

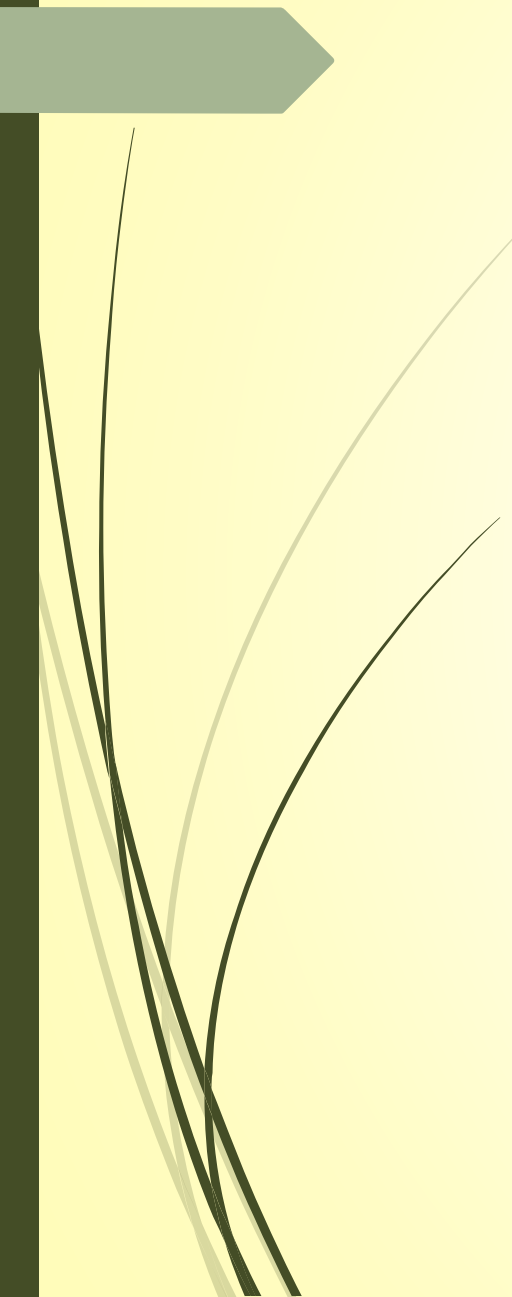
**In the name of God**

**case presentation**

**Maryam Amirahmadi, MD**

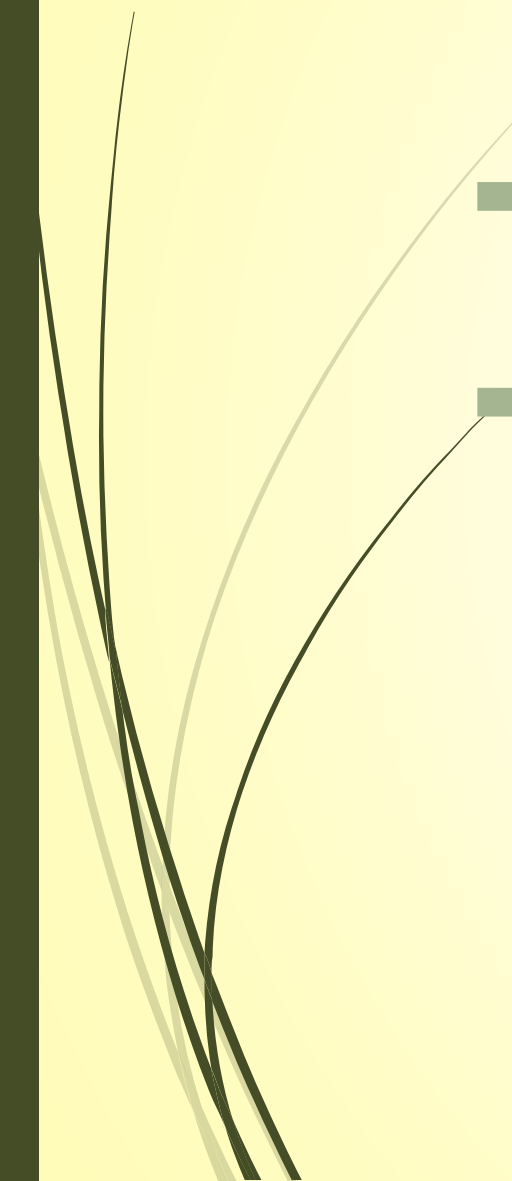
**RESEARCH INSTITUTE FOR ENDOCRINE SCIENCES SHAHID BEHESHTI  
UNIVERSITY OF MEDICAL SCIENCES**

**12 february 2024**

- 
- A decorative graphic on the left side of the slide. It features a dark green arrow pointing right at the top, with several thin, curved lines in shades of green and grey extending downwards from its base.
- Gender: woman
  - Age: 53-year-old
  - Source of History: Her mother, Reliable
  - Single
  - Born & live in Tehran
  - Education: environmental health



## Chief complaint:

- A 53-year-old woman with the history of Psychiatric disorders & parathyroidectomy
  - Hospitalized with weakness, fatigue, imbalance, drowsy since two weeks ago
- 

## Present illness:

- A 53-year-old woman with the history Psychiatric disorders & parathyroidectomy
- Admitted in emergency room with drowsy & hypercalcemia
- Eight months ago ( 1402.03.15 ) she was hospitalized in Taleghani because of schizoaffective disorder depressive type diagnosed
- Depression mood
- Persecutory delusion
- Control delusion



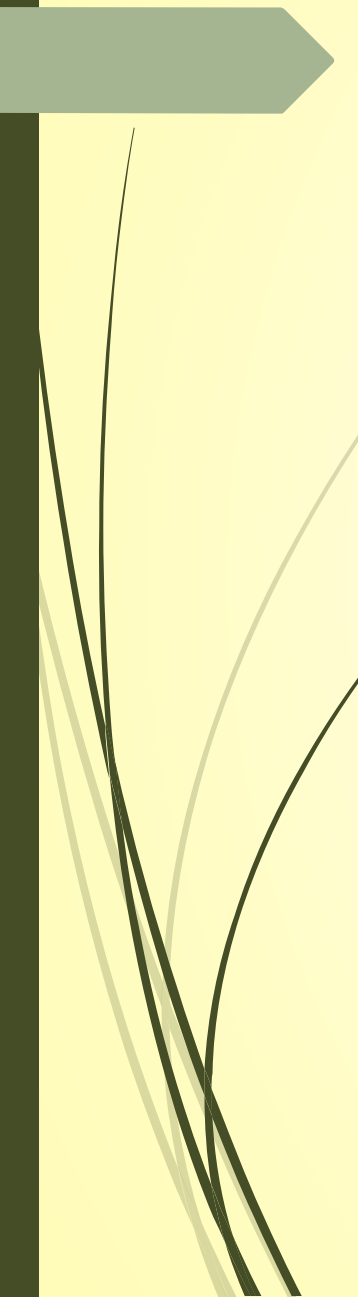
## Present illness:

- ( 1402.03.23 ) medical therapy + ECT with 26j
- ( 1402.03.25 ) ECT
- (1402.03.23) Endocrinology consult
- calcium = 14.2 mg/dl



# Present illness:

- Hydration + diuretic therapy + calcitonin
- Lab data
- BMD
- Sonography
- MIBG



<b>Calcium</b> mg/dl	14.2	14.6 (1402. 03.23)	13.8	12.3	11.6	10.1	9.5 4 TIR	7.8	8.5
<b>Phosphorus</b> mg/dl	2	2.2	1.8	1.5	1.3	1.2	1.2	1.4	1.3
<b>Mg</b> mg/dl	1.5						1.5		
<b>ALB</b>	3.8	3.9							
<b>PTH</b> Pg/dl		457							
<b>25(OH)D3</b> ng/dl		19.4							

## BONE MINERAL DENSITOMETRY

This patient attended for bone densitometry of lumbar spine and hip regions on the HOLOGIC Explorer QDR series DXA.

**Risk factors** of the patient for low bone density and fracture are:

**Menopause**

The young normal adult and age matched T and Z scores for BMD are:

Scan	BMD(g/cm <sup>2</sup> )	T-Score	Fracture Risk	Z-Score
Lumbar Spine	0.499	-4.7	High	-3.9
Total Femur	0.560	-3.1	High	-2.6
Femoral Neck	0.484	3.3	High	-2.4
Forearm	-	-	-	-

**Impression:** According to WHO classification, the BMD of this patient is

**Osteoporosis.**





## Present illness: (1402.03.29)

- Thyroid sonography:
  - NL size & NL echogenicity
- Parathyroid sonography:
  - A round & isoechoic mass 13\*11.5\*11 mm in left parathyroid

## **PARATHYROID SCINTIGRAPHY BY 99m Tc-MIBI AND SPECT:**

Images were obtained after IV injection of 99m Tc-MIBI in 20 minutes and 1 and 2 hours.

