

# Hide and Seek

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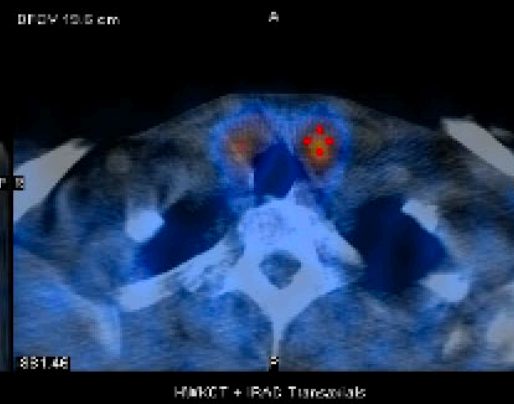
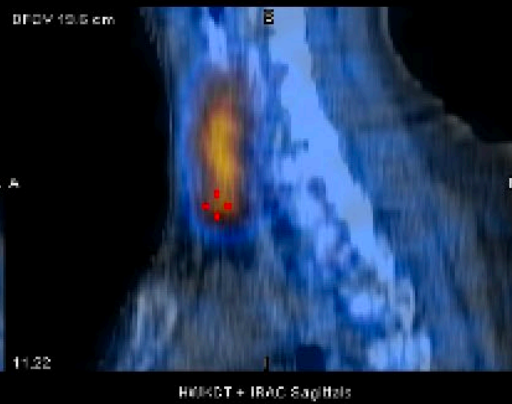
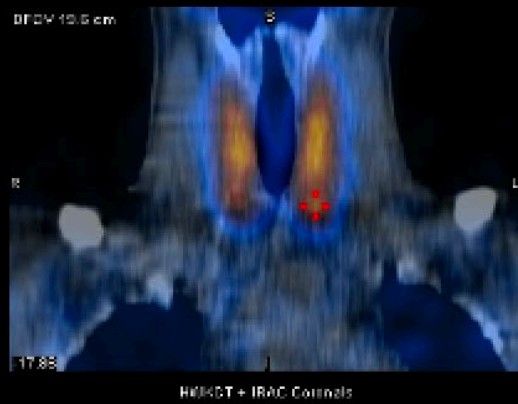
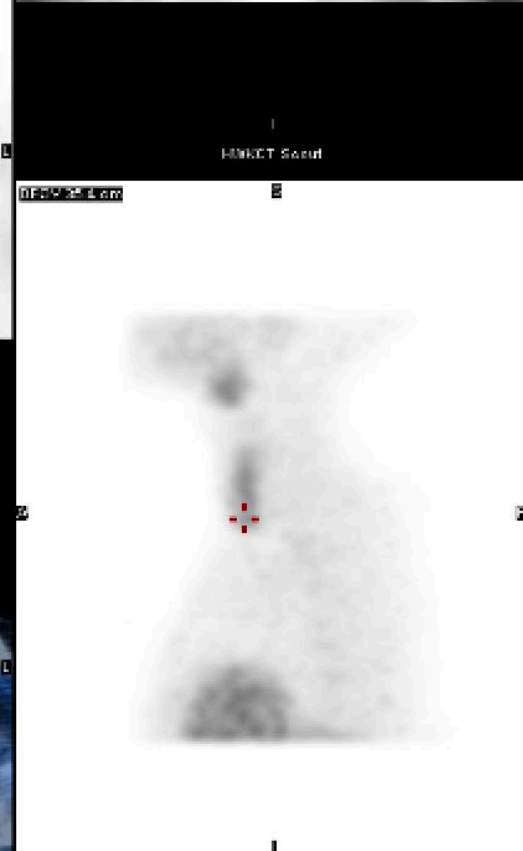
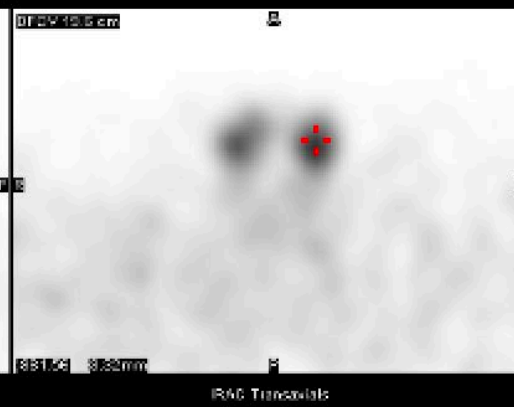
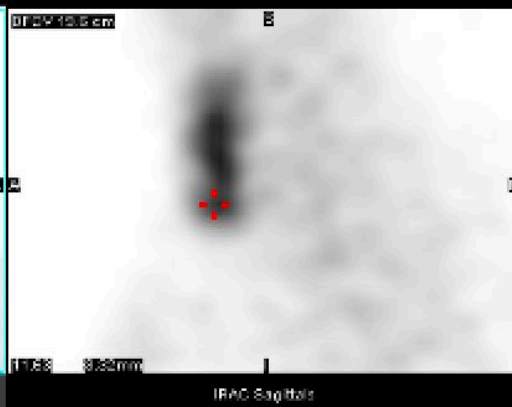
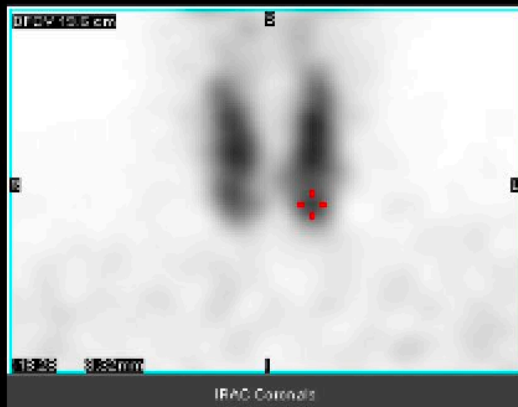
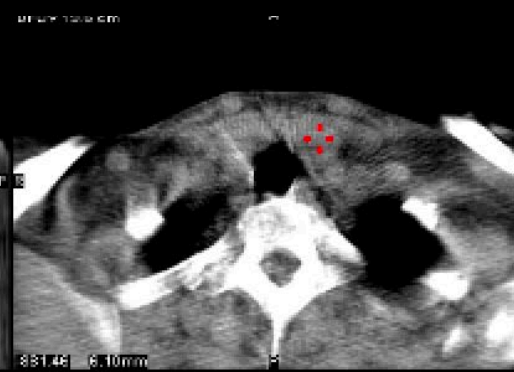
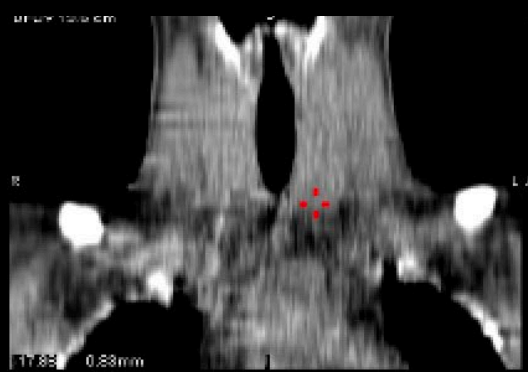


