# Thyroid and Parathyroid Disease

**Priya Dedhia, MD, PhD**
*Assistant Professor*
*Department of Surgery*
*Division of Surgical Oncology*
*The Ohio State University Wexner Medical Center*

MedNet21
Center for Continuing Medical Education

The Ohio State University
Wexner Medical Center

# No Disclosures

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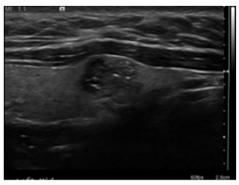
# Agenda

- Thyroid nodules and cancer
  - Imaging
  - Indications for FNA
  - Common FNA results
  - Extent of surgery
- PHPT
  - Definition of “Asymptomatic” PHPT
  - Indications for Parathyroidectomy
  - Benefits of Parathyroidectomy




https://commons.wikimedia.org/wiki/File:Papillary_Thyroid_carcinoma_Ultrasound_37F_20160005.jpg

**A patient was found to have a possible thyroid nodule on CT scan…**

Adapted from DOI:10.1007/s13244-016-0506-5. ISSN 1869-4101

# Thyroid nodules are common

| Endocrine Condition | Prevalence |
|---|---|
| Thyroid nodules | 30-70% |
| Metabolic syndrome | 35-40% |
| Obesity | 25-50% |
| Hyperlipidemia | 15-20% |
| Diabetes | 5-25% |
| Osteoporosis | 7% |

Golden SH., et al. J Clin Endo Metab 2009; 94:1853-78
Mazzaferri M. New England Journal Medicine 1993; 328:553-558
Guth S., et al. Eur J Clin Invest 2009; 39:699-706

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# Thyroid nodules - background

- Up to 15% of nodules are cancer

| Study | Number of Biopsies | Malignant (%) |
|---|---|---|
| Yassa 2007 | 3589 | 14% |
| Theoharis 2009 | 3207 | 15% |
| Yang 2007 | 4703 | 7.6% |

- **Which ones to resect?**

Yassa L., et al. Cancer Cytopathology 2007; 111(6):508-16
Theoharis, C., et al. Thyroid 2009; 19(11):1215-23
Yang J., et al. Cancer Cytopathology 2007; 111(5):306-15

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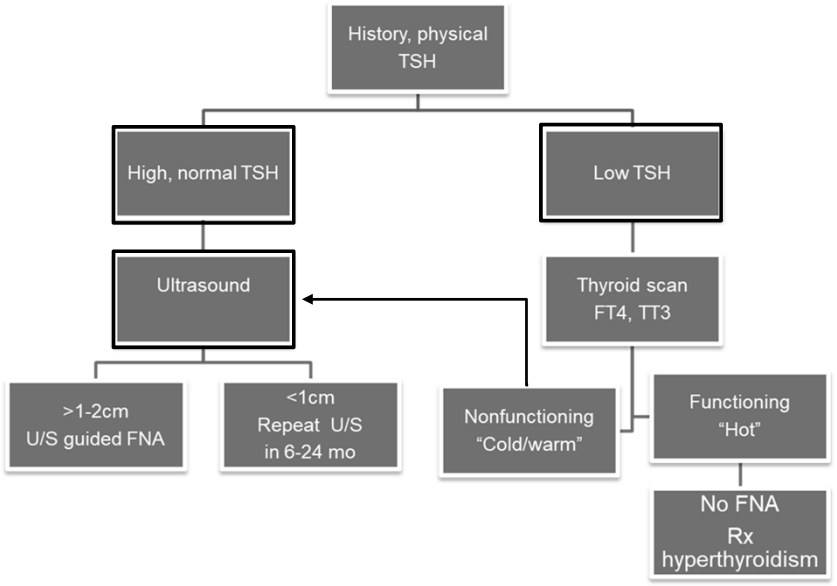


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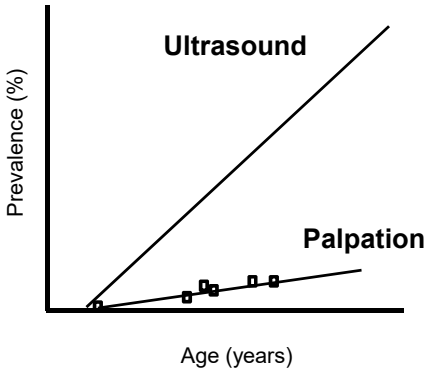
# Thyroid nodules - background

- 5% prevalence in general population
- Up to 67% prevalence by ultrasound!
- Increases with age, female sex, iodine deficiency, radiation exposure




Mazzaferri M. New England Journal Medicine 1993; 328:553-558

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# American Thyroid Association Guidelines

Thyroid sonography should be performed in all patients with known or suspected thyroid nodules.