**On MIBI scan, there are multiple focal zones of radiotracer collection in lower pole of left thyroid lobe, adjacent (or inferior) to lower pole of left thyroid lobe and the largest one in lower pole of right thyroid lobe, which are persistent in delayed images.**

On thyroid scan, distribution of homogenous radiotracer uptake is seen.

### **IMPRESSION:**

- Findings of scan suggest parathyroid adenoma in lower pole of left thyroid lobe, adjacent (or inferior) to lower pole of left thyroid lobe and the largest one in lower pole of right thyroid lobe.
- Laboratory correlation (serum PTH) and sonographic evaluation are recommended for evaluation of thyroid nodules in lower pole of right and left thyroid lobes.





## Present illness:

- Surgery consult
  - ( 1402.04.04) two parathyroidectomy
- 

( 1402.04.04 )

ادامه شرح عمل از صفحه قبل :	continue:
پس از بیهوشی عمومی	
سپس بیمار پرپ درپ شد.	
تزریق اپرون در دوسانتی متر بالای سوپرا استرنال ناچ تا پلن ساب اتالیسمال زده شد و سپس فلپ سوپریور و اینفریور در بالا و پایین	
بار شد. در میدان عضلات استرپ در رافه میانب باز شد سپس تیروئید اکسپوز شد	
در سمت چپ پل تحتانی تیروئید ادنوم بزرگ حدود یک تا دو سانتی متر ریت شد. عصب ریکارنت سمت چپ رویت و حفظ شد در	
سمت راست نیز ادنوم رزکت شد و عصب ریکارنت نیز حفظ شد	
نمونه ها جهت پاتولوژی ارسال شد	
درن همواگ هر دو سمت تعبیه شد	
عضلات استرپ دوخته شد و سپس پوست در دولایه دوخته شد	
پس از اطمینان از هموستاز بیمار تحویل همکاران محترم بیهوشی داده شد	

**Macroscopic :**

Received specimen in fresh state for intraoperative consultation and consist of:

F1) A pink elastic irregular tissue measuring 2x0.7x0.6cm, W: 0.62gr. TS in 1 block.

F1SDX: Parathyroid tissue.

F2) A pink elastic irregular tissue measuring 1.8x1.1x0.5cm, W: 0.8gr. TS in 1 block.

F2SDX: Parathyroid tissue.

**Microscopic :**

Histologic findings, confirm the following diagnosis.

**Diagnosis :**

F1) Labeled as right parathyroid adenoma, resection (frozen and final diagnosis):

- Parathyroid tissue compatible with clinical diagnosis "parathyroid adenoma".

F2) Labeled as left parathyroid adenoma, resection(frozen and final diagnosis):

- Parathyroid tissue compatible with clinical diagnosis "parathyroid adenoma".

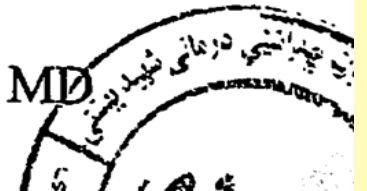
Pathologist: Dr. Parvizi

MD/AP.CP

Resident: Dr. Firouzi

MD

1402.04.11

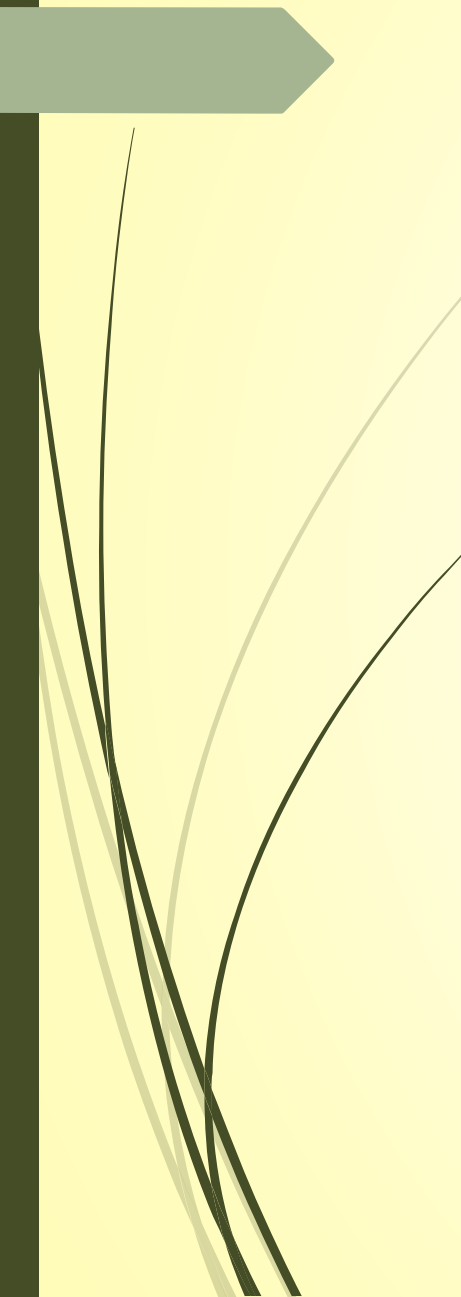


<b>Calcium</b> mg/dl	14.2	14.6 (1402.0 3.23)	13.8	12.3	11.6	10.1	9.5 4 TIR	7.8	8.5
<b>Phosphorus</b> mg/dl	2	2.2	1.8	1.5	1.3	1.2	1.2	1.4	1.3
<b>Mg</b> mg/dl	1.5						1.5		
<b>ALB</b>	3.8	3.9							
<b>PTH</b> Pg/dl		457							
<b>25(OH) D3</b> ng/dl		19.4							

# Present illness:

- She discharged;
- Risperidone 2mg daily
- Biperiden 2mg BD
- Citalopram 20mg daily
- Propranolol 20mg TDS
- Clonazepam 1mg H.S
- Depakine 500 daily
- Quetiapine 25mg H.S
- Calcium carbonate 500mg TDS
- Rocaltrol 0.25mcg daily





	1402.05.18	1402.05.28
<b>Calcium</b> (mg/dl)	10.8	10
<b>Phosphorus</b> (mg/dl)	2.7	
<b>ALB</b> (g/dl)	4.4	
<b>PTH</b> (Pg/dl)	310	
<b>25(OH)D3</b> (ng/dl)	36	





## Present illness:

- ( 1402.06.10) hospitalized B1D +PF , DEMENTIA
- Persecutory delusion
- Control delusion
- Aggression
- Auditory hallucination
- Visual hallucination
- Talkative

## خدمت درخواستی: MRI مغز بدون ماده حاجب

تکنیک تصویر برداری: ام ار ای مغز بدون کنتراست

یافته ها:

فضاهای اکسترا آگزریال: در سائز و شکل با توجه به سن بیمار نرمال هستند.

خونریزی اکسترا آگزریال: ندارد

سیستم بطنی: در سائز و شکل با توجه به سن بیمار نرمال هستند

سیسترن های بازال: نرمال

شیفت میدلاین: ندارد

مخچه: نرمال

ساقه مغز: نرمال

کالواریوم: نرمال

سیستم عروقی: نرمال .

Signal void مناسب شریانی و سینوس های دورا رویت میشود.

بخش های قابل رویت سرویکال فوقانی: نرمال

Polyp/mucus retention cyst در سینوس ماگزیلاری چپ رویت شد.

ندول زیرجلدی به ابعاد  $9 \times 7 \text{ mm}$  در پریتال چپ به صورت Low T2/FLAIR و intermediate T1 رویت شد.

اریت: در حد قابل رویت نرمال

ناحیه سلا و قاعده جمجمه نرمال

# Brain Perfusion Scintigraphy

## History:

The patient is a 53-year-old woman with history of psychosis, manic episode (BID) and aggressive behavior who is referred for further evaluation.

## Procedure:

The patient was placed in a quiet, dimly-lit room. Intravenous cannula was placed 10 to 15 min prior to injection of 740 MBq  $^{99m}\text{Tc}$ -ECD. The patient had their eyes open but was instructed not to speak, read or move for at least 5 minutes before to 5 minutes after the injection. SPECT was acquired 60 minutes after injection with the patient lying in supine position.

