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Case Series

Myriad manifestations of parathyroid adenoma – clinical insights from a case series

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ABSTRACT

Parathyroid adenoma is the most common cause of primary hyperparathyroidism and demonstrates a wide spectrum of clinical manifestations, ranging from asymptomatic hypercalcemia detected on routine evaluation to classical "bones, stones, abdominal groans, and psychic moans". Biochemical markers along with combined imaging modalities help in arriving at the diagnosis. This case series highlights four different cases with diverse clinical scenarios causing diagnostic challenges and their management. Establishing the diagnosis, accurate preoperative localization followed by timely surgical intervention provides excellent cure rates with minimal morbidity, thereby preventing long term complications and significantly improving patient outcomes.

Keywords: Parathyroid, Hypercalcemia, Hyperparathyroidism, Scintigraphy, Parathyroid adenoma, Pephrocalcinosis

INTRODUCTION

Primary hyperparathyroidism (PHPT) is an endocrine disorder characterized by inappropriate elevation of parathyroid hormone (PTH) levels, resulting in hypercalcemia and associated hypophosphatemia. In classic Hyperparathyroidism, biochemical evaluation shows elevated serum calcium with increased PTH levels, whereas in mild hyperparathyroidism there is inappropriate secretion of PTH with normal calcium levels. However, in normocalcemic Hyperparathyroidism, serum calcium level remains normal persistently in the presence of increased PTH after exclusion of secondary causes.[1]

The most common cause of PHPT is solitary adenoma of parathyroid gland, followed by parathyroid gland hyperplasia, adenomas in multiple glands and, rarely, parathyroid carcinoma.[2] PHPT exhibits a wide range of clinical presentations, necessitating a high index of suspicion for early and accurate diagnosis. Here, we present a case series of four patients with parathyroid adenoma who had distinctly different clinical presentations and discuss their surgical management and outcomes.

CASE SERIES

Case 1

A female in her early 60s presented with a 2-month history of constipation and abdominal discomfort. She was conscious and alert, and the general physical examination was unremarkable. There was no significant past medical history.

Blood investigations revealed hypercalcemia (serum calcium: 10.9 mg/dl) with elevated serum PTH level (PTH: 67.2 pg/ml).

Ultrasonography of the neck demonstrated hypoechoic nodules with a surrounding echogenic rim located inferior to the lower poles of both thyroid lobes. Contrast-enhanced computed tomography (CECT) of the neck showed heterogenously enhancing hypodense nodules along the inferior aspect of the right and left thyroid lobes,

measuring 4×5 mm and 7×5 mm, respectively, with preserved fat planes (Figure 1).

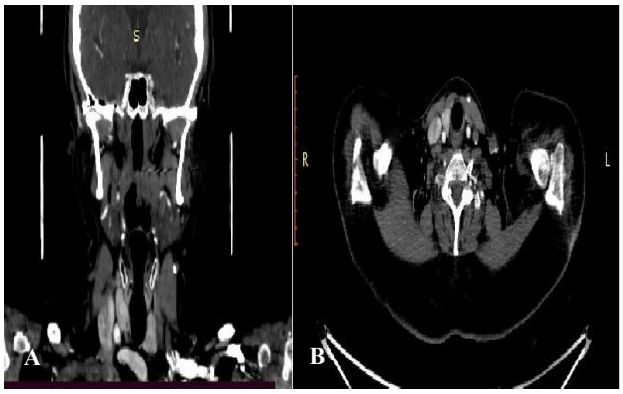

Figure 1 (A and B): CECT of neck enhancing the nodules inferior to both thyroid lobes.

Parathyroid scintigraphy using technitium-99m sestamibi (20 mCi) revealed normal thyroid uptake on early images, with focal areas of increased tracer uptake at the inferior poles of both thyroid lobes showing persistent retention on delayed images, suggestive of bilateral parathyroid adenomas (Figure 2).

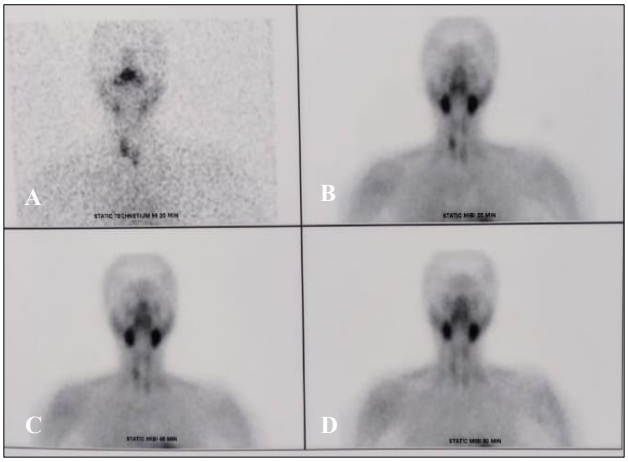

Figure 2 (A-D): Parathyroid scintigraphy images suggestive of bilateral parathyroid adenoma.