Strong recommendation, high-quality evidence

AMERICAN THYROID ASSOCIATION
FOUNDED 1923

Haugen 2016 Thyroid

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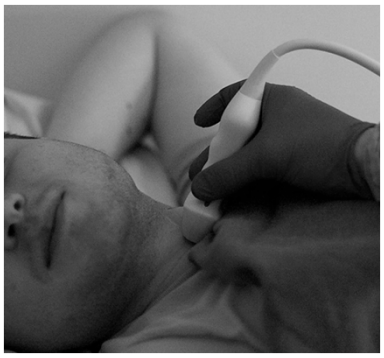
# A patient was found to have a possible thyroid nodule on CT scan…

Get TSH and an ultrasound!


https://commons.wikimedia.org/wiki/File:Ultrasound_Scan_ND_110207151454_1519090.jpg

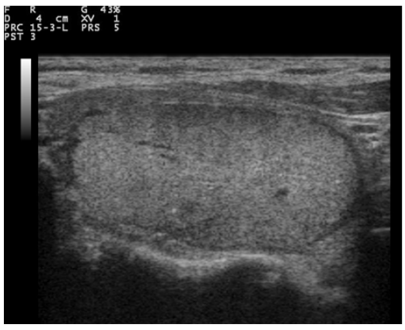
## Evaluation of a New Thyroid Nodule - Imaging

- Ultrasound
  - Most useful, only test needed for most
- Thyroid Scintigraphy
  - Reserved for hyperthyroid work-up
- CT
  - Rarely indicated
  - Substernal extension
  - Extensive nodal disease
  - Suspicion of MTC or ATC



https://commons.wikimedia.org/wiki/File:Neck_ultrasound.jpg

## Thyroid ultrasound



- Nodule
  - Size
  - Location
  - Composition
  - Echogenicity
  - Margins
  - Presence of calcifications
  - Taller than wide
  - Vascularity
- Lymph node
  - Size and shape
  - Loss of hilum
  - Calcifications
  - Echogenicity

https://commons.wikimedia.org/wiki/File:Thyroid_ultrasound_110322134324_1353480.jpg

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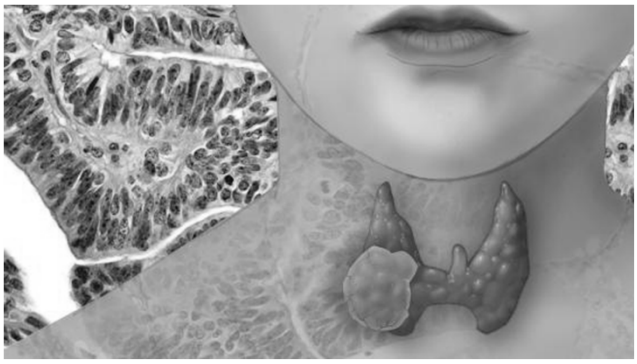
# Which nodules should we biopsy?



# Increasing malignancy risk with increasing nodule diameter

| Nodule diameter, cm | Multivariate analysis, OR (95% CI) | p Value |
|---|---|---|
| 1.0-1.9 | 1 (reference) | |
| 2.0-2.9 | 1.30 (1.14-1.49) | <0.0001 |
| 3.0-3.9 | 1.58 (1.34-1.88) | <0.0001 |
| ≥4.0 | 1.70 (1.42-2.04) | <0.0001 |

- ATA nodule risk stratification system
- Thyroid Imaging Reporting and Data System (TI-RADS)

Angell T 2019 JCEM 104: 5665-5672

# ATA nodule risk stratification

More suspicious

| Category | Risk of malignancy | US Description | FNA Threshold |
|---|---|---|---|
| Benign | 0% | Simple cyst | n/a |
| Very low suspicion | <3% | Spongiform, partially cystic with no suspicious features | ≥2cm |
| Low suspicion | 5-10% | Isoechoic solid with regular margin<br>Partially cystic with eccentric solid | ≥1.5cm |
| Intermediate suspicion | 10-20% | Hypoechoic, solid, regular margin | ≥1cm |
| High suspicion | >70-90% | Hypoechoic, solid with:<br>irregular margins<br>microcalcifications<br>taller than wide<br>extrathyroidal extension<br>suspicious lymph nodes | ≥1cm |

