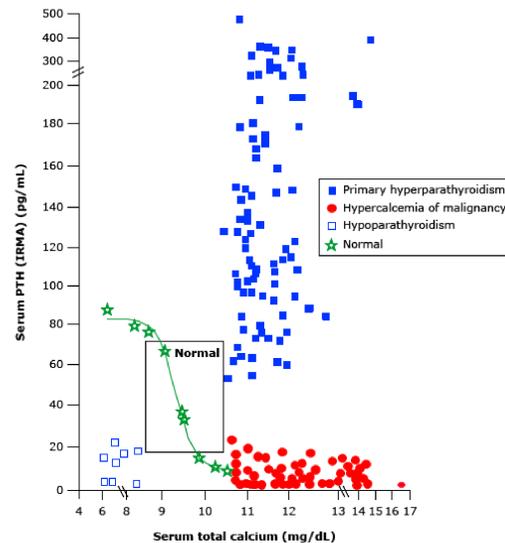


## Background

Primary hyperparathyroidism (PHPT) is the most common cause of hypercalcemia.

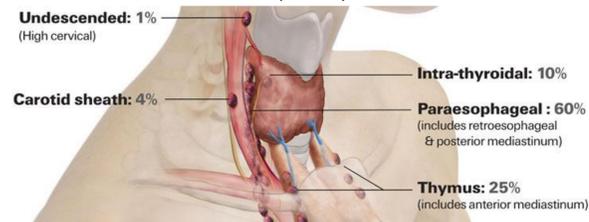
Parathyroid hormone (PTH) vs. Calcium serum concentrations showing patterns for different disease processes



Data from: Haden ST, Brown EM, Hurwitz S, et al. The effects of age and gender on parathyroid hormone dynamics. *Clin Endocrinol* 2000; 52:329. Graphic via © 2020 UpToDate, Inc.

Parathyroid adenomas account for 80 to 85% of causes for PHPT. Roughly 90% of patients with PHPT can be cured with an initial parathyroidectomy.

Common locations of missed parathyroid adenomas



<https://www.uclahealth.org/endocrine-center/re-do-parathyroid-surgery>

However, when symptoms or abnormal labs persist after surgery, it is important to consider the possibility of a missed adenoma or supernumerary gland. One study reports that according to autopsy studies, a fifth gland may be present in up to 5% of patients with hyperparathyroidism.

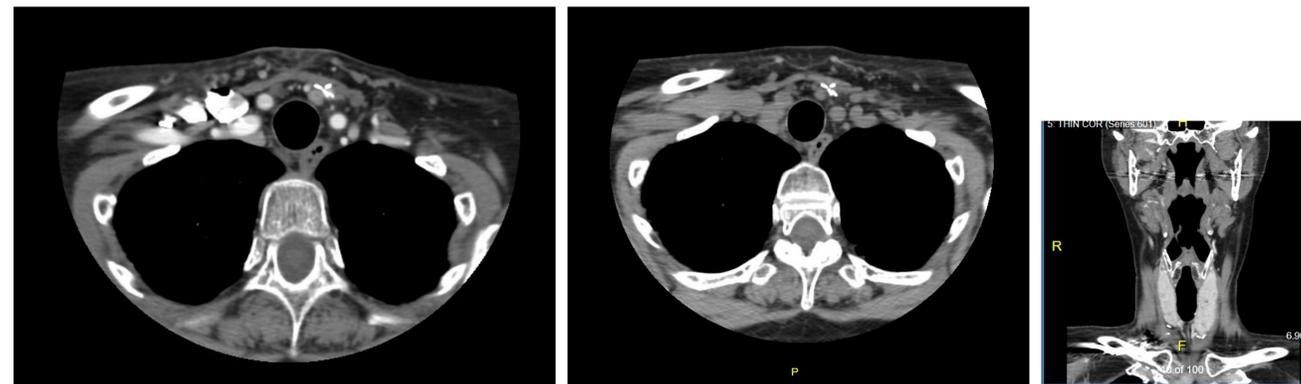
## Case Description

A 69-year-old female with a history of osteoporosis on treatment was found to have a mildly elevated calcium level of 10.5 with a normal parathyroid hormone (PTH) level in 2017. Repeat bloodwork in 2019 then showed an elevated PTH level of 80 after a repeat DXA Scan showed worsening osteoporosis despite treatment with alendronate.

The patient proceeded with a parathyroidectomy during which she was found to have parathyroid hyperplasia resulting in the removal of three clinically enlarged parathyroid glands as well as a portion of the normal fourth gland. However, the patient's PTH continued to remain elevated after surgery, requiring further evaluation.

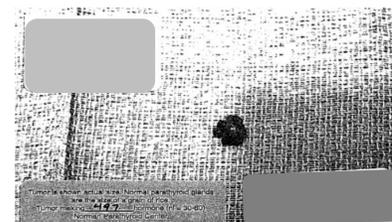
	Calcium Level (8.6-10.4 mg/dL)	PTH level (14-64 pg/mL)	DXA scan (T score > -2.5)
March 2017			T score -2.8
July 2017	10.5	54	Wedge fx up to 24% in T12
March 2019	9.7	80	T score -4.1
May 2019 (after 1st surgery)	9.6	83	
December 2019 (after 2nd surgery)	9.0	29	

The patient was able to obtain a 4D parathyroid CT scan due to the persistent PHPT which showed a 7x5mm enhancing nodule adjacent to the inferomedial aspect of the left lobe of the thyroid suggestive of a parathyroid adenoma.



4D CT images showing the 7x5 mm enhancing nodule adjacent to the inferomedial aspect of the left lobe of the thyroid gland just medial to the surgical clips from the initial surgery via the axial view with contrast (left), axial view without contrast (middle) and the corresponding coronal view

She then underwent a second surgery involving a high-resolution sestamibi scan that same morning showing uptake in the same location which allowed for intraoperative nuclear mapping with successful removal of a supernumerary left lower parathyroid.



Final surgical pathology of the 0.6 x 0.3 x 0.3 cm supernumerary left lower parathyroid weighing 0.026 g

## Discussion

While rare, this case is an important example that initial surgical parathyroidectomy is not a guaranteed cure and that further workup is warranted if there is persistent PHPT after surgery. Parathyroid imaging has been challenging in the past due to the small size of the glands. However, 4D CT scans have now been shown to be superior to other methods of imaging for localizing parathyroid glands with up to 95% sensitivity and 99% positive predictive values.

In this case, this imaging modality allowed for an accurate assessment of a missed supernumerary gland during an initial surgery that used intraoperative nuclear mapping. This case demonstrates the effectiveness of new imaging techniques as well as the importance of continued workup for persistent PHPT.

## Additional Information

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