The patient underwent excision of bilateral parathyroid lesions. Intraoperatively, a soft yellowish mass measuring 2×2 cm was identified at the right inferior pole and another measuring 1.5×1 cm at the left inferior pole (Figure 3).

Intraoperative PTH measured 10 minutes after excision showed a significant decline (serum PTH: 12.3 pg/ml).

Postoperatively, the patient achieved normocalcemia. Histopathology confirmed the diagnosis of parathyroid lipo-adenoma (Figure 4).

At 3-month follow up, she remained asymptomatic.

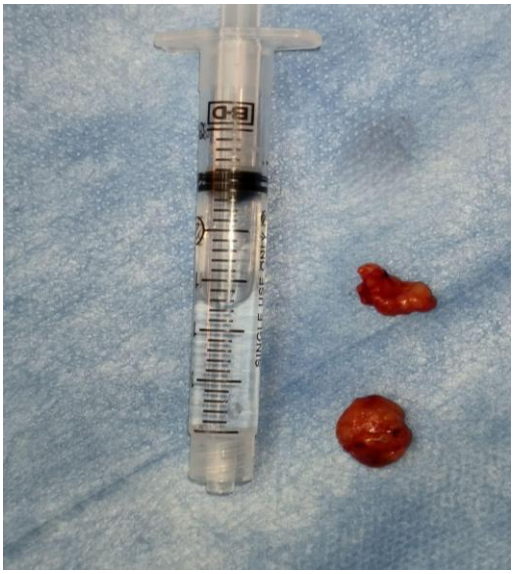

Figure 3: Intraoperative photograph showing excised right and left inferior parathyroid masses.

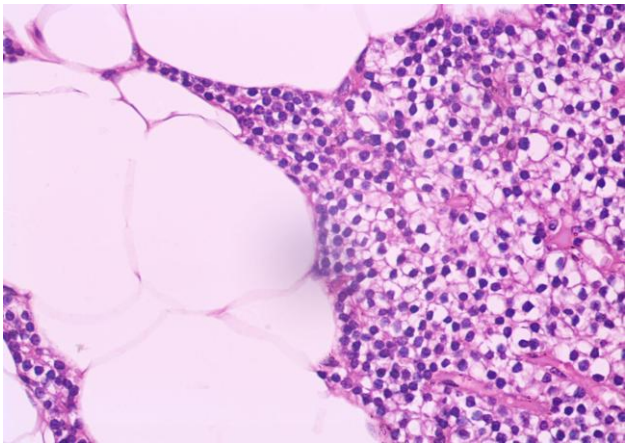

Figure 4: Histopathological image showing features consistent with parathyroid lipo-adenoma composed of chief cells with abundant stromal adipose tissue.

Case 2

A 52-year-old male presented with a complaint of fullness in the left lower neck. On physical examination, an ill-defined swelling was noted in the left thyroid region which moved with deglutition. There was no other significant clinical history.

Ultrasonography of the neck revealed a well-defined solid lesion with cystic areas located inferior to the lower pole of the left thyroid lobe and clearly separate from the thyroid gland (Figure 5).

Biochemical investigations showed a normal thyroid profile, elevated serum PTH (PTH: 112 pg/ml) with hypercalcemia (serum calcium: 14.1 mg/dl). Parathyroid scintigraphy using technitium-99m sestamibi demonstrated focal increased tracer uptake at the left

inferior pole with persistent retention on delayed images, suggestive of a left inferior parathyroid adenoma (Figure 6).

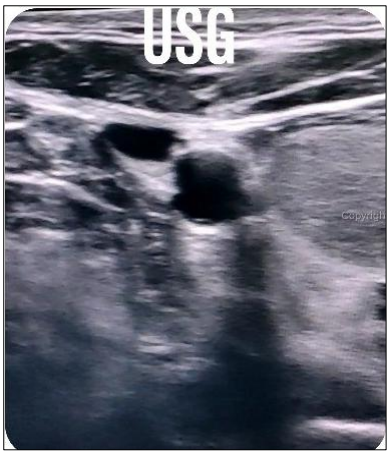

Figure 5: Ultrasonography image of neck showing solid lesion inferior to left thyroid lobe.