Smaller size threshhold

Haugen et al 2015 Thyroid

# American College of Radiology TI-RADS

| Composition | | Echogenicity | | Shape | | Margin | | Echogenic foci | |
|---|---|---|---|---|---|---|---|---|---|
| • Cystic | 0 | • Anechoic | 0 | • Wider than tall | 0 | • Smooth | 0 | • None | 0 |
| • Spongiform | 0 | • Hyper/iso | 1 | • Taller than wide | 3 | • Ill-defined | 0 | • Comet-tails | 0 |
| • Mixed | 1 | • Hypo | 2 | | | • Lobulated/irregular | 2 | • Macro | 1 |
| • Solid | 2 | • Very hypo | 3 | | | • ETE | 3 | • Peripheral/rim | 2 |
| | | | | | | | | • Punctate | 3 |

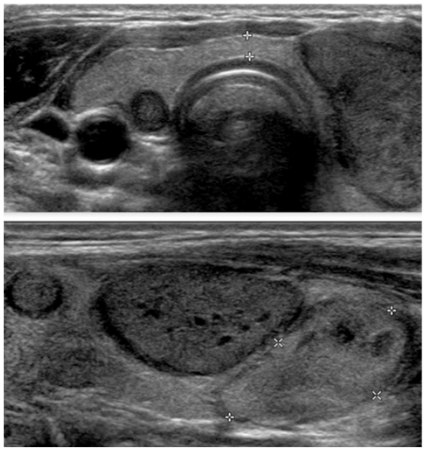
Add points from all categories to determine TIRADS level

| 0 points | 2 points | 3 points | 4-6 points | ≥7 points |
|---|---|---|---|---|
| **TR1**<br>Benign<br>No FNA | **TR2**<br>Not suspicious<br>No FNA | **TR3**<br>Mildly suspicious<br>FNA ≥ 2.5cm<br>Follow ≥ 1.5cm | **TR4**<br>Moderately suspicious<br>FNA ≥ 1.5cm<br>Follow ≥ 1.0cm | **TR5**<br>Highly suspicious<br>FNA ≥ 1.0cm<br>Follow ≥ 0.5cm |

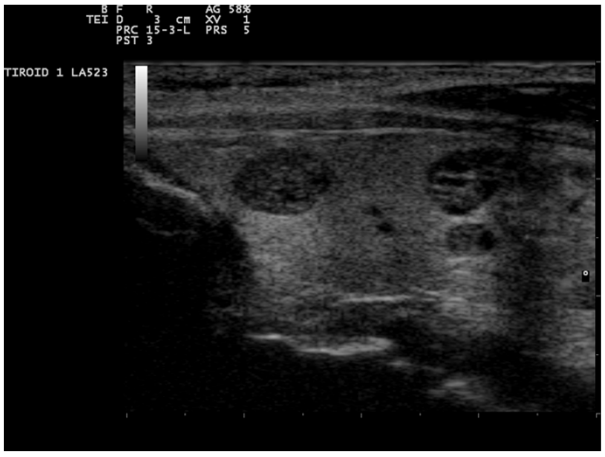
Tessler et al 2017 J Am Coll Radiol 14: 587-95

# Risk stratification of thyroid nodules

- All reduce unnecessary biopsies
- High concordance rates for classifying nodules as intermediate or high suspicion



# What about multiple nodules?




https://commons.wikimedia.org/wiki/File:Ultrasound_Scan_ND_0107091941_0928470.png

# Missed cancer with biopsy of only largest nodule

- 1985 patients with FNA of 3483 nodules

| | Number of nodules >1cm | | |
|---|---|---|---|
| **FNA performed on** | **2 nodules (n = 73)** | **3 nodules (n = 27)** | **≥ 4 nodules (n = 20)** |
| Largest nodule | 86.3% | 51.8% | 55% |
| Largest 2 nodules | 100% | 81.5% | 85% |
| Largest 3 nodules | | 100 | 95% |
| Largest 4 nodules | | | 100% |
| **Missed cancers when only 1 nodule is biopsied** | **13.7%** | **48.2%** | **45%** |