## Description:

The scan reveals mild to moderately decreased perfusion of bilateral anterior temporal lobes, more prominent on the right side. No significantly decreased or increased regional perfusion is evident in remainder of the brain hemispheres.


## Impression:

- *Mild to moderately decreased perfusion of bilateral anterior temporal lobes, more prominent on the right side.*

*With respect to patient's history and complex neurologic medications she is receiving, the scan pattern is currently not specific. Initial stages of frontotemporal dementia may be DDx, in appropriate clinical setting.*

Sincerely yours

G. Norouzi M.D.





# Present illness:

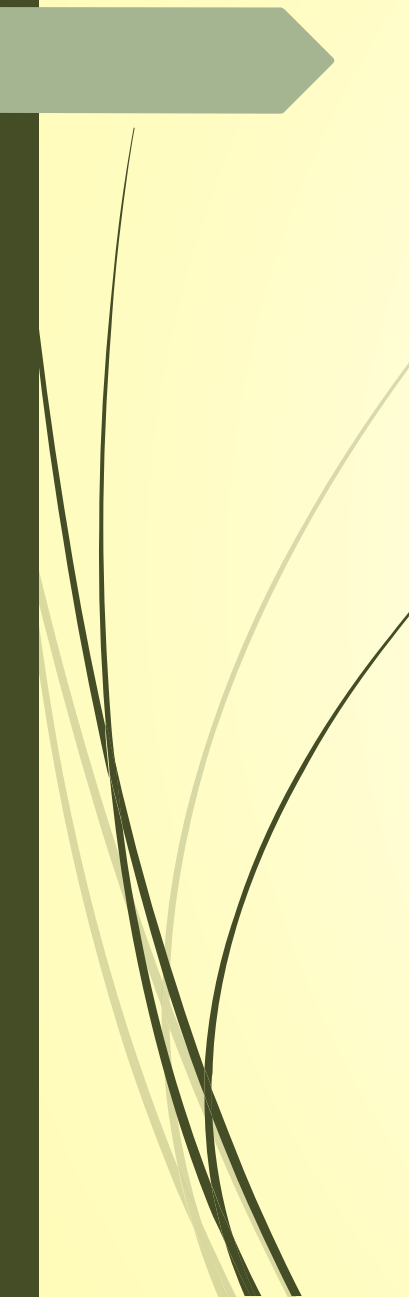
<b>Calcium</b>	<b>9.9</b>	<b>9.2</b>	<b>9.4</b>	<b>10.4</b>	<b>10.7</b>
Mg	2.1				
Cr	0.74				
Tsh	2.17				
Alk P	220				
K	4.1				

# Present illness:

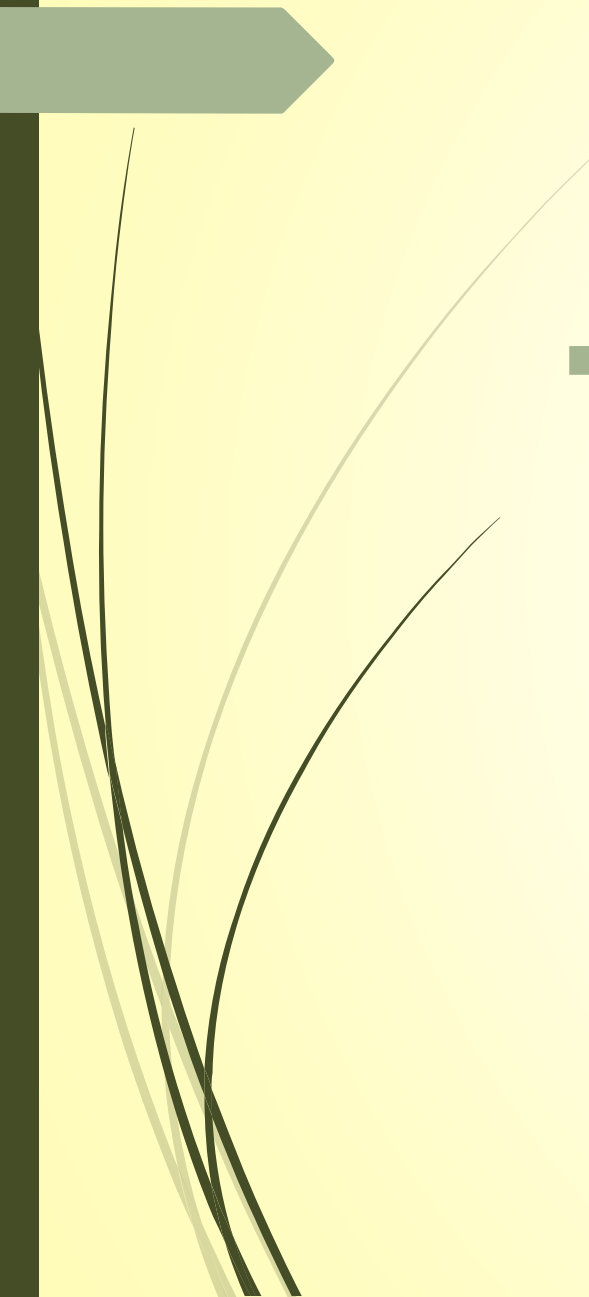
- She discharged; ( 1402 MEHR )
  - psychotherapy
  - Valproate NA 200mg TDS
  - Biperiden 2mg BD
  - Haloperidol 5mg daily
  - Propranolol 20mg TDS
  - Memantine 10 BID
  - Donepezil 5mg H.S
  - Quetiapine 25mg H.S

## Present illness:

	1402.07.10	1402.08.06
<b>Calcium</b> (mg/dl)	11	11.2
<b>Phosphorus</b> (mg/dl)		3.6
<b>Mg</b> (mg/dl)		2.4
<b>ALB</b> (g/dl)		3.7
<b>PTH</b> (Pg/dl)		284.4
<b>25(OH)D3</b> (ng/dl)		25
<b>K</b> (mEq/l)	4.2	
<b>TSH</b> ( $\mu$ IU/ml)	9.59	

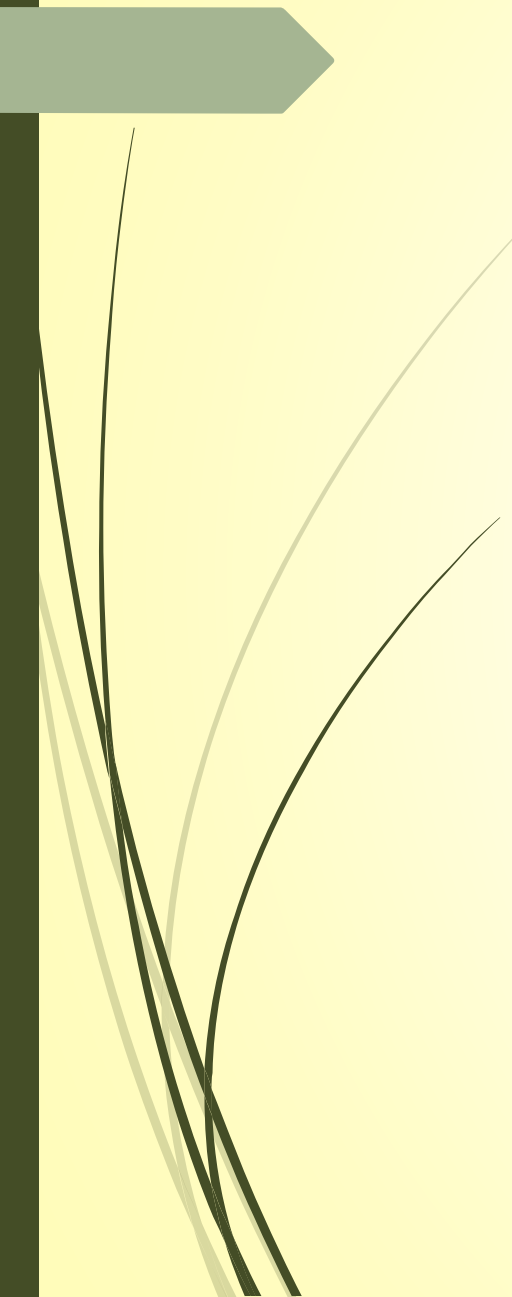


	1402.10.17	1402.10.24
<b>Calcium</b> (mg/dl)	14.2 – 10.2	8.5
<b>Phosphorus</b> (mg/dl)		2.7
<b>Mg</b> (mg/dl)		1.6
<b>ALB</b> (g/dl)		3.7
<b>PTH</b> (Pg/dl)		550
<b>25(OH)D3</b> (ng/dl)		35
<b>K</b> (mEq/l)	4	
<b>TSH</b> ( $\mu$ IU/ml)	0.013	

