is often correlated with the size of the adenoma [20-25]. Larger adenomas are associated with a higher incidence of transient hypocalcemia due to the sudden drop in PTH levels, leading to a condition known as 'hungry bone syndrome' [26-28]. However, as Zamboni et al. [29] note, smaller adenomas, such as the 6.2 gm adenoma in our case, have a lower risk of postoperative hypocalcemia, which was reflected in our patient's smooth recovery without the need for calcium repletion therapy.

The patient remained asymptomatic and normocalcemic during the one-year follow-up period, indicating a successful long-term outcome. This result is consistent with the findings of a study by Abdel-Aziz et al. [19] which followed patients for an average of 12 months postoperatively and reported sustained normocalcemia and no recurrence, even in cases with suspicious histologic features.

This case study corroborates the broader clinical understanding of GPTAs as outlined in various studies. Neagoe et al. [3] provide a comprehensive review of GPTAs, noting their rarity and the

importance of accurate preoperative localization and surgical planning. Our case supports their findings, particularly the utility of sestamibi scintigraphy and the need for thorough surgical excision [30-33].

Spanheimer et al. [1] questions whether GPTAs represent a distinct clinical entity, highlighting the variability in presentations and outcomes. Our patient's presentation with multiple fractures and elevated biochemical markers aligns with their observation of the symptomatic nature of GPTAs, which often present more dramatically due to higher calcium levels produced by the larger tumor mass.

Power et al. [2] describe unusual presentations of GPTAs, emphasizing the diversity in clinical manifestations. Our patient's symptoms and successful surgical management add to the spectrum of documented GPTA cases, reinforcing the necessity for individualized diagnostic and therapeuticapproaches.

4. CONCLUSION

This case study highlights the clinical presentation, diagnostic challenges, and effective management of a GPTA, aligning with the broader literature. The successful surgical outcome and favorable long-term follow-up underscore the importance of early diagnosis and comprehensive treatment in managing this rare but significant condition. GPTA is a rare subset of PTAs that weigh > 3.5 grams, it is benign but can manifest with the symptoms of extreme hypercalcemia. GPTA generally presents symptomatically, with high preoperative PTH and serum calcium directly proportional to the adenoma weight. The most accurate method for localizing a GPTA is a combination of neck ultrasound and MIBI scan. MIP with intraoperative PTH monitoring is the suggested management.

CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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