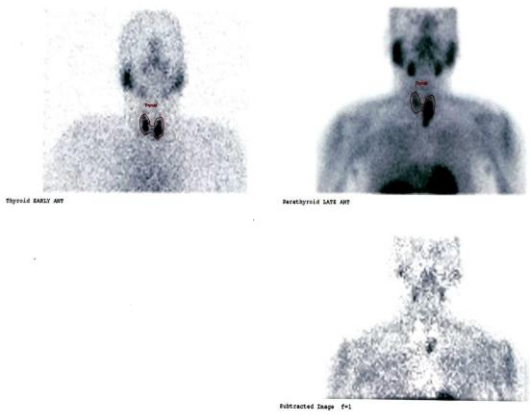

Figure 6: Parathyroid scintigraphy images suggestive of left inferior parathyroid adenoma.

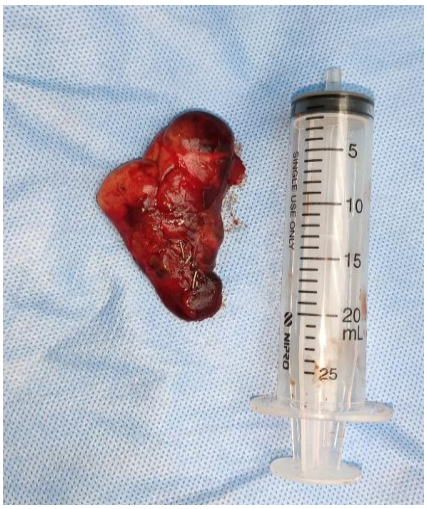

Figure 7: Intraoperative photograph of excised specimen.

The patient underwent surgical excision of the lesion. Intraoperatively, a solid, well-circumscribed mass measuring approximately 4×2×1 cm was identified inferior to the lower pole of the left thyroid lobe and was easily dissected from the surrounding structures (Figure 7).

Intraoperative PTH measured 10 minutes after excision was markedly reduced (serum PTH: 21 pg/ml).

Histopathological examination was consistent with parathyroid adenoma. The postoperative period was uneventful. At 3-month follow up, serum calcium and PTH levels were within normal limits.

Case 3

A 55-year-old male presented to the emergency department with sudden-onset of severe upper back pain. There were no other associated complaints. His past medical history was not significant, and physical examination was unremarkable. Cardiac evaluation was performed and was within normal limits.

Biochemical investigations revealed severe hypercalcemia (serum calcium: 13.7 mg/dl). Subsequent evaluation showed a markedly elevated serum PTH level (serum PTH: 153 pg/ml). CECT of the neck and chest demonstrated a large right inferior parathyroid adenoma with features suggestive of acute hemorrhage (Figure 8).

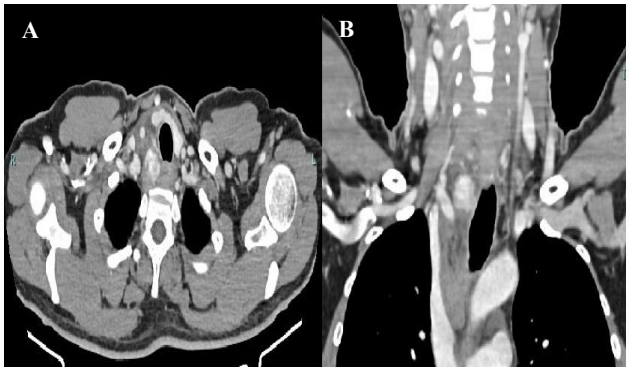

Figure 8 (A and B): Images of CECT neck showing features of acute hemorrhage of right inferior parathyroid adenoma.

Parathyroid scintigraphy using technitium-99m sestamibi demonstrated focal increased tracer uptake at the right inferior pole with persistent retention on delayed images, consistent with a right inferior parathyroid adenoma (Figure 9).

He was operated on and the mass was excised. Intraoperatively, a large ill-defined lesion with extracapsular hemorrhage was encountered (Figure 10), with hemorrhagic infiltration of surrounding soft tissue and strap muscles.

There was a significant decrease in serum PTH level 10 minutes after excision (serum PTH: 10.2 pg/ml).

Final histopathology revealed parathyroid adenoma with areas of hemorrhage (Figure 11). Post operatively, he remained asymptomatic and achieved normocalcemia.