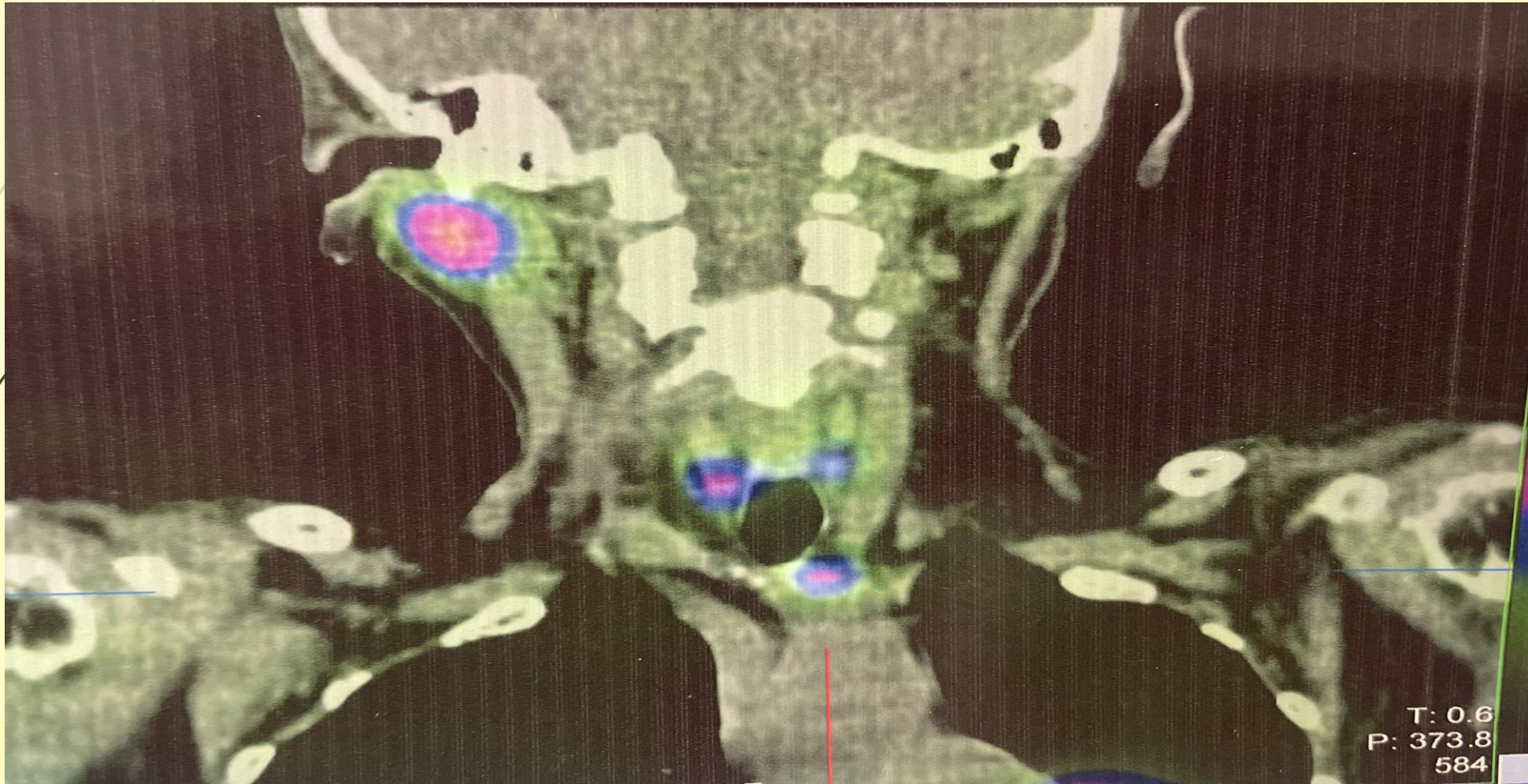
- 
- A decorative graphic on the left side of the slide. It features a dark green arrow pointing right at the top left. Below it, several thin, curved lines in shades of green and grey sweep upwards and to the right, creating a sense of movement and design.
- Hospitalized with weakness, fatigue, imbalance, drowsy since two weeks ago ( 1402.11.07)



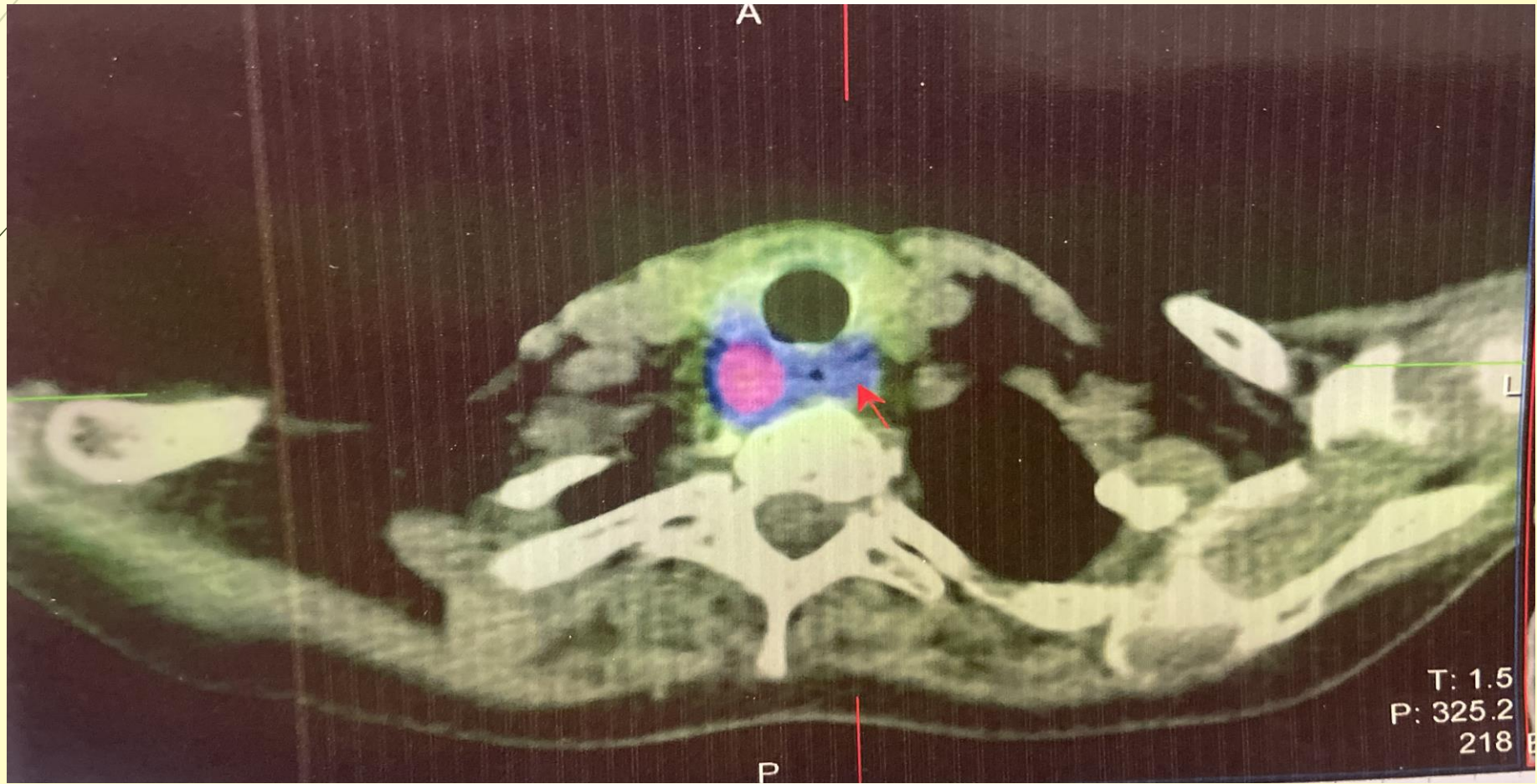
	7.11					9.11		11.11		12.11	
<b>Calcium</b> mg/dl	19.1	16.9	15.3	13.5	11.9	12.6	12	7.9	7.1	8.9	9.1
<b>Phosphorus</b> mg/dl	2.7			1.3	1.2	2.9	1	1.4	1.2	1.6	3
<b>Mg</b> mg/dl	1.4					1.2	1.5	1.9	1.3	1	1.2
<b>ALB</b> g/dl	3.4										
<b>PTH</b> Pg/dl	1099					204				114	
<b>25(OH)D3</b> ng/dl	31.1										
<b>K</b> mEq/l	2.3	2.5	4.3	3	5.2	4.8		4.5			4.2