# Case 1 – Wong CH, F/57

- Incidental finding of hypercalcaemia in 2015
  - Peak adjusted calcium 3.08 mmol/L
  - Parathyroid hormone (PTH) 15 pmol/L

# Case 1 – Wong CH, F/57

- Ultrasound (USG) neck
  - Bilateral thyroid nodules
- Sestamibi (MIBI) SPECT/CT
  - Delayed washout at bilateral inferior poles of thyroid
  - Suspicious focal lesion at lower pole of left thyroid
- 4D CT: non-localization

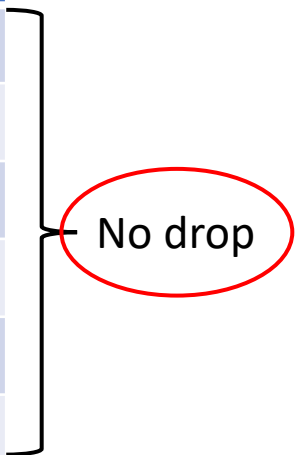


# Case 1 – Wong CH, F/57

- Cervical exploration 10/10/2018
  - Left superior parathyroid: normal looking, biopsy taken
  - ?Left inferior parathyroid / lymph node at thyrothymic tract, excised
  - Right superior parathyroid: nodular lesion, excised
  - Right inferior parathyroid not found

# Case 1 – Wong CH, F/57

	PTH level (pg/mL)
Induction	98.7
0 min	99.67
5 min	117.3
10 min	144.7
15 min	164.2
20 min	151.8



No drop

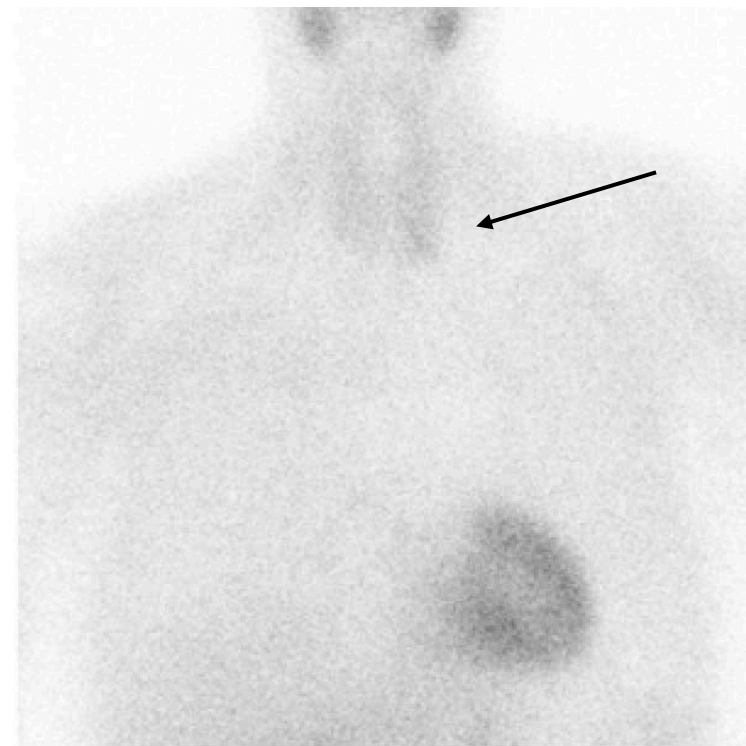
- Carotid sheath, retrotracheal, retroesophageal regions and thymus explored: negative
- Decided for closure and repeat localization studies

