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18.02.2017

Case Presentation

- An elderly woman with hypercalcemia…

Case Presentation

- 74-years old female

- Main complaints:
- Fatigue, weakness, mild depression, constipation, leg pain

- Medical history:
- Hypertension, Type 2 diabetes mellitus, hyperlipidemia, gastroeosophageal reflux disease

- Medications: ramipril+thiazide, gliclazide, metformin, atorvastatin, rabeprazol

Case Presentation

- Family history:
- Brother: lung ca, Sister:breast ca
- Brother: ALS (ex)

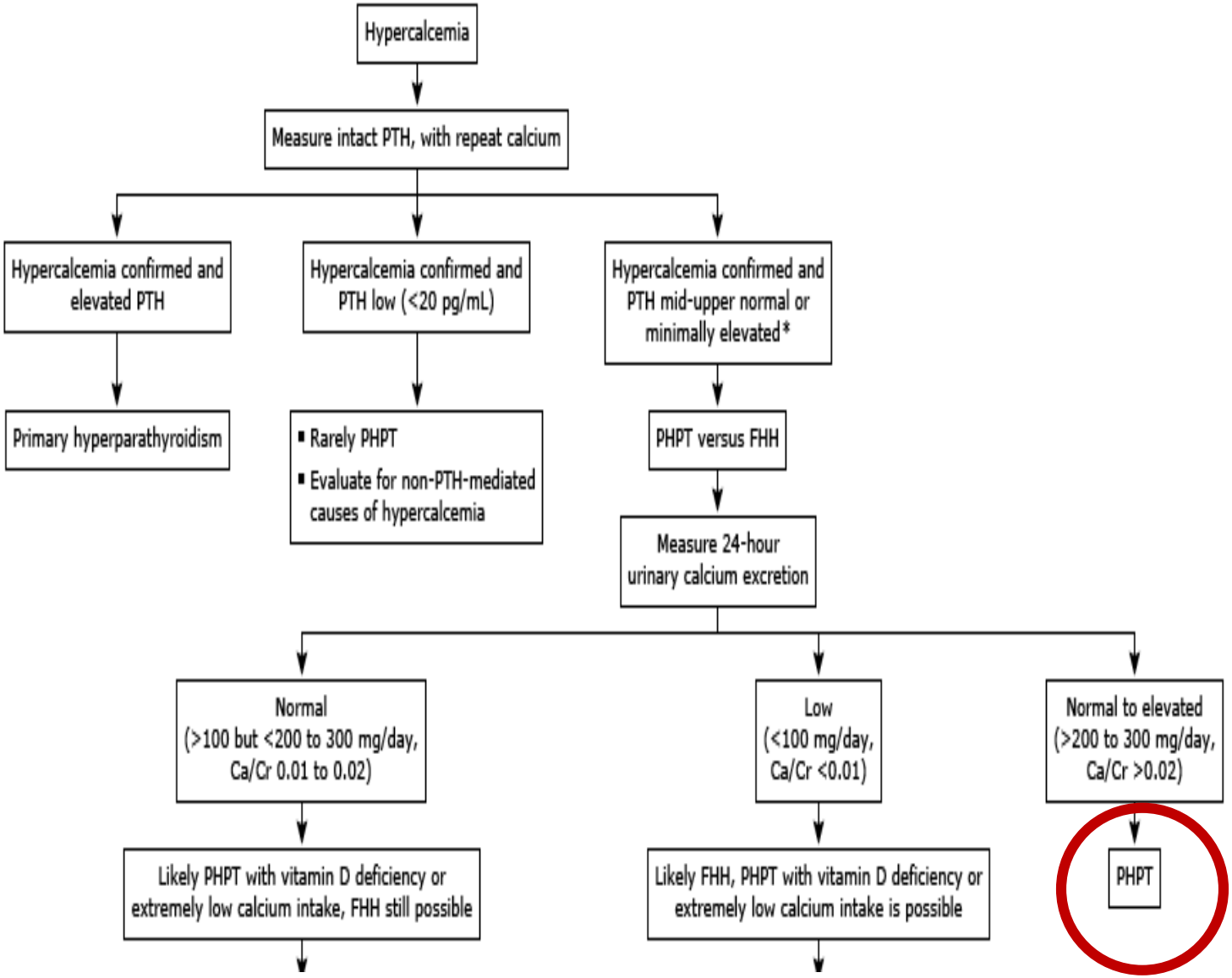
- No tobacco/alcohol usage/ilicit drug use

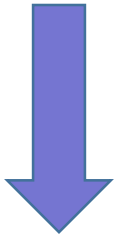
- Physical examination:
- Patient appeared to be weak and depressed
- Temp:36.4C BP:140/90 mmHg HR:70/min
- Mild Bradykinesia, no motor defisit

Laboratory work-up

- Hb/WBC/Plt: 14.4 / 6.4 / 239
- BUN/Kr: 14 / 0.7 mg/dl
- Liver function Tests: normal
- Na: 140 mEq/L (135-145)
- K: 3.7 mEq/L (3,5-5,1)
- **Ca ,total: 13.6 mEq/L (8,8-10,6)**
- **P: 2.7 (2,5-4,5) mg/dl**
- Albumin: 4,15 g/dL (3,5-5,2)
- TSH:1,11 (0,34-5,6) µIU/l
- 25-OH-vitD:18,4 (25-80) µg/l
- Glucose:153 mg/dL
- HbA1c:7.0%

- **Urine Ca (24-hour): 549.15 (100-250) mg/day**
- **iPTH: 76,9 (12-88) pg/ml**


Hypercalcemia
Measure intact PTH, with repeat calcium
Hypercalcemia confirmed and elevated PTH
Hypercalcemia confirmed and PTH low (<20 pg/mL)
Hypercalcemia confirmed and PTH mid-upper normal or minimally elevated*
Primary hyperparathyroidism
Rarely PHPT
Evaluate for non-PTH-mediated causes of hypercalcemia
PHPT versus FHH
Measure 24-hour urinary calcium excretion
Normal (>100 but <200 to 300 mg/day, Ca/Cr 0.01 to 0.02)
Low (<100 mg/day, Ca/Cr <0.01)
Normal to elevated (>200 to 300 mg/day, Ca/Cr >0.02)
Likely PHPT with vitamin D deficiency or extremely low calcium intake, FHH still possible
Likely FHH, PHPT with vitamin D deficiency or extremely low calcium intake is possible
PHPT



Age,constitutional symptoms
Family history

Malignancy,
Tuberculosis,
Sarkoidosis, etc..

Thorax/Abdomen CT
Mamogram
Skeletal surveys

- Serum and urine electrophoresis: normal
- ECG: normal

- Toraks CT: no lymphadenomegali, parenchyme normal, thyroid nodules in the neck region

- Abdomen CT, Mamogram, Skeletal Surveys: normal

Neck US

- No parathyroid adenoma
- A 14x10 mm, hypoechoic solid lesion, at the inferior pole of the right thyroid lobe
- In addition to this nodule, several other subcentimeter solid nodules were scattered throughout both thyroid lobes
- FNA biopsy→ *atypia of undetermined significance*

Primary Hyperparathyroidism

Where is this parathyroid adenoma?

Imaging?

- 99mTc-MIBI with SPECT
- Neck MRI
- 4-D neck CT

Did not show
any findings of parathyroid adenoma

Thyroid nodules

Is it a thyroid nodule or parathyroid adenoma?

- A second US and FNA biopsy with PTH washout was performed
- PTH washout concentration → 2612 pg/mL
- Serum PTH: 69 pg/mL

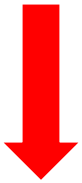
Intrathyrodial parathyroid adenoma

FNA wash out?

- FNA were performed by using a 23-G needle with a 5-mL syringe
- After insertion of the needle, negative pressure was applied to the suspicious lesion.
- The tissue contents of the syringe were diluted in 5 mL of saline solution
- Samples were then injected into the EDTA-containing tubes for PTH analysis.
- The PTH concentration of the aspirates was determined by using the dual antibody immunoassay for intact PTH and the results are expressed in pg/mL

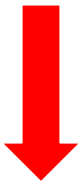
Surgery

intrathyroidal parathyroid adenoma



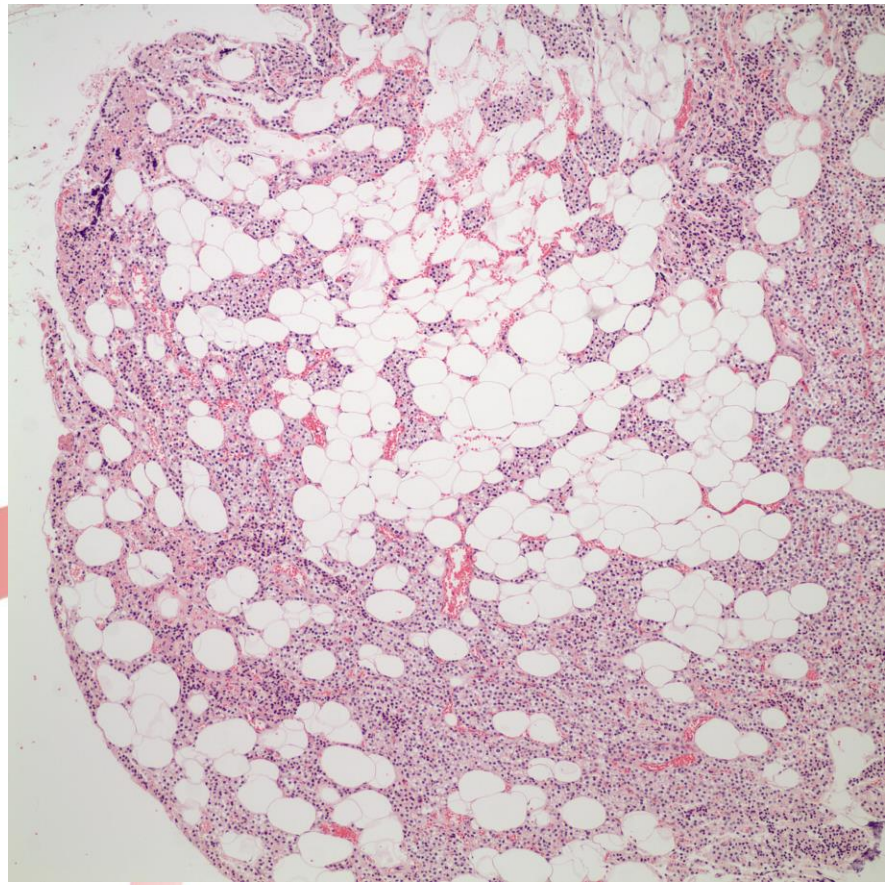
right thyroid lobectomy

intraoperative frozen exam > *papillary thyroid carcinoma?*

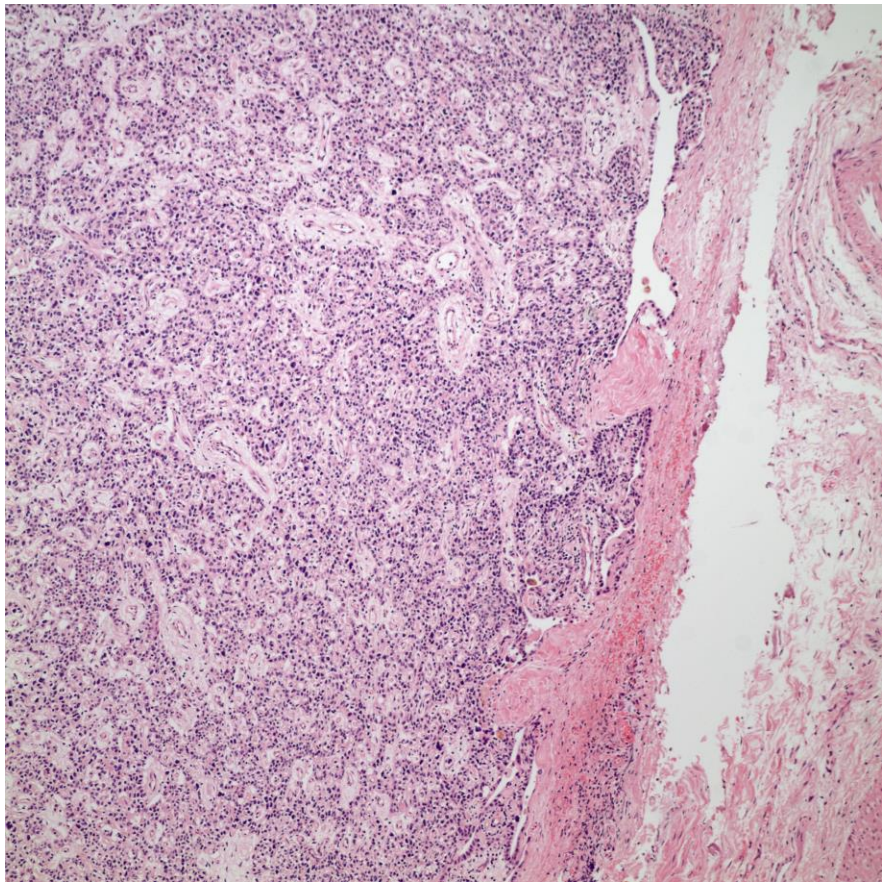


total thyroidectomy

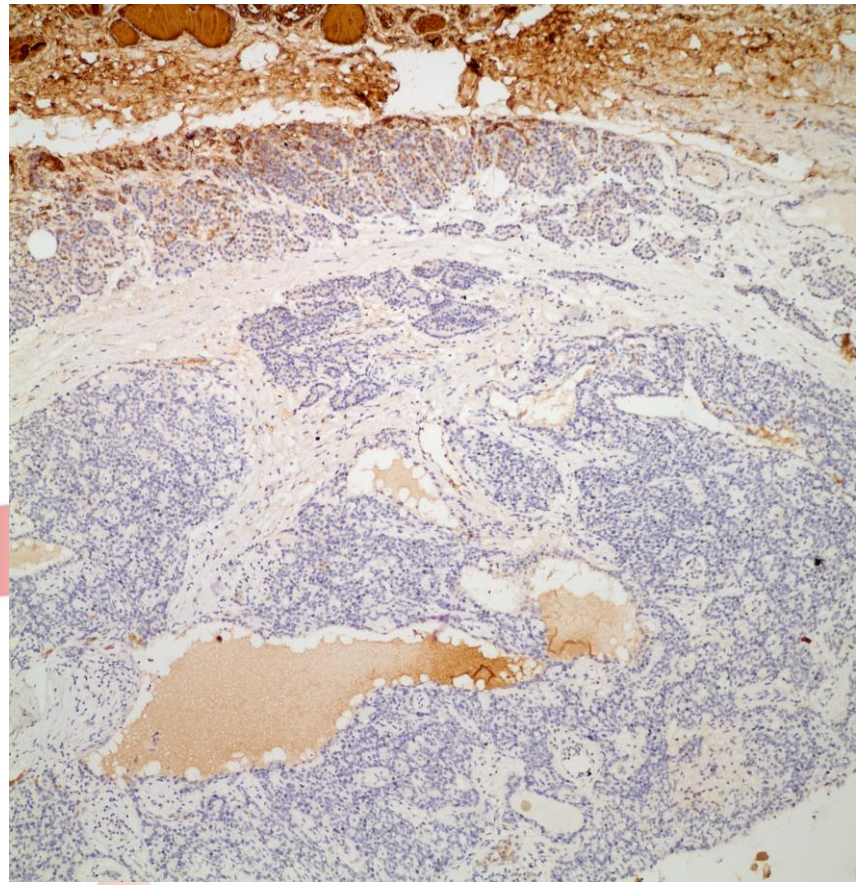
- Post-surgical definitive pathological exam→ parathyroid adenoma
- Immunohistochemical staining → PTH positive, tyroglobulin negative
- Ki67 proliferation index < 1%

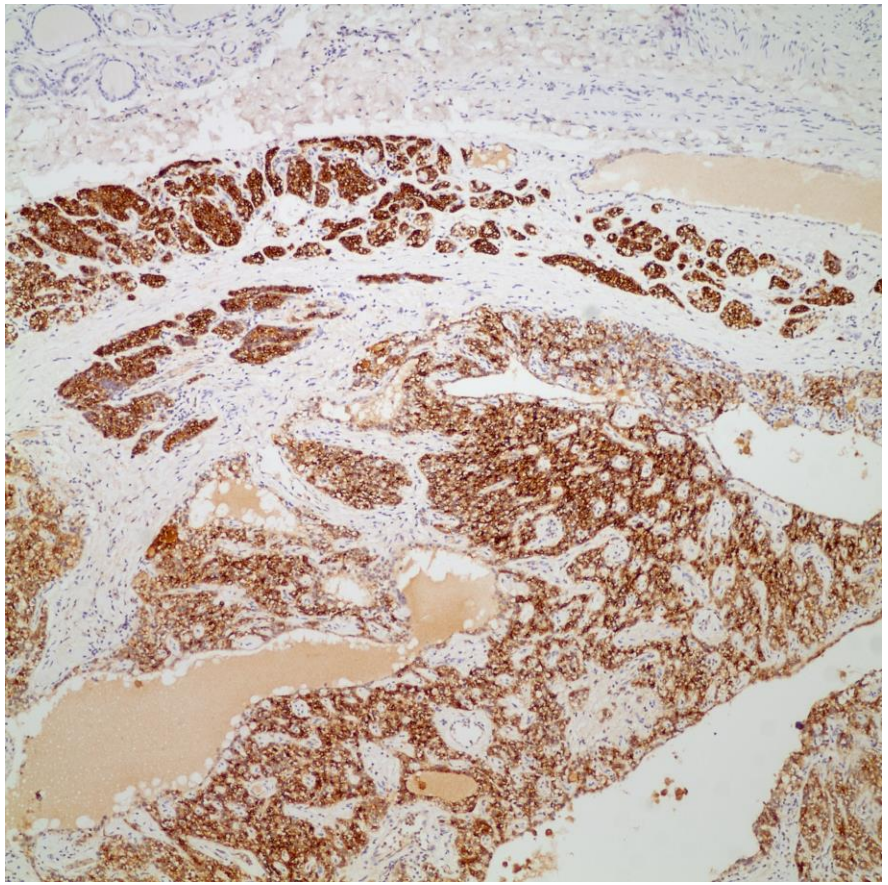


Normal parathyroid



Parathyroid adenoma





Tyroglobulin negative

PTH positive

Follow up

- Serum PTH and Ca levels returned to normal
- **Ca ,total / P : 9.37 (8,8-10,6) / 2.9 (2,5-4,5) mg/dl**
- **iPTH: <<6 (12-88) pg/ml**
- Symptoms disappeared

Discussion

- About 6-16% of parathyroid adenomas can be in an ectopic location
- It is supposed to be based on abnormal migration of parathyroid cells during embryogenesis
- The most common locations of ectopic parathyroid glands are retro/paraesophageal region, thymus, mediastinum, carotid sheath and thyroid gland
- The incidence of intrathyroidal parathyroid adenoma is 1.4-6.0%

Phitayakorn R, McHenry CR (2006) Incidence and location of ectopic abnormal parathyroid glands. Am J Surg 191:418–423

Madhuchhanda R, Haggi M(2013) and Localization of Ectopic Parathyroid Adenomas in Previously Unexplored Patients World J Surg (2013) 37:102–106

Discussion

- Surgery is the only curative treatment option for primary hyperparathyrodism
- It is recommended to use preoperative imaging studies to localize the hyperfunctioning parathyroid glands in order to perform minimally invasive approach
- Occasionally, locating the lesion can be challenging

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Discussion

- What kind of imaging studies should we use?
- Neck US
- 99mTc sestamibi SPECT
- Neck MRI
- 4D-CT
- The best imaging study or combination of studies for preoperative localization of ectopic gland disease has not yet been identified

- One of the newest adjuncts to parathyroid surgery is fine-needle aspiration (FNA) with parathyroid washout.
- This method has been used to confirm or deny if the tissue being sampled is of parathyroid origin.
- There are very few studies with small numbers of patients that have shown the use of preoperative FNA to localize parathyroid adenomas and determine the eligibility of patients for minimally invasive thyroid surgery with a high sensitivity (94%), specificity (100%), and positive predictive value (PPV) (100%)

Stephen AE, Milas M, Garner CN, Wagner KE, Siperstein AE. Use of surgeon-performed office ultrasound and parathyroid fine needle aspiration for complex parathyroid localization. Surgery 2005;138:1143–1150; discussion 1150–1151

Discussion

- Ultrasound-guided FNA as a localization procedure for parathyroid tissue was first described in 1983
- Parathyroid aspiration could rarely cause to parathyromatosis
- If the lesion is parathyroid carcinoma, the procedure of FNA-PTH washout can give rise to the seeding of tumor

Doppman JL, Krudy AG, Marx SJ, et al. Aspiration of enlarged parathyroid glands for parathyroid hormone assay. Radiology 1983; 148:31–5.

Y. Erbil et al. / Use of preoperative parathyroid fine-needle aspiration and parathormone assay in the primary hyperparathyroidism with concomitant thyroid nodules .American Journal of Surgery 193 (2007) 665–671

Kendrick ML, Charboneau JW, Curlee KJ, et al. Risk of parathyro- matosis after fine-needle aspiration. Am Surg 2001;67:290–3

Take Home Messages

- Cytological similarities of thyroid and parathyroid lesions can lead to misdiagnose depending on FNA of assumedly ‘thyroid nodules’
- FNA-PTH washout has a high accuracy to differentiate parathyroid lesions from thyroid nodules and this is of special value in an area of mild iodine deficiency with a high prevalence of thyroid nodules
- FNA- PTH washout should be used only in selected cases

Triggiani V et al.Parathyroid Hormone Determination in Ultrasound-Guided Fine Needle Aspirates Allows the Differentiation between Thyroid and Parathyroid Lesions: Our Experience and Review of the Literature Endocr Metab Immune Disord Drug Targets. 2013 Dec;13(4):351-8.

PEACE AT HOME, PEACE IN THE WORLD

Mustafa Kemal ATATÜRK