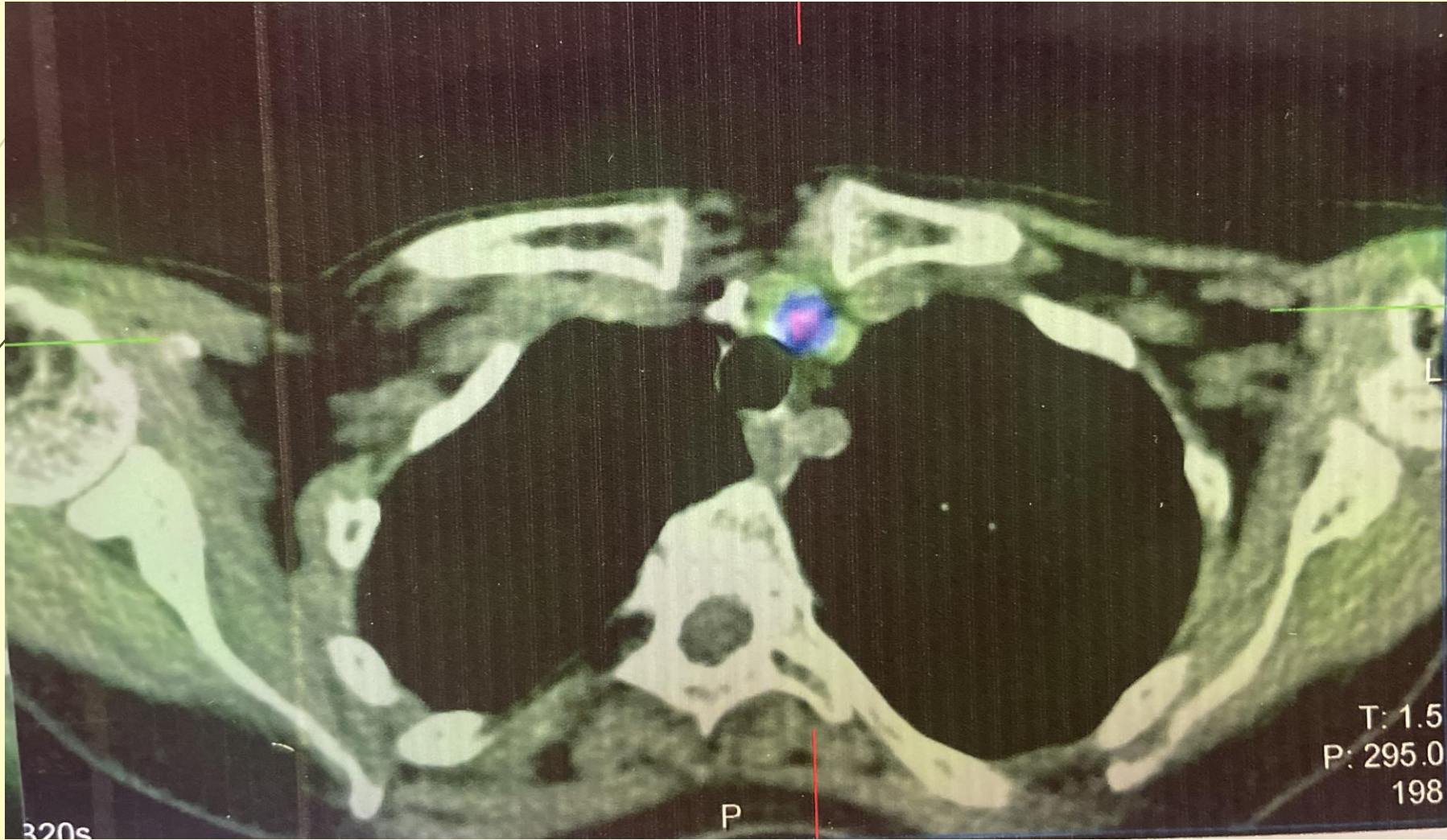
- 
- A decorative graphic on the left side of the slide. It features a dark green arrow pointing right at the top. Below it, several thin, curved lines in shades of green and grey sweep across the page, creating a dynamic, abstract background element.
- Hydration ( serum N/S 200 cc/h)
  - Vial KCL 15% 20 cc/L
  - Calcitonin 200 IU/ml s.c BID
  
  - Surgery counsult
  
  - O/P= 100 cc/h

# Present illness:











## سونوگرافی شکم و لگن:

در بررسی اولتراسونیک کبد دارای سائز و اکوی طبیعی است. حدود کبد منظم است.

قطر مجاری صفراوی داخل و خارج کبدی، ورید پورت و ورید های هیپاتیک طبیعی می باشند. (  $CBD = NL$   $PVD = NL$  )

کیسه صفرا فاقد سنگ بوده، و شکل و ضخامت جدار طبیعی دارد.

طحال (  $spleen\ span = NL$  ) با سائز و اکوی طبیعی مشاهده می شوند.

در حد قابل بررسی پانکراس با سائز و اکوی طبیعی مشاهده می شود

ضایعه فضاگیر در احشای شکمی فوق مشاهده نگردید.

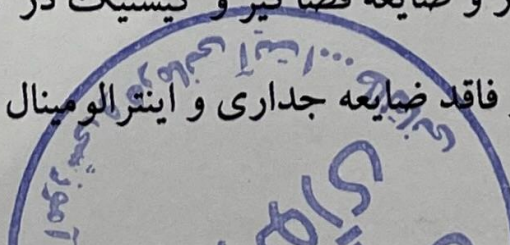
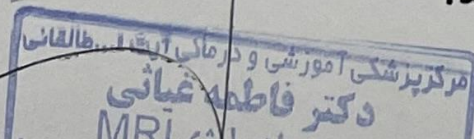
در بررسی اولتراسونیک کلیه راست با طول تقریبی  $NL$  و کلیه چپ با طول تقریبی  $NL$  در موقعیت طبیعی دیده می شود.

ضخامت و اکوی کورتکس در هر دو کلیه طبیعی است. اکوی مدولا و سینوس کلیه ها طبیعی می باشد.

علائمی به نفع وجود سنگ ادراری، هیدرونفروز و ضایعه فضاگیر و کیستیک در کلیه ها مشاهده نمی گردد.

مثانه نیمه پر و در حد قابل بررسی حاوی ادرار و فاقد ضایعه جداری و اینترالومینال رویت شد.

مایع آزاد در فضای شکم و لگن رویت نشد.



continue :

ادامه شرح عمل از صفحه قبل :

پس از برش و درج و نخت جترال آنستزی و در وضعیت سوپاین آنستزیون کولار در ناحیه لدام کردن داده شد و پوست ، زیر جلد و پلاستیم بازر سفت فلپ فوقانی و تحتانی بلند شد. عضلات استرپ توسط یک برش میدلاین از ناچ تیروئید تا استرنال ناچ باز شد. تیروئید اکسپوز شد و آزاد شد و لوب های تیروئید آزاد و دلیور گردید. غدد پارا تیروئید بزرگ شده در قسمت خلفی تیروئید داشت که به اندازه ۲ سانتی متر بود و رزکت شد و از بافت اطراف با حفظ عصب ریکارنت لارنژیال دایسکت شد و پدیکل عروقی آن دابل لیگاتور شد و جهت برررسی پاتولوژی فروزن نسکتشن ارسال شد و مقدار کمی از بافت پارا تیروئید سمت راست در عضله بایسپس سمت راست گانسه شد. ضیق تماس با دکتر صیاد رزیدنت پاتولوژی نمونه frozen فقط بافت تیروئید داشتند. پس از هموستاز و تعبیه هموگ عضلات استرپ ترمیم شد. همچنین پوست و زیر جلد ترمیم شد و بیمار با حال عمومی خوب تحویل ریکاوری شد. هم چنین CV لاین سباب کلاوین سمت راست برای بیمار تعبیه شد که پس از چک خونگیری و خون دهی از هر ۲ لومن فیکس و پانسمان شد.



### **Macroscopic :**

Specimens received in two containers two in fresh state for intraoperative consultation (F1, F2) labeled as above and consist of:

F1) A fragment of creamy soft tissue measuring 3x1.5x0.8cm, weighing 0.99g. RSS in 1 block and TS in 2 blocks after formalin fixation.