# Case 1 – Wong CH, F/57

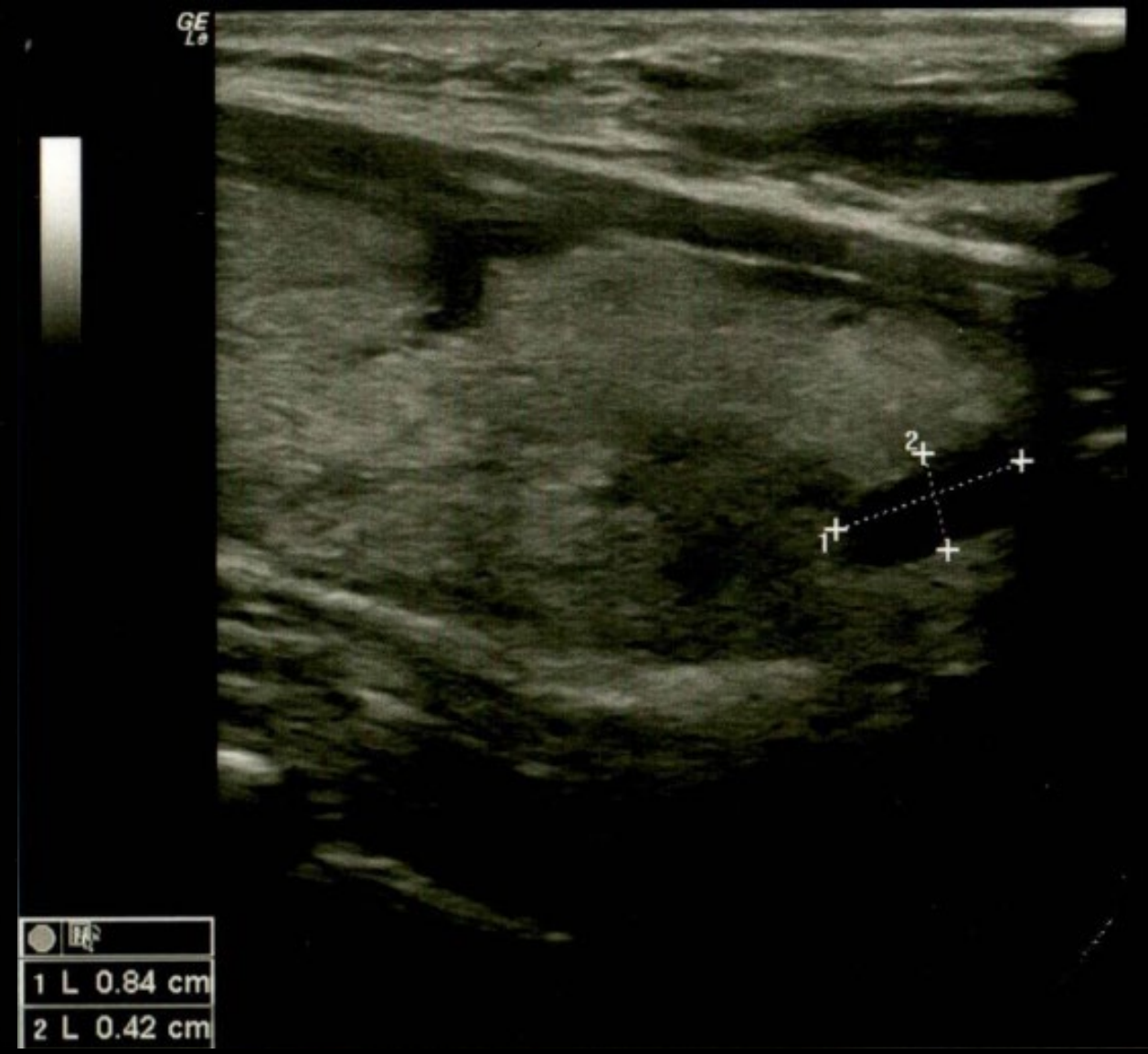
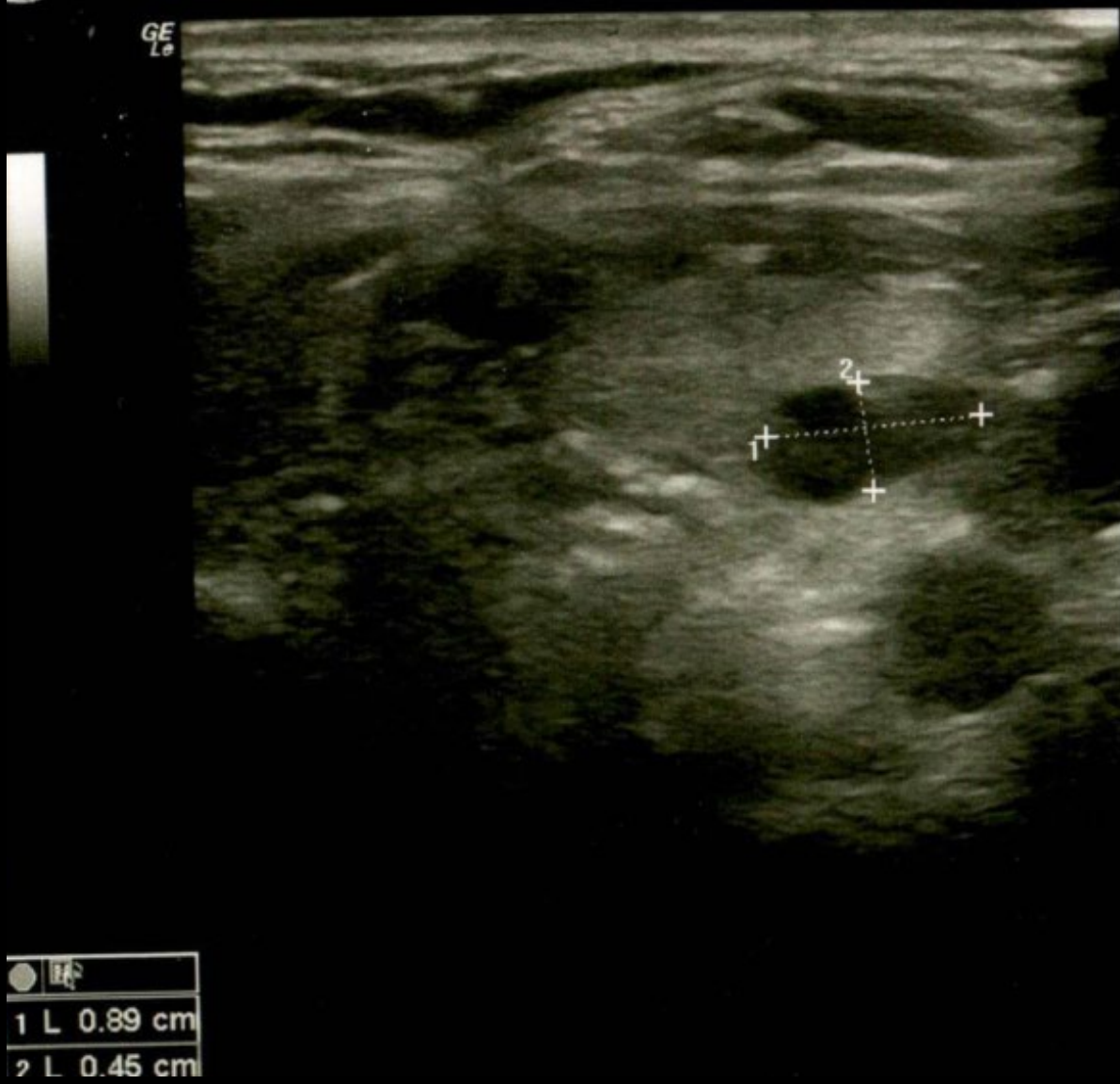
- Pathology
  - Left superior parathyroid: normal parathyroid
  - ?Left inferior parathyroid / lymph node: adipose tissue only
  - Right superior parathyroid: normal parathyroid
- Persistent hypercalcaemia
  - Adjusted calcium 3.04 mmol/L
  - Parathyroid hormone 15 pmol/L
- Repeat 4D CT: non-localization

# Case 1 – Wong CH, F/57

- Repeat Sestamibi SPECT/CT
  - 1.2cm nodule posterior to lower pole of left thyroid with focal uptake





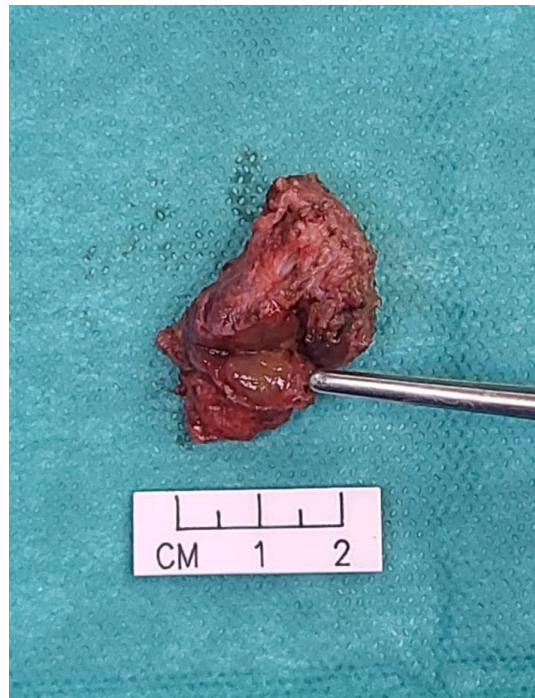


USG: 0.75cm hypoechoic lesion in left thyroid suspicious of intrathyroidal parathyroid

# Case 1 – Wong CH, F/57

- Left neck exploration 10/8/2022
  - No abnormal extra-thyroidal parathyroid glands identified
  - USG: 9mm intrathyroidal hypoechoic lesion at posterior lower pole of left thyroid, USG-guided aspirate for PTH: >5000 pg/mL
  - Partial left thyroidectomy performed

	PTH level (pg/mL)
Induction	336.9
0 min	82.93
5 min	51.25
10 min	39.20
15 min	33.34
20 min	29.57