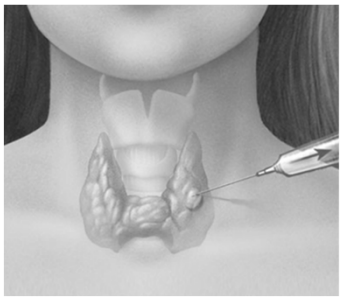
Frates et al 2006 JCEM 91: 3411-17

# Considerations for FNA

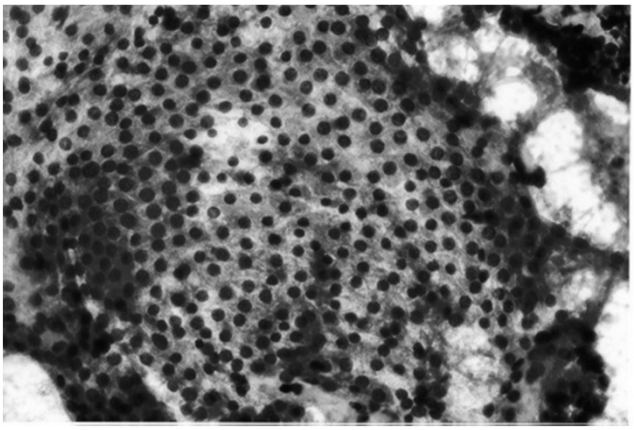
- Lower threshold for FNA
  - Concerning clinical features
  - PET avid
  - Young age
- Higher threshold for FNA
  - Older age without concerning clinical features
  - Significant comorbidities

## Follow-Up for Nodules Not Meeting Initial Criteria for FNA

- US in 6-12 months for high suspicion nodules
- US in 12-24 months for low/intermediate suspicion nodules
- US >24 months if at all for very low suspicion nodules/cystic lesions



## What happens after FNA?



# FNA Results

| Diagnostic Category | Risk of Malignancy (%) |
|---|---|
| Nondiagnostic or Unsatisfactory | 1-4 |
| Benign | 0-3% |
| Atypia of Undetermined Significance *or* Follicular Lesion of Undetermined Significance | ~ 5-15%** |
| Follicular Neoplasm *or* Suspicious for a Follicular Neoplasm | 15-30% |
| Suspicious for Malignancy | 60-75% |
| Malignant | 97-99% |

Varies by institution

Indeterminate

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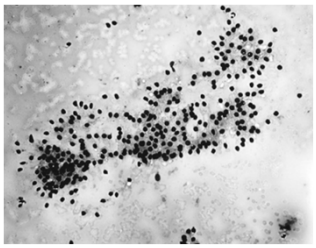
# FNA - non-diagnostic result

- NO interpretation can be made
- Incidence varies based on technique and experience ( 5-15%)
- Repeated in 6 weeks
- If repeated biopsies are non-diagnostic consider surgical excision

Hypocellular specimen

# FNA - benign



- High suspicion US pattern
  - Repeat US and FNA in 6-12 months
- Low to Intermediate suspicion US pattern
  - Repeat US in 12-24 months
  - Repeat FNA if…
    - If 20% growth in 2 dimensions, 50% increase in nodule volume or development of new suspicious sonographic features
- Very Low suspicion US pattern
  - Utility of repeat US limited, no follow-up necessary
  - If US repeated, should be in ≥ 24 months

Haugen et al 2015 Thyroid

# FNA - benign

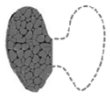
- 2nd benign cytology and no growth, US every 3-5 years
- Growing nodule should be monitored
- Surgery if…
  - Large (> 4 cm)
  - Compressive symptoms
  - Other clinical concerns

Haugen et al 2015 Thyroid

# FNA – indeterminate

- Molecular testing
  - Genomic and transcriptional profiles that identify risk of malignancy
  - Good option for average patient
- Diagnostic lobectomy
  - Consider if your institution has high malignancy rate for indeterminate FNA biopsy
  - Consider in patients with increased risk