F1SDX: Parathyroid tissue.

F2) A fragment of creamy soft tissue measuring 4x1.5x1.2cm, weighing 1.2g. TS in 4 blocks.

F2SDX: Parathyroid tissue.

### **Microscopic :**

Histologic findings, confirm the following diagnosis.

### **Diagnosis :**

F1) Left parathyroid, resection (frozne and final diagnosis):

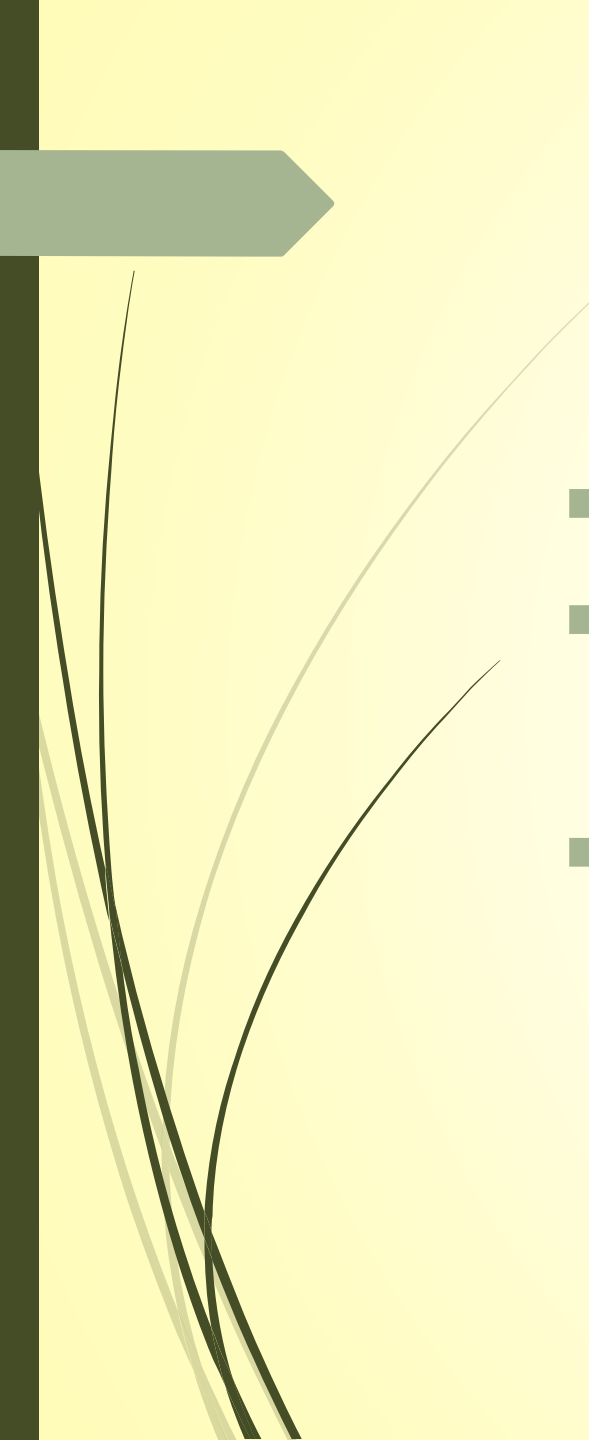
- Parathyroid hyperplasia.

F2) Right parathyroid, resection (frozne and final diagnosis):

- Parathyroid hyperplasia.



	7.11					9.11		11.11		12.11	
<b>Calcium</b> mg/dl	19.1	16.9	15.3	13.5	11.9	12.6	12	7.9	7.1	8.9	9.1
<b>Phosphorus</b> mg/dl	2.7			1.3	1.2	2.9	1	1.4	1.2	1.6	3
<b>Mg</b> mg/dl	1.4					1.2	1.5	1.9	1.3	1	1.2
<b>ALB</b> g/dl	3.4										
<b>PTH</b> Pg/dl	1099					204				114	
<b>25(OH)D3</b> ng/dl	31.1										
<b>K</b> mEq/l	2.3	2.5	4.3	3	5.2	4.8		4.5			4.2

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- A decorative graphic on the left side of the slide. It features a dark green arrow pointing right at the top left. Below it, several thin, curved lines in shades of green and grey sweep upwards and to the right, creating a sense of movement and design.
- Calcium carbonate 500 po TDS
  - Rocaltrol 0.5 BID
  - Calcium gluconate IV inf ( 24 h )



# Drug history:

- Valproate NA 200mg TDS
- Biperiden 2mg BD
- Haloperidol 5mg daily
- Propranolol 20mg TDS
- Memantine 10 BID
- Donepezil 5mg H.S
- Quetiapine 25mg H.S



- **PMH:**

- Renal stone ( 5 years ago)
- B1D with psychotic feature
- Parathyroidectomy

- **PSH:**

- Parathyroidectomy

- **FH:**

- Mother and Brother = HLP
- Father : HTN, GOUT, IHD

# REVIEW OF SYSTEM:

- Headache (-) Nausea & vomiting (-) Visual problems(-)
- Weight changes (+) appetite changes (-) sexual problems (-)
- Skin: pigmentation (-) diaphoresis (-) Dry & fragile hair (-)
- Ear , nose, mouth: NL
- Cardiovascular: NL palpitation (-)
- Respiratory: NL
- Gastrointestinal: NL
- Musculoskeletal: NL
- Neurological: AbNL
- Psychiatric: AbNL

# PHYSICAL EXAMINATION:

- General appearance:
  - A 53-year-old woman, disorient
- Vital sign:
  - BP:125/70 mmhg
  - HR=78
  - RR= 18
  - BMI= 18.51 kg/m<sup>2</sup>
  - W= 40 Kg
  - H=1.48 Cm



# PHYSICAL EXAMINATION:

- Neck: Previous surgical scar
- Thorax: NL
- Lung: clear
- Heart: NL
- Abdomen: NL
- Extremities: NL

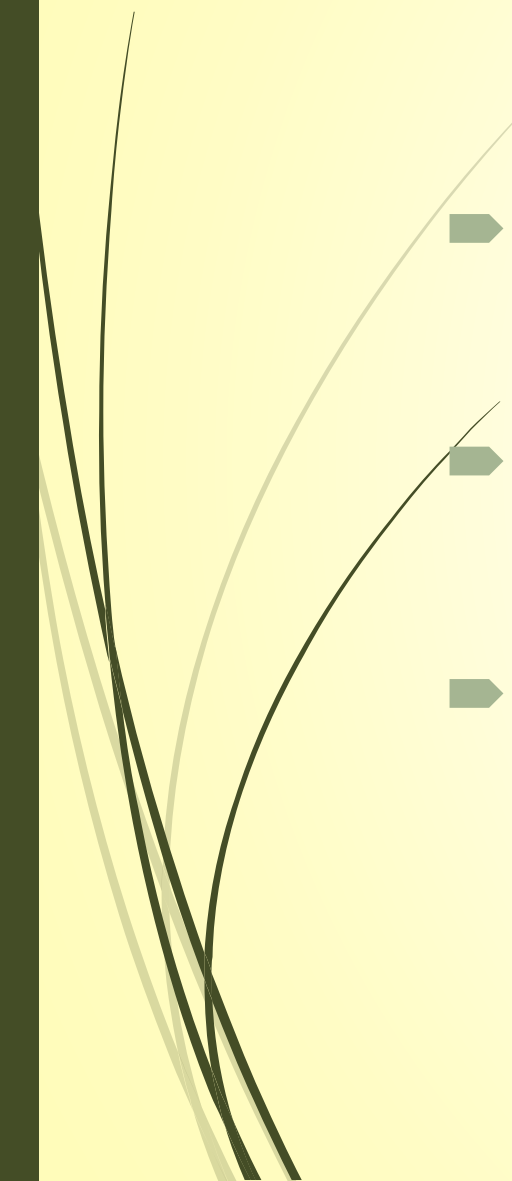
## Problem list:

- A 53-year-old woman with the history Renal stone & parathyroid adenoma ( 2 adenoma ) & Psychiatric disorders
- hyper calcemia ( ca=19.1 ) & high PTH (1100)
- Osteoporosis
- Two parathyroidectomy ( hyperplasia )
- Low ca, p, mg, k after parathyroidectomy





# AGENDA:

- What are the causes of hypocalcemia in this patient ?
  - Does this patient need a genetic test ?
  - What is the course of lab data changes & treatment & expectations after treatment in this patient?
- 