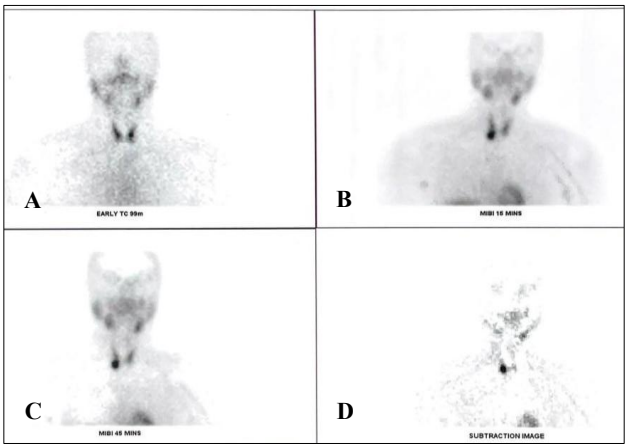

Figure 9 (A-D): Parathyroid scintigraphy images suggestive of right inferior parathyroid adenoma.

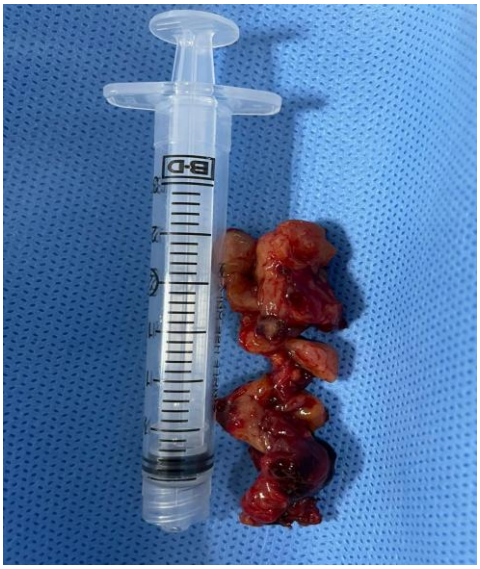

Figure 10: Intraoperative photograph of excised ill-defined specimen.

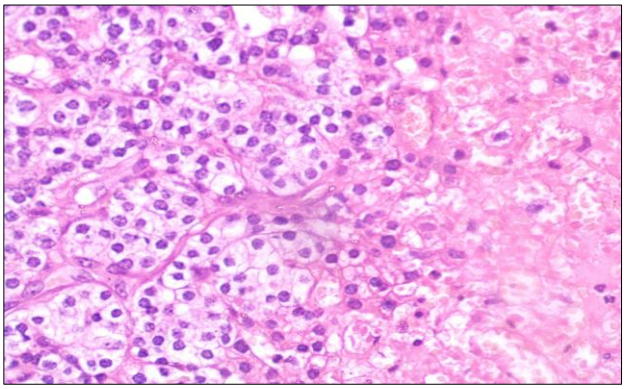

Figure 11: Histopathology section demonstrating parathyroid adenoma with area of hemorrhage.

Case 4

A 40-year-old male presented with acute lower abdominal pain radiating to the back. He was a known case of type 2 diabetic mellitus for 3 years, well controlled on medication, with no other significant medical history.

Ultrasonography of the abdomen revealed renal calculi measuring approximately 4 mm in diameter along with nephrocalcinosis (Figure 12).

Biochemical evaluation showed severe hypercalcemia (serum calcium: 15 mg/dl) and elevated serum PTH (PTH: 180 pg/ml). Urine analysis demonstrated hypercalciuria (24-hour urinary calcium: 450 mg).

The patient received symptomatic treatment for renal colic with clinical improvement. CECT of the neck demonstrated a large lesion inferior to the right thyroid lobe. Parathyroid scintigraphy showed focal increased tracer uptake at the right inferior pole with persistent retention on delayed images, suggestive of right inferior parathyroid adenoma.

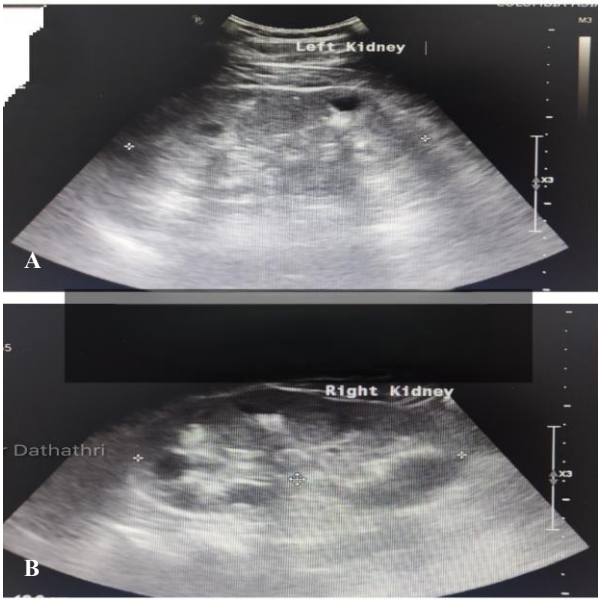

Figure 12 (A and B): Ultrasonography image of abdomen showing renal calculi with nephrocalcinosis.