Molecular testing



Lobectomy

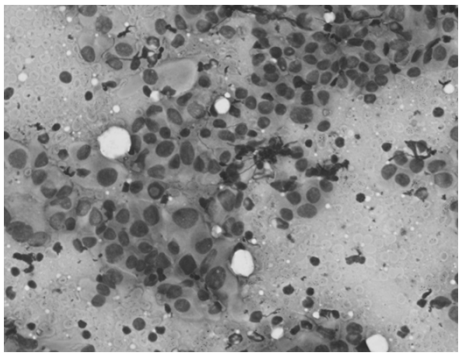
# Molecular testing

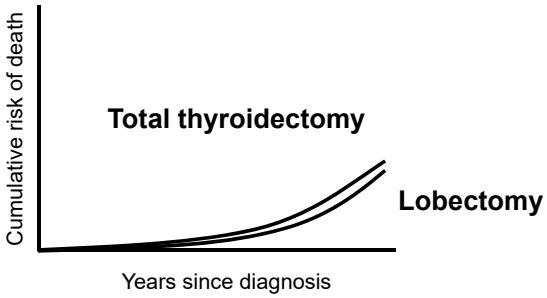
- Afirma
  - Previously “rule-out”
  - Benign >96% NPV, safe to leave in
  - Xpression Atlas → extent of surgery
- Thyroseq
  - Previously “rule-in”
  - v3 is similar to Afirma

https://commons.wikimedia.org/wiki/File:Preparation_of_the_RT-PCR_Reaction_(05811009)_(49869473991).jpg

# FNA – malignant or suspicious for malignancy

- Active surveillance vs lobectomy (≤ 1cm, very low risk)
- Lobectomy vs total thyroidectomy (<4cm, low risk)
- Total thyroidectomy and nodal dissection based on US






Welch and Doherty 2018 NEJM 379: 310-312

# Extent of Initial Surgery

Thyroid lobectomy

- < 4cm
- No extrathyroidal extension
- No suspicious lymph nodes

Welch and Doherty 2018 NEJM 379: 310-312

# Confirmation of malignancy

- Low risk well-differentiated thyroid cancer
  - Lobectomy is sufficient
  - RAI is not necessary

- Intermediate/high risk well-differentiated thyroid cancer
  - Completion thyroidectomy should be considered
  - RAI should be considered

Welch and Doherty 2018 NEJM 379: 310-312

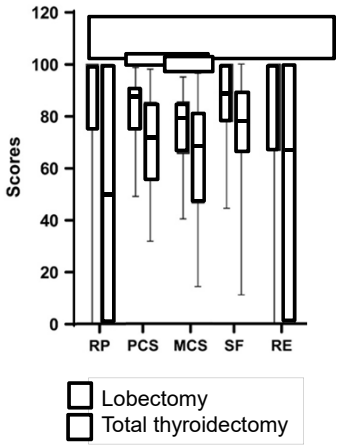
# Why consider thyroid lobectomy?

Advantages

- Decreased need for levothyroxine
- No risk of hypoparathyroidism
- Improved quality of life
  - Role physical (RP)
  - Social function (SF)
  - Role emotional (RE)
  - Physical component summary (PCS)
  - Mental component summary (MCS)

Disadvantages

- Potential completion thyroidectomy
- Difficulty with laboratory surveillance (Tg)




Lan Y., 2021, Cancer Medicine 10:1989-2002

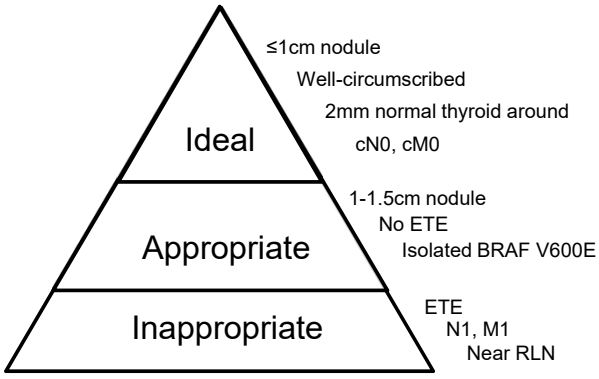
# Active surveillance

Indications for consideration

- Low risk PTC ≤ 10 mm
- Lack of high-risk features such as
  - Adjacent to RLN
  - Invasion
  - Clinically apparent LN
  - Distant metastases

Indications for surgery after AS

- Tumor diameter reaches 13 mm
- Appearance in LN metastases
- Change in patient preference
- Other thyroid/parathyroid disease requiring surgery