# What are the causes of hypocalcemia in this patient ?

## ➤ Hypoparathyroidism

➤ PTH ↓ ( <15 )

➤ Ca ↓

➤ P ↑


## ➤ Hungry bone syndrome

➤ PTH (NL - ↑ )

➤ Ca ↓

➤ P ↓

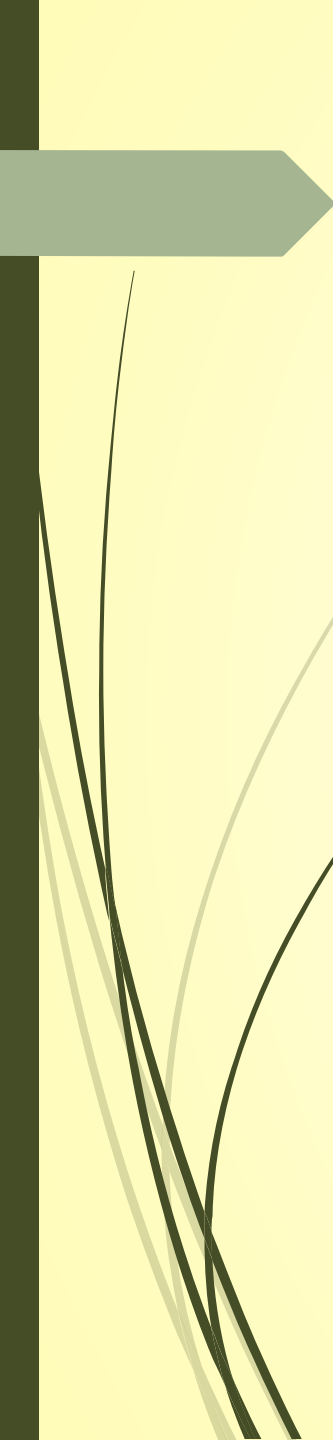
➤ Mg ↓

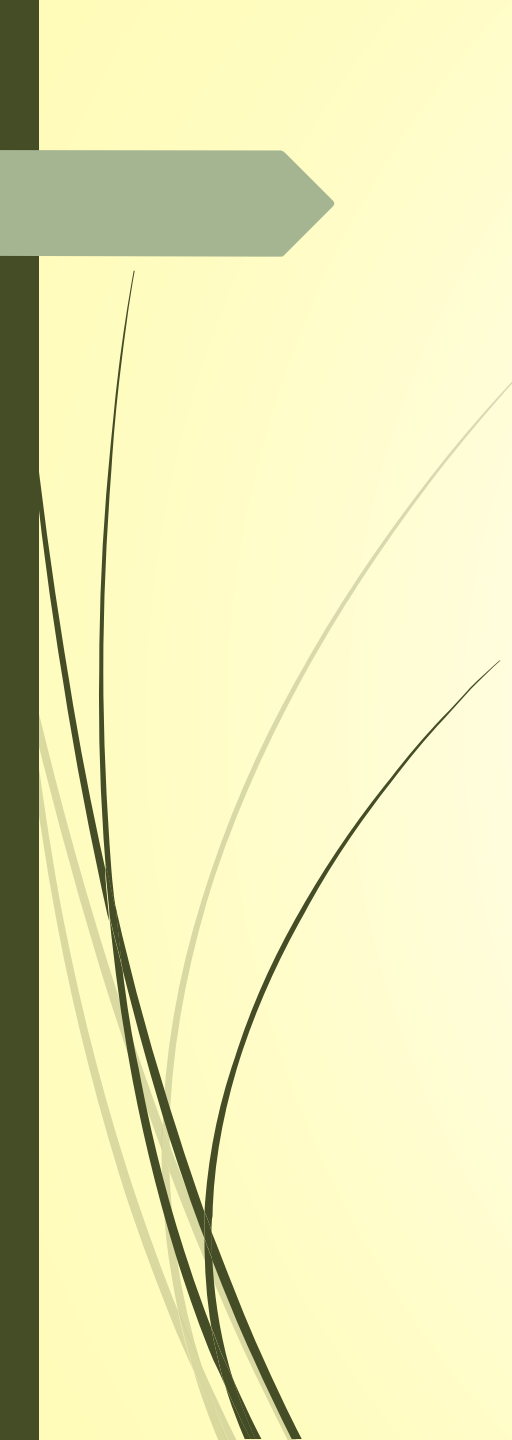


# Forestalling hungry bone syndrome after parathyroidectomy in patient with primary & renal hyperparathyroidism (2023 jun )

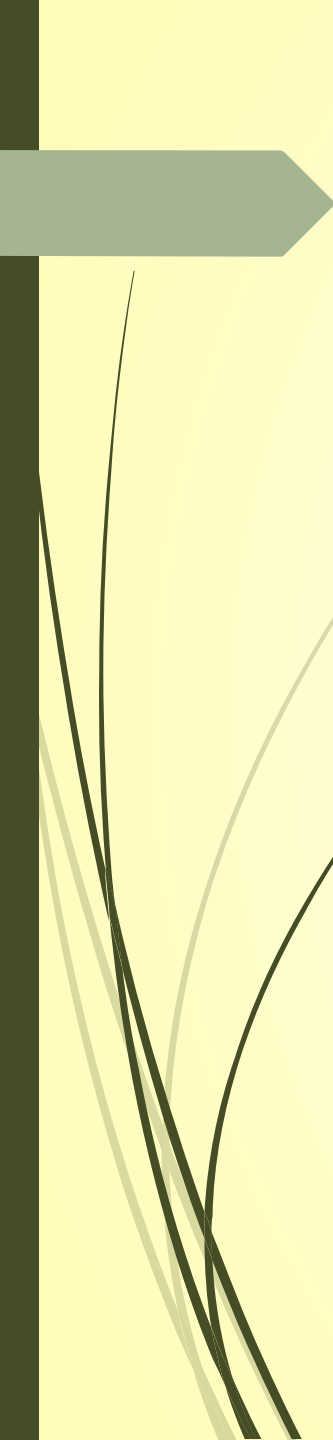
- **risk factors for HBS:**

- younger age at PTx,
- pre-operative elevated bone alkaline phosphatase, and PTH, serum calcium.
- longer pre-surgery dialysis duration
- obesity
- an elevated pre-operative calcitonin
- prior use of cinalcet
- the co-presence of brown tumors, and osteitis fibrosa cystica

- 
- 15–25% to 92% of patients diagnosed with renal hyperparathyroidism (RHPT),
  - up to 15–20% of individuals with PHPT
  
  - Hypocalcemia (usually below the value of 8.2–8.4 mg/Dl
  - post-operative day to 3-day up to 30 days, requiring intravenous calcium replacement.
  
  - hypophosphatemia, hypomagnesiemia, and, hyperkalemia
  
  - Early after PT surgery, normal or high (but lower than pre-operative level) parathyroid hormone (PTH) is essential for establishing HBS diagnostic since non-low PTH is the clue to differentiate the condition from post-surgery hypoparathyroidism (low PTH)

- 
- The pre-operative use of anti-resorptives such as bisphosphonates (for example, pamidronate or zoledronic acid) in PHPT is controversial to associate benefits for HBS, but some authors reported it
  - a 55-year-old female with a giant PT adenoma (of 5 cm, and a weight of 16 g) who was post-operative re-admitted for HBS (the symptoms started 72 h after surgery and the patient remained hospitalized for one month)



- 
- **Hungry bone syndrome: still a challenge in the post-operative management of primary hyperparathyroidism: a systematic review of the literature 2013**
  - Various risk factors of HBS
    - older age
    - weight/volume of the resected parathyroid glands
    - radiological evidence of bone disease
    - vitamin D deficiency.
  - The syndrome is reported in 25-90% of patients with radiological evidence of hyperparathyroid bone disease vs only 0-6% of patients without skeletal involvement