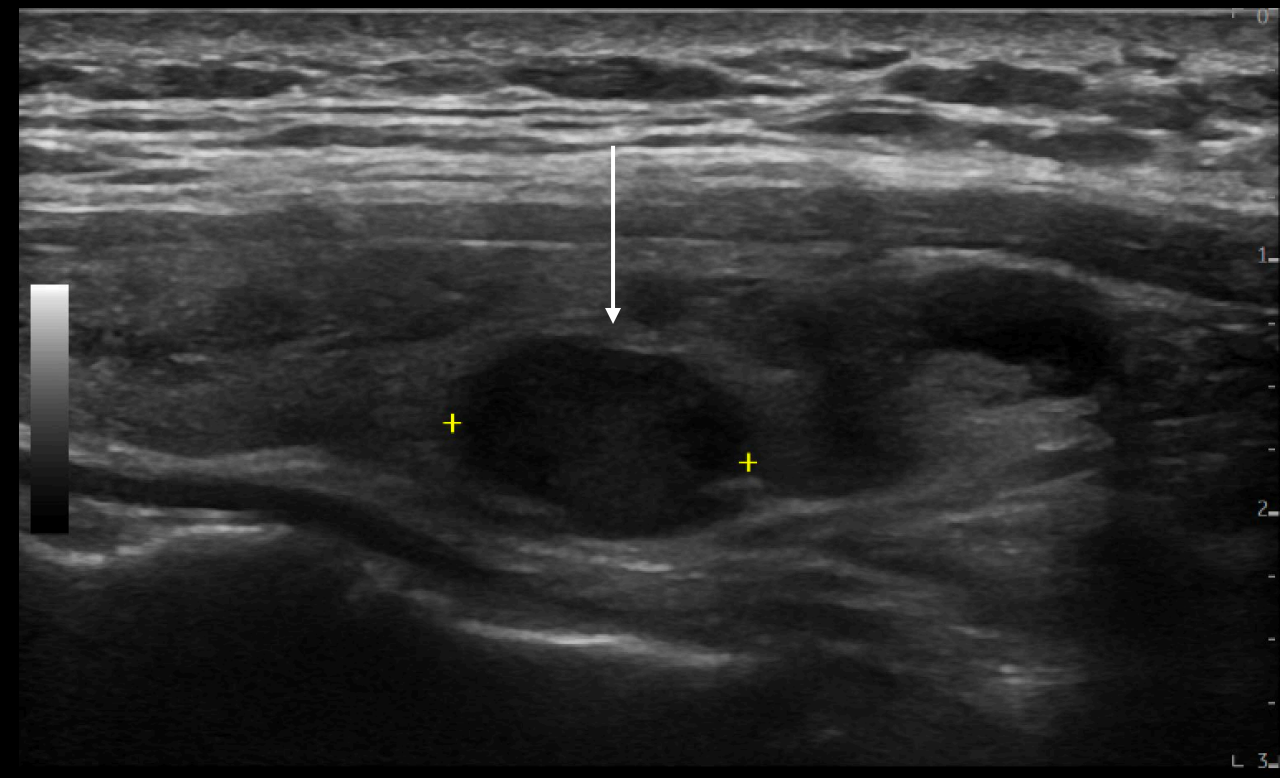
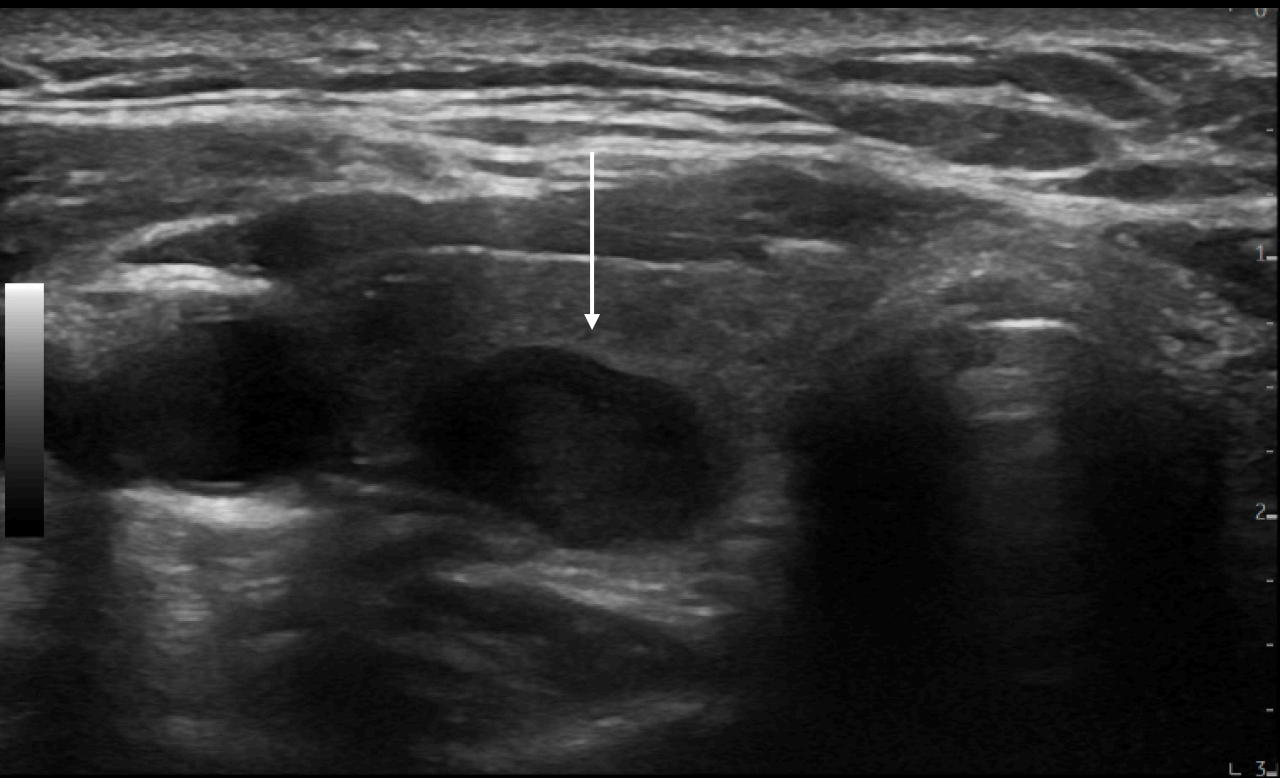