Sugitani I., 2021, Thyroid 21:183-192

# Take Home

- Lower threshold for FNA in patients with higher risk of thyroid cancer
- Consider forgoing FNA in patients with significant comorbidities or poor prognosis cancer
- FNA cytopathology demonstrates significant variability which dictates management
- Consideration should be given for less aggressive treatment of low risk well-differentiated thyroid cancer

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# Primary hyperparathyroidism


*And other things!*

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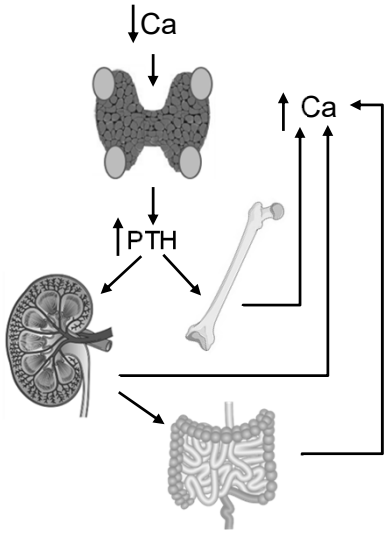
# Background

- One or more of the parathyroid glands inappropriately makes PTH
- Prevalence 1% general population
  - 2-3.4% postmenopausal women
  - Underdiagnosed and undertreated
- Clinical diagnosis based solely on labs
  - Hypercalcemia with elevated or inappropriately normal PTH
  - Normocalcemia with elevated PTH




SMART-Servier Medical Art
http://open.umich.edu/education/med/resources/second-look-series/materials

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# Background

- 4 parathyroid glands
- 85% single adenoma
- 15% four-gland hyperplasia

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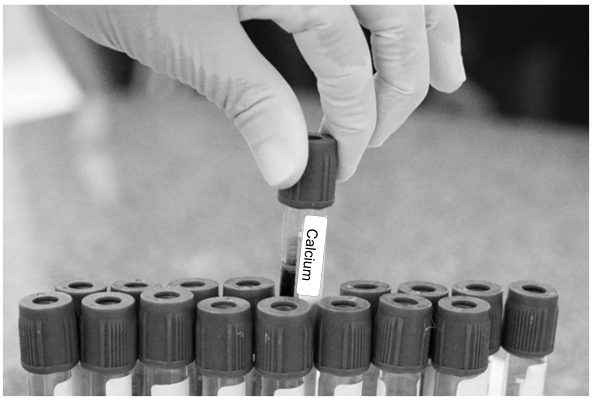
# Diagnosis

- Who should be tested?
  - Hypercalcemia
  - Osteoporosis
  - Kidney stones
- Labs
  - Calcium
  - PTH
  - 25-OH Vitamin D
  - Creatinine
  - Urine studies – Ca AND Cr

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# Diagnosis

- High/normal serum calcium
- Inappropriate (high/normal) parathyroid hormone
- Absence of secondary causes
  - Thiazide diuretics
  - Lithium
  - Chronic kidney disease
  - Vitamin D deficiency

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# Diagnosis

| Finding | PHPT | FHH |
|---|---|---|
| Lifelong hypercalcemia | No | Yes |
| **PTH** | **High/normal** | **Normal** |
| **Calcium** | **High/normal** | **High** |
| **25-OH Vit D** | **Normal** | **Normal** |
| 24h urine calcium | High/normal | Low |
| Calcium clearance | >0.02 | <0.01 |

↑ ↑ Ca + ↑ ↑ PTH + nl Vit D + past normal Ca

Igsogna, NEJM 2018.