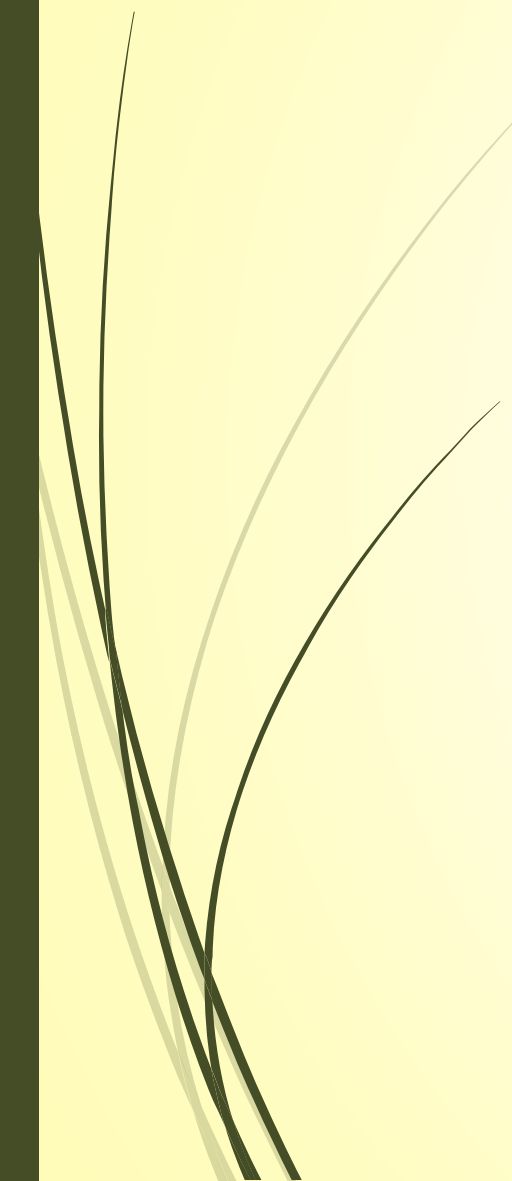
[The hungry bone syndrome--an  
update]

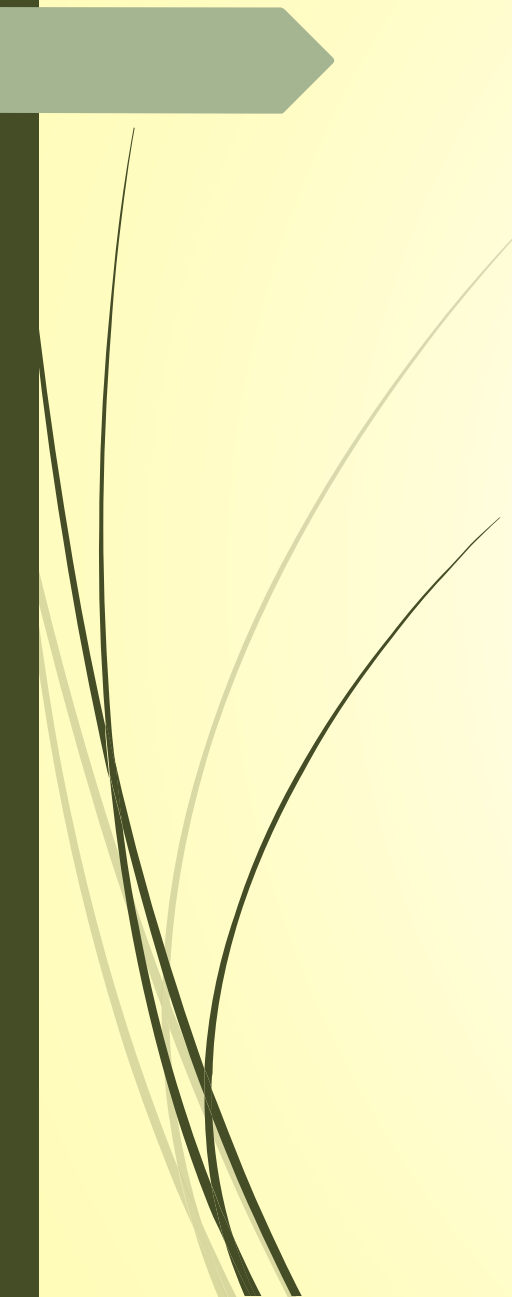
**2007**

- Risk factors for the development of HBS
- Large parathyroid adenomas
- age > 60 years
- high preoperative levels of serum PTH, calcium and alkaline phosphatase




# Does this patient need a genetic test ?

- Age <30-40
  - Carcinoma
  - Multiglands
  - MEN syndrome
  - First degree relatives >2 PHPT
- 

A decorative graphic on the left side of the slide. It features a dark green arrow pointing right at the top, with several thin, curved lines in shades of green and black extending downwards from the arrow's base.

# Overview of the 2022 WHO Classification of Parathyroid Tumors

- Terms such as multi-glandular parathyroid disease and multiple multiglandular parathyroid adenomas have now replaced the historical term “parathyroid hyperplasia”.
- the term “parathyroid hyperplasia” is now used primarily in the setting of secondary hyperplasia which is most often caused by chronic renal failure.



# Overview of the 2022 WHO Classification of Parathyroid Tumors



## **Definite criteria of malignancy:**

- Angioinvasion
- Lymphatic invasion
- Perineural invasion
- Unequivocal invasion into adjacent structures
- Histologically confirmed metastasis





# Overview of the 2022 WHO Classification of Parathyroid Tumors

- **Atypical features in parathyroid tumors:**
  - Cellular nests in a thickened connective tissue
  - Tumour cells in capsule
  - Adherence to adjacent structures without frank invasion
  - Band-like fibrosis
  - Trabecular growth
  - Increased mitotic activity (>5 per 10 mm<sup>2</sup>)
  - Atypical mitotic figures
  - Coagulative necrosis
  - PFIB loss
  - Ki-67 labeling index >5%
  - Other immunohistochemical aberrancies

# Parathyroid tumor

①



Routine histology

*No atypical features  
No definite criteria for malignancy*

*Atypical features  
No definite criteria for malignancy*

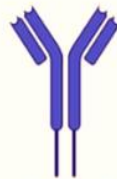
*Definite criteria for malignancy*

Parathyroid adenoma

Atypical parathyroid tumor

Parathyroid carcinoma

②



Immunohistochemistry

PFIB+

PFIB-

PFIB+

PFIB-

PFIB+ or -

No risk of recurrence

No risk of recurrence

Very low risk of recurrence

Low risk of recurrence

High risk of recurrence

③



DNA sequencing

No need for constitutional *CDC73* gene sequencing

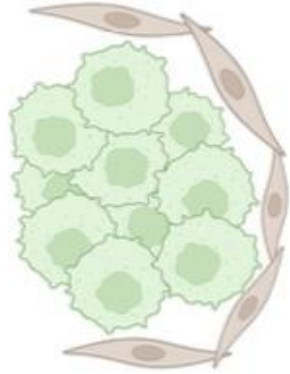
Consider constitutional *CDC73* gene sequencing

No need for constitutional *CDC73* gene sequencing

Perform constitutional *CDC73* gene sequencing

Perform constitutional *CDC73* gene sequencing

### Parathyroid adenoma



PFIB +

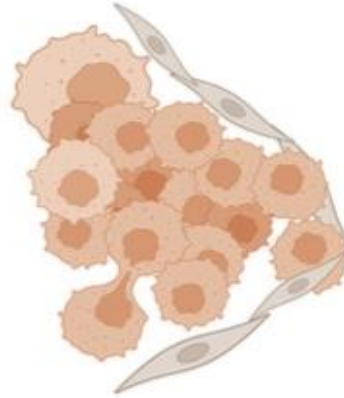
PGP9.5 -

APC +

GAL-3 -

Ki-67 ↓

### Atypical parathyroid tumor



PFIB + or -

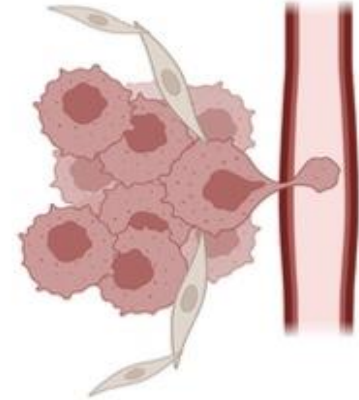
PGP9.5 + or -

APC + or -

GAL-3 + or -

Ki-67 ↓ ↑

### Parathyroid carcinoma



PFIB -

PGP9.5 +

APC -


GAL-3 +

Ki-67 ↑



# Does this patient need a genetic test ?

- MEN 1 (menin)
- MEN 4
- CDC 73
- MEN 5 (MAX)
- FIHP (GCM2)



# What is the course of lab data changes & treatment & expectations after treatment in this patient?

- Ca = 8.5 -9 mg/dl
- PTH < 2ALN
  
- IF NOT:
- Ca > 9.5 mg/dl
- PTH > 2 ALN
- Persistent disease should be evaluate again





**➤ THANKS FOR YOUR ATTENTION**