The patient subsequently underwent surgical excision of the lesion. Intraoperatively, a large well-circumscribed mass measuring 4.5×3×2 cm was found on the inferior pole of the right thyroid lobe (Figure 13).

Serum PTH level decreased to 11.9 pg/ml 10 minutes after excision of the lesion. Histopathological examination confirmed the diagnosis of parathyroid adenoma. Postoperatively, he remained asymptomatic. His biochemical parameters normalized, and renal function stabilized. There was no progression of nephrocalcinosis at 1-year follow-up.

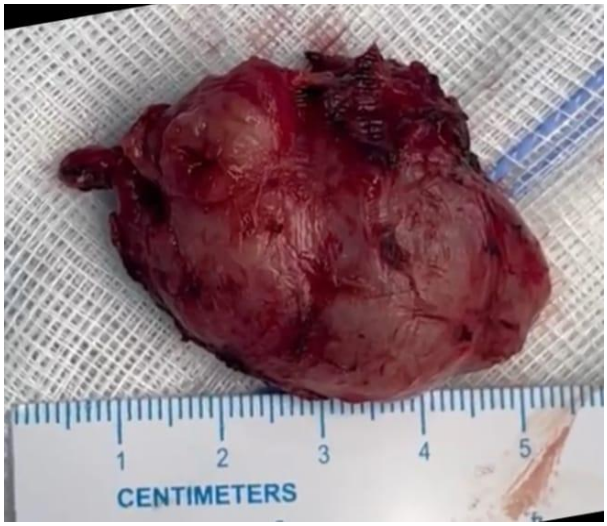

Figure 13: Intraoperative photograph of excised parathyroid adenoma.

DISCUSSION

Parathyroid adenoma represents the most frequent etiology of primary hyperparathyroidism, accounting to approximately 80-85% of the cases.[2] This case series demonstrates the diverse clinical spectrum of parathyroid adenoma ranging from asymptomatic incidentally detected biochemical abnormalities to its unusual complications.

The classical description of primary hyperthyroidism has always been "stones, bones, abdominal groans and psychic moans". However, with increased availability of routine health check-ups and screening, it has been possible to diagnose even asymptomatic cases.[3]

Biochemical evaluation remains the cornerstone of diagnosis. Elevated serum calcium with raised or non-suppressed PTH levels confirms the diagnosis of PHPT.[4]

As described in our case series, imaging plays a crucial role in localization of the disease preoperatively. Neck ultrasound is the first line commonly available imaging modality used preoperatively to localized parathyroid adenoma. Sonography combined with technitium-99 sestamibi increases the sensitivity and specificity to more than 90%.[5]

The definitive treatment for Parathyroid adenoma remains surgical excision.[6] Intraoperative PTH monitoring is crucial to assess complete excision. Decrease in the level of PTH level after 10 minutes of excision of gland is an indicator of successful surgery.[7,8]

A well-recognized complication after parathyroidectomy is hungry bone syndrome, in which patients have transient postoperative hypocalcemia, which is mostly seen in long standing diseases.[9] None of the patients in our case series encountered any complications following surgery.

Histopathological examination is confirmatory of the diagnosis, which especially differentiates an adenoma from carcinoma. Capsular invasion, vascular invasion and perineural invasion typically differentiates carcinoma from adenoma.[10] None of our patients had any features suggestive of carcinoma. The typical finding was a well circumscribed mass surrounded by a fibrous capsule, with plenty of chief cells compressing adjacent normal parathyroid tissue.[11]

CONCLUSION

Parathyroid adenoma is the most frequently encountered cause of primary hyperparathyroidism exhibiting a wide range of clinical and biochemical presentations. This case series demonstrates the importance of biochemical markers in arriving at the diagnosis rather than symptoms alone. Imaging is contributory for preoperative planning. As elaborated in our case series, surgical excision of parathyroid adenoma provides rapid normalization of biochemical markers and thereby symptomatic improvement. The low incidence of intraoperative or postoperative complications observed emphasizes the safety of surgical management, when performed with necessary precautions. Also, early intervention can prevent long term skeletal or renal sequelae.

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