# Case 1 – Wong CH, F/57

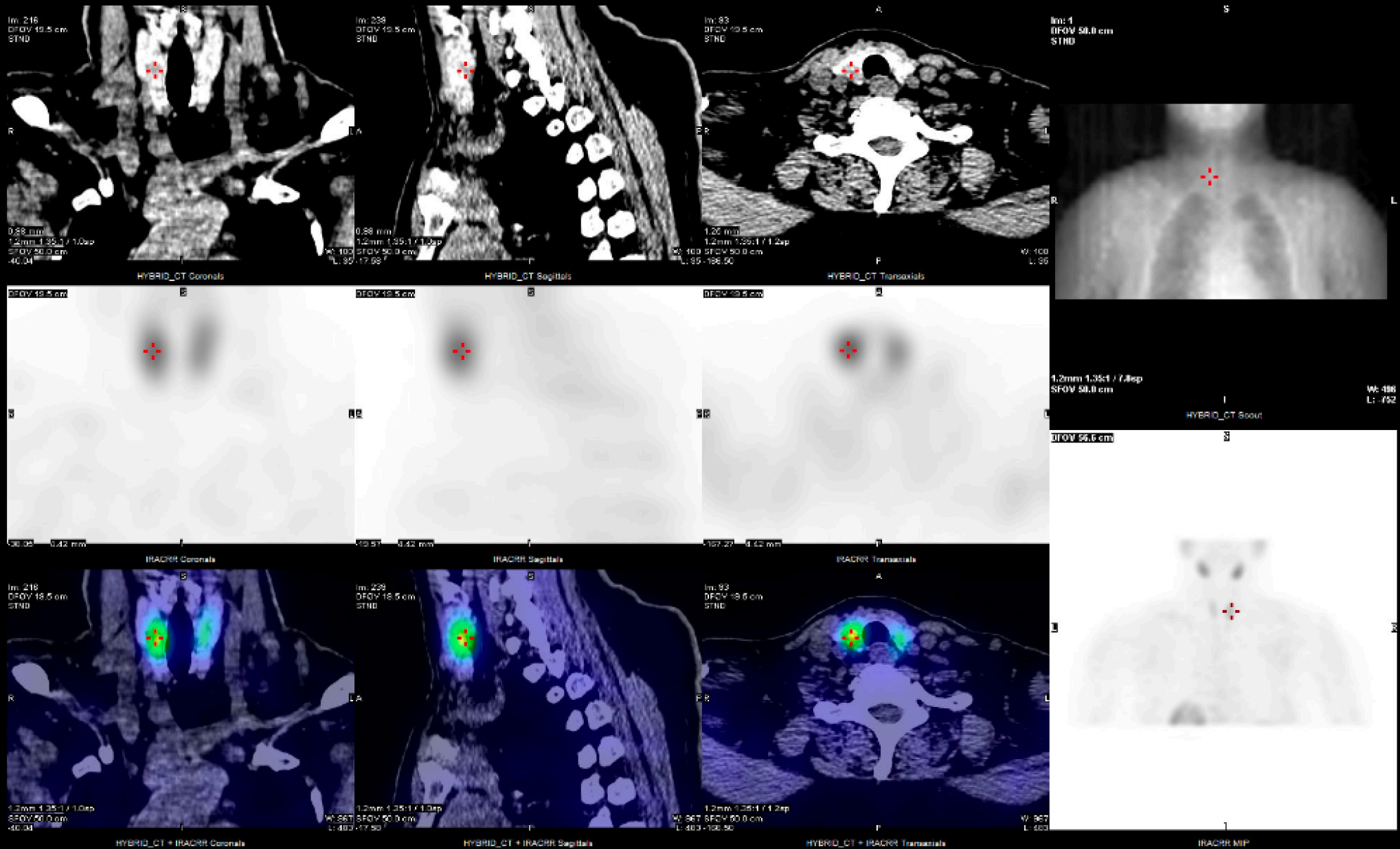
- Pathology: intrathyroidal parathyroid gland
- Adjusted calcium normalized on post-operative day 1

## Case 2 – Chan SY, F/67

- Incidental finding of hypercalcaemia in 8/2019
  - Peak adjusted calcium 2.96 mmol/L
  - PTH 9 pmol/L
- Complication screening
  - DEXA scan: osteopenia
  - No renal stones
  - Normal renal function



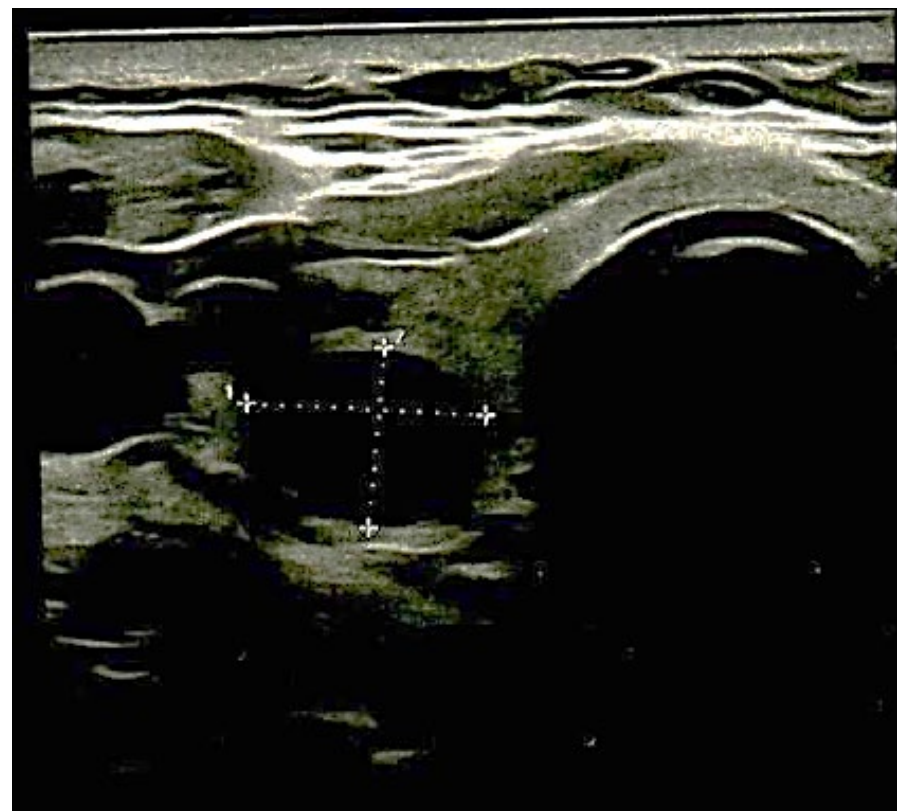
USG: 1.2cm solid hypoechoic nodule at posterior mid pole of right thyroid



MIBI: 9mm right thyroid nodule at mid pole with uptake  
4D CT: non-localization

## Case 2 – Chan SY, F/67

- Bilateral neck exploration 14/12/2022
  - No abnormal parathyroid identified
  - USG: 1cm intrathyroidal hypodense nodule at posterior lower pole of right thyroid
    - Aspiration for PTH assay: >5000 pg/mL
  - Right hemithyroidectomy performed