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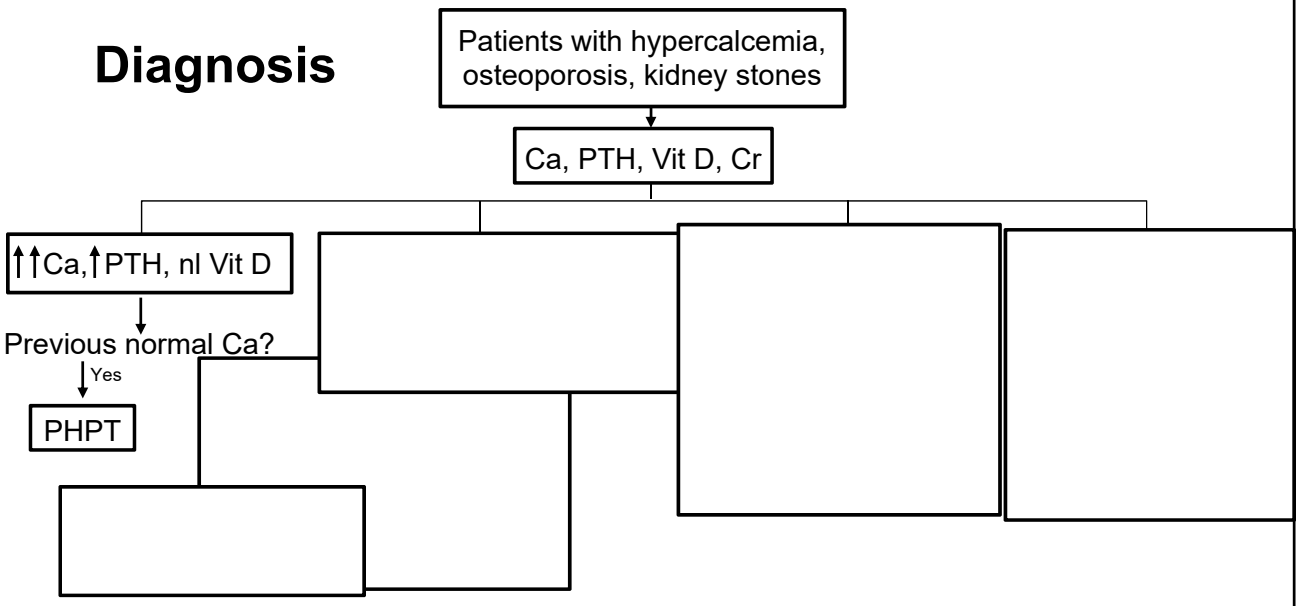
# Diagnosis

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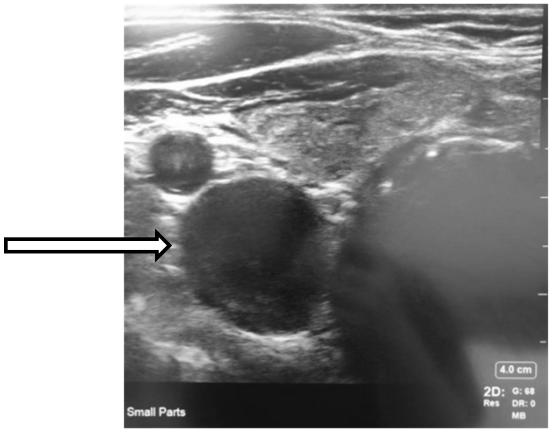
# Imaging is not necessary for diagnosis




Usually negative in 4 gland hyperplasia

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**You made the diagnosis!**

**Now what?**

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## Treatment options

1. Observation
   - 29-62% chance of progression at 10 yrs
   - Hydration, normal calcium intake

2. Medical Therapy
   - Bisphosphonates – increased BMD *AND* fractures
   - Cinacalcet – improves hypercalcemia, but not BMD/fracture/QoL, may worsen kidney stones, $$$

3. Surgery
   - Only definitive treatment : 95-98% cure rate

Khan, Osteo Int. 2016.

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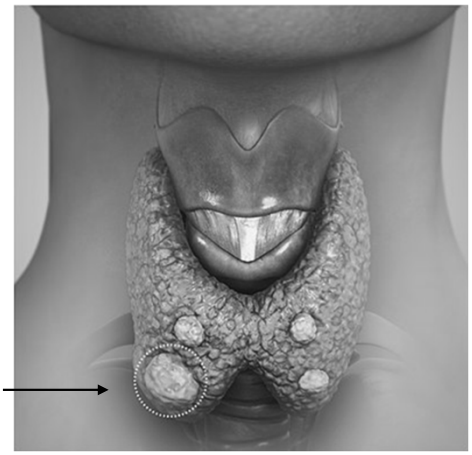