	PTH level (pg/mL)
Induction	249.0
0 min	34.19
5 min	27.15
10 min	22.48

## Case 2 – Chan SY, F/67

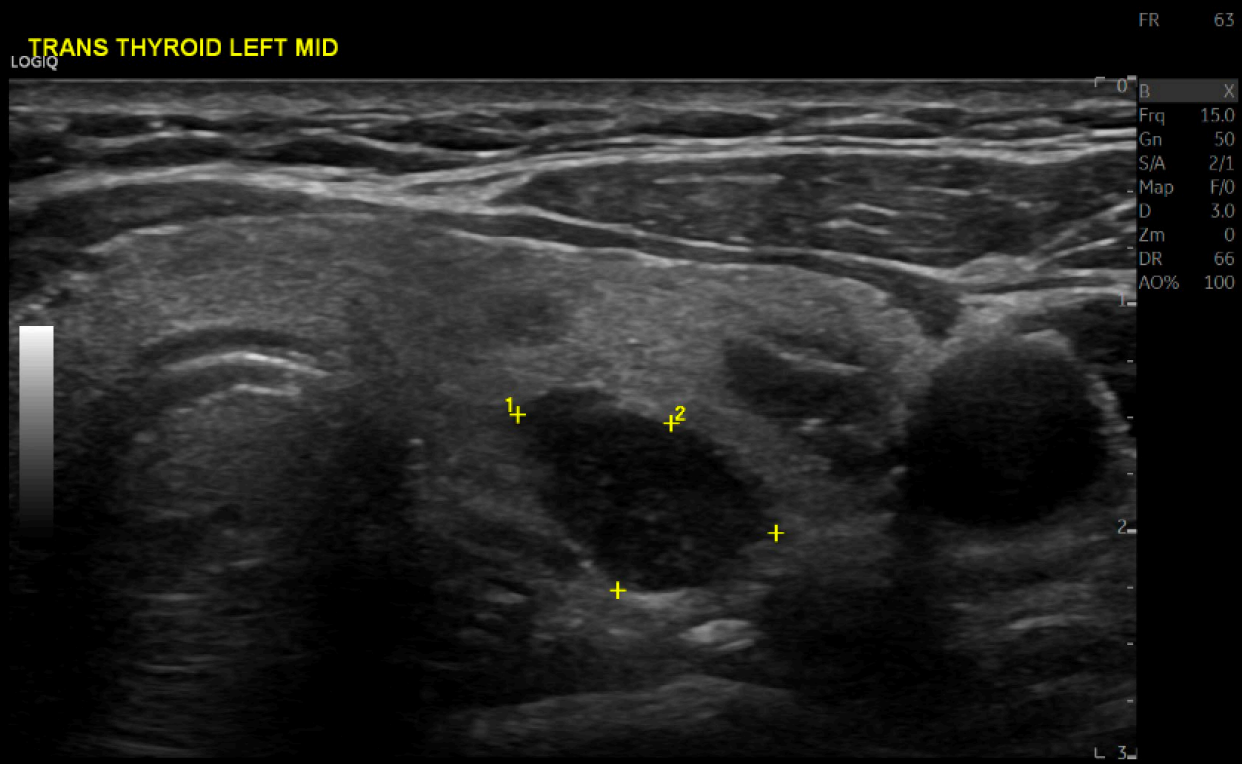
- Pathology: 8mm intrathyroidal parathyroid adenoma
- Adjusted calcium normalized on post-operative day 1



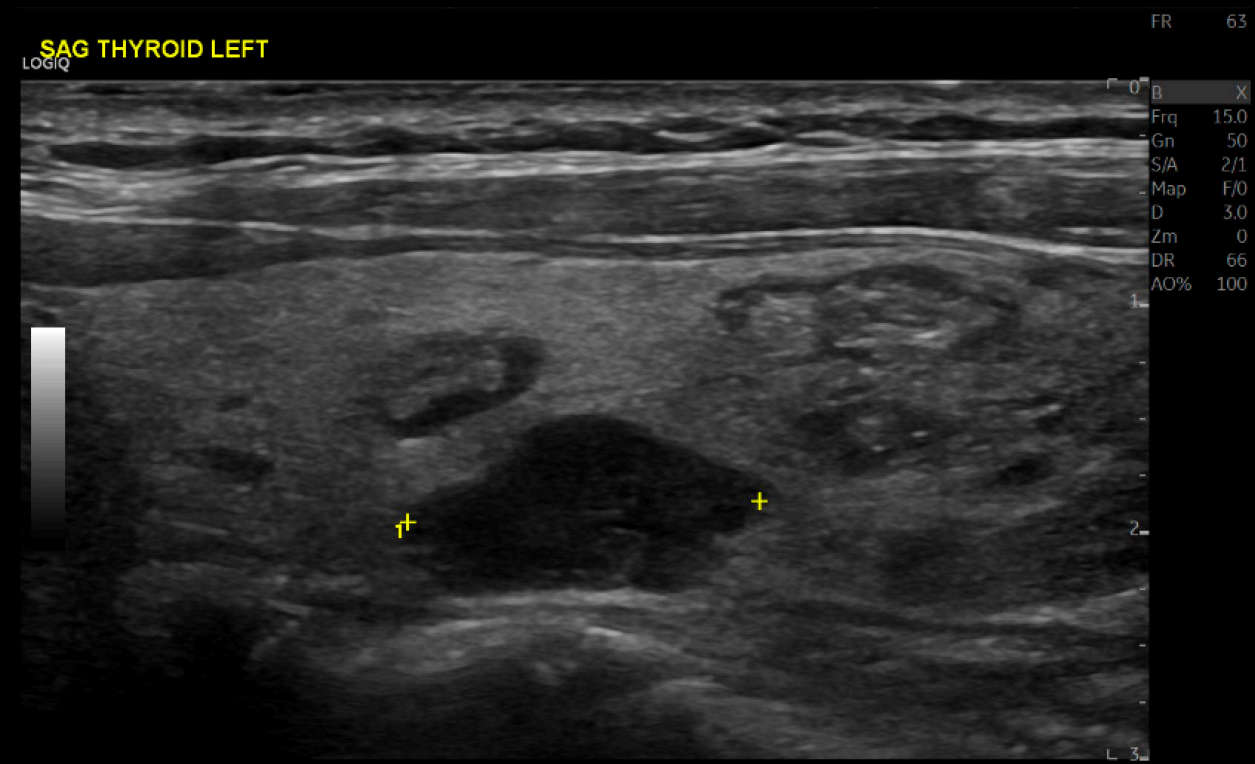


## Case 3 – Leung SH, F/63

- Incidental finding of hypercalcaemia in 1/2021
  - Peak calcium 2.70 mmol/L
  - PTH 14 pmol/L
- Complication screening
  - History of right vesicoureteric stone
  - DEXA scan: osteoporosis



1 L 1.26 cm  
2 L 0.77 cm



1 L 1.56 cm

USG: 1.6cm hypoechoic nodule posterior to mid pole of left thyroid

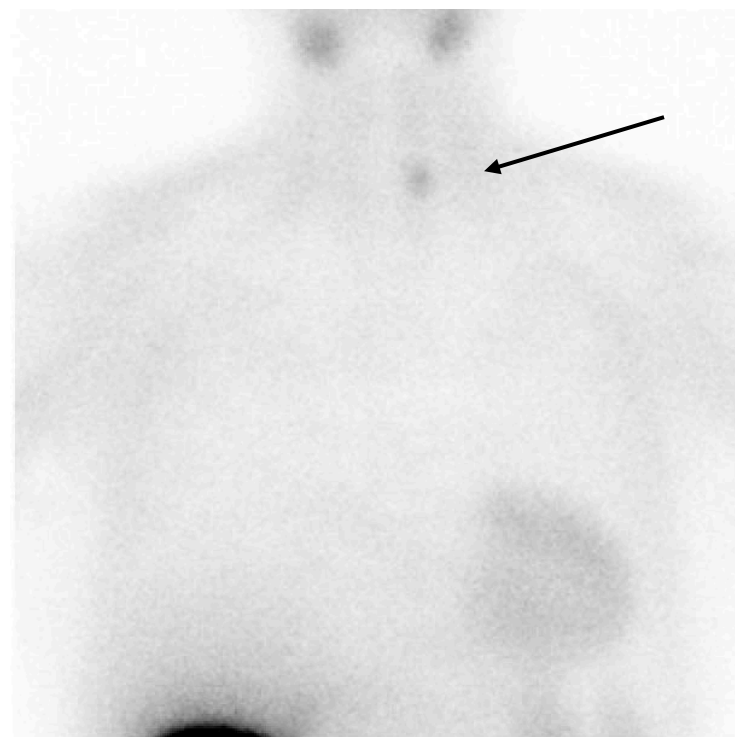
# Case 3 – Leung SH, F/63

- Sestamibi SPECT/CT
  - Hypodense lesion at posterior upper to interpolar region of left thyroid with focal uptake

ANT 10MIN



ANT 3H



## Case 3 – Leung SH, F/63

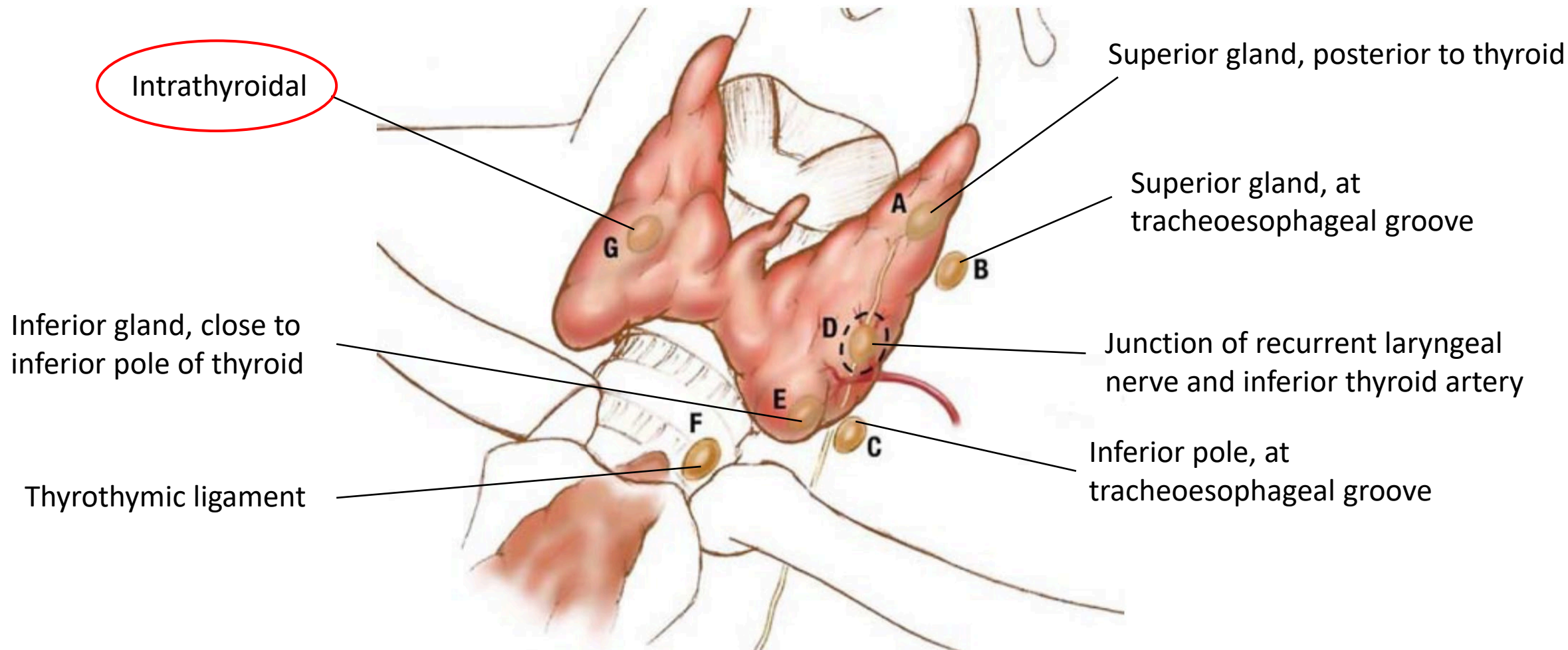
- Left neck exploration 14/12/2022
  - Partially intrathyroidal parathyroid adenoma
  - Closely adherent to posterior mid pole of left thyroid
  - PTH assay of lesion aspirate: >5000 pg/mL
- Left hemithyroidectomy performed

	PTH level (pg/mL)
Induction	194.9
0 min	62.25
5 min	53.74
10 min	46.89

## Case 3 – Leung SH, F/63

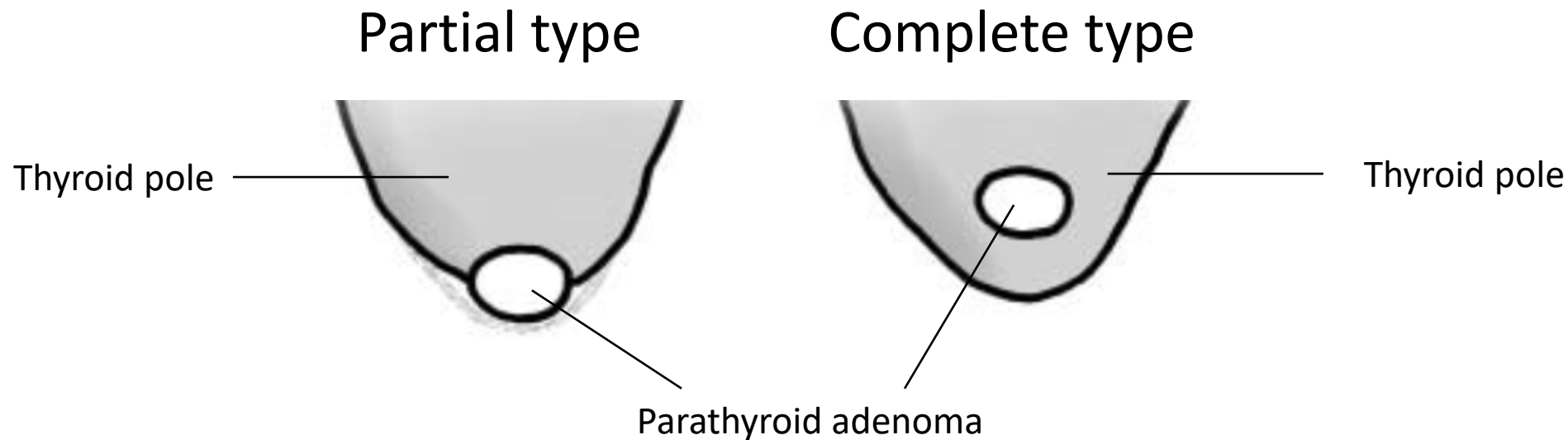
- Pathology: intrathyroidal parathyroid adenoma
- Normal calcium level post-operatively

# Classification



# Intrathyroidal parathyroid adenoma

- Incidence 0.7 – 6%
- Commonly involve inferior glands
- Smaller in size (325mg)



# Localization



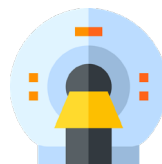
Ultrasound

+



<sup>99m</sup>Tc-sestamibi (MIBI)  
scan

Diagnostic accuracy  
up to **92.3%**



4D CT

- Sensitivity 40%



4D MRI

- Sensitivity 60%



<sup>18</sup>F-Fluorocholine PET-CT



<sup>11</sup>C-methionine PET-CT

## Non-invasive

## Invasive



Selective venous  
sampling +/-  
arteriography

- Sensitivity 33% - 100%



# Ultrasound

- Hypoechoogenicity
- Solid content
- Polar feeding vessel on Doppler
- Hyperechoic line on ventral surface

# MIBI SPECT-CT

- Lower sensitivity for small glands and multiple pathological glands
- False positive due to thyroid nodules
- Lower localization rate in re-operative cases
- More useful for ectopic glands at thymus, mediastinum and retroesophageal space

# Non-invasive studies

- 4D CT
  - Homogenous nodule
  - Arterial enhancement, venous washout
- MRI
  - T2 hyperintensity
  - Higher signal on diffusion weighted images

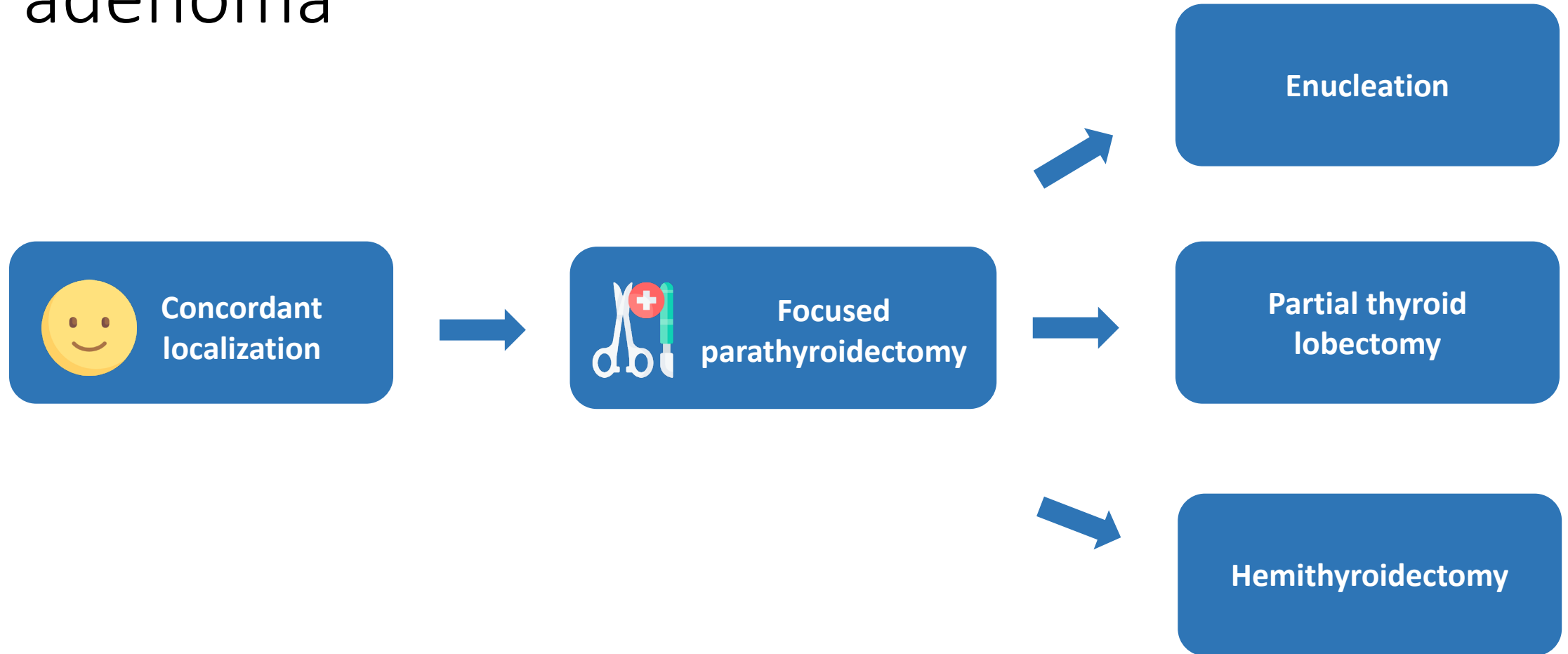
# Non-invasive studies

- $^{18}\text{F}$ -fluorocholine PET-CT
  - Increased uptake due to PTH-induced upregulation of choline kinase
  - Uptake in adenoma or hyperplastic glands
  - False positive in thyroid cancer

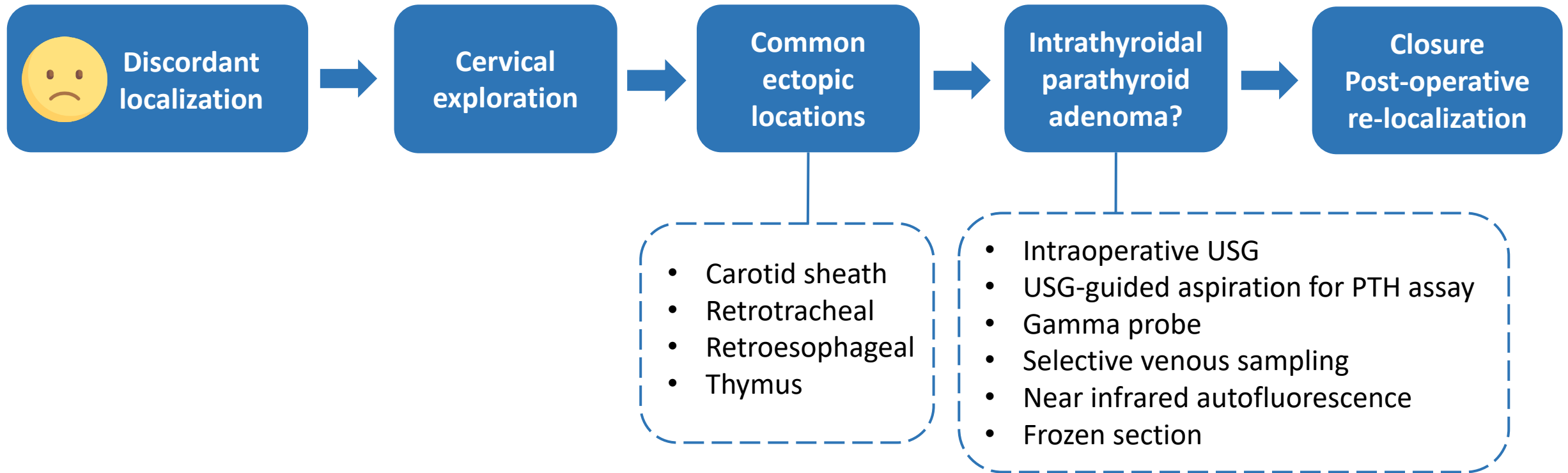
# Pre-operative adjuncts

- USG-guided fine needle aspiration (FNA) cytology
  - Papillary fragments, microfollicles, naked nuclei, anisokaryosis
  - Similar to neoplastic thyroid lesions
- FNA washing for PTH assay

# Management of intrathyroidal parathyroid adenoma



# Management



# Conclusion

- Intrathyroidal parathyroid adenoma is rare
- Localization may be difficult
  - USG + MIBI reported to have high diagnostic accuracy
  - Newer modalities e.g.  $^{18}\text{F}$ -fluorocholine PET-CT emerging
- Should be considered when abnormal parathyroid not identified at usual sites or usual ectopic locations
- Surgical options: enucleation, partial thyroid lobectomy, hemithyroidectomy