Adapted from https://www.scientificanimations.com/wiki-images/

## Who should get parathyroidectomy?

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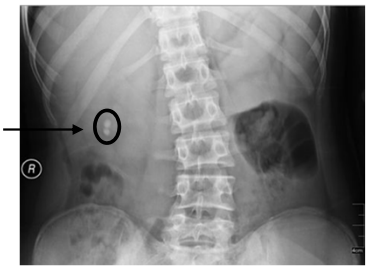
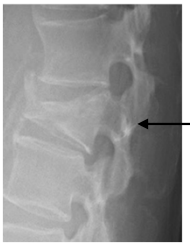
## NIH Guidelines for Parathyroidectomy

- Serum Calcium 1.0 mg/dl above normal
- Renal Criteria
  - Creatinine clearance <60 ml/min
  - 24-h urine calcium >400 mg/dl
  - Presence of nephrolithiasis or nephrocalcinosis
- Bone involvement
  - T score <-2.5 at lumbar spine, femoral neck, or distal 1/3rd radius
  - Vertebral fracture by imaging
- Age <50




Bilezikian, J Endocrinol Metab 2009.
Caillard, Surgery 2007.
Eigelberger, Ann Surg 2004.

https://commons.wikimedia.org/wiki/File:Medical_X-Ray_imaging_BNP02_nevit.jpg
https://commons.wikimedia.org/wiki/File:Balloon_kyphoplasty_for_osteoporotic_vertebral_fracture.jpg

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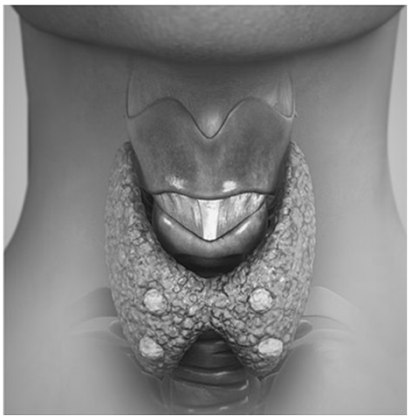
# NIH Guidelines for Parathyroidectomy

- Ignores patients with subjective symptoms, age >50, and those with mild disease
- >90% of “asymptomatic” patients have significant symptoms that are likely related to PHPT



Adapted from https://www.scientificanimations.com/wiki-images/

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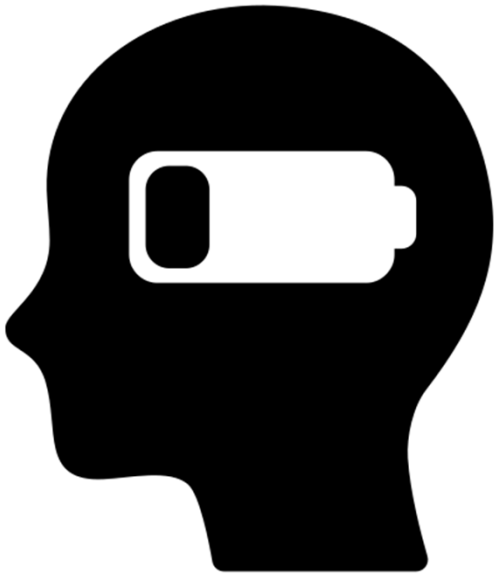

https://thenounproject.com/victorulerz/collection/mental-health-and-disorder-outline/

## Symptomatic improvement after parathyroidectomy

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# 60 year-old woman with “asymptomatic” PHPT

- No kidney stones or fractures
- +Fatigue
- +Difficulty sleeping
- +Headaches
- +Difficulty concentrating
- +Irritability
- +Depression
- +Bone pain

Bilezikian. J Endocrinol Metab 2009.
Caillard. Surgery 2007.
Eigelberger. Ann Surg 2004.

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# 60 year-old woman with “asymptomatic” PHPT

| Lab | Value |
|---|---|
| Serum Calcium | 11.0 (normal 8.5-10.5) |
| PTH | 139 (normal 10-65) |
| Creatinine | 0.97 (0.6-1.2) |
| Creatinine Clearance | >60 |
| 25-OH Vitamin D | 28.6 (normal 30-100) |
| 24-hour Urine Calcium | 296 (normal 100-300) |
| T-score | -1.2 |


https://commons.wikimedia.org/wiki/File:Switzerland-03044_-_Freddie_Mercury_(Blue_Hour)_(22943513573).jpg

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https://pixabay.com/en/woman-old-age-retirement-home-65675/ archive copy

**"Primary hyperparathyroidism is like premature aging. The symptoms are what you expect to happen with older age – it just happens sooner than you think it should."**

- Orlo Clark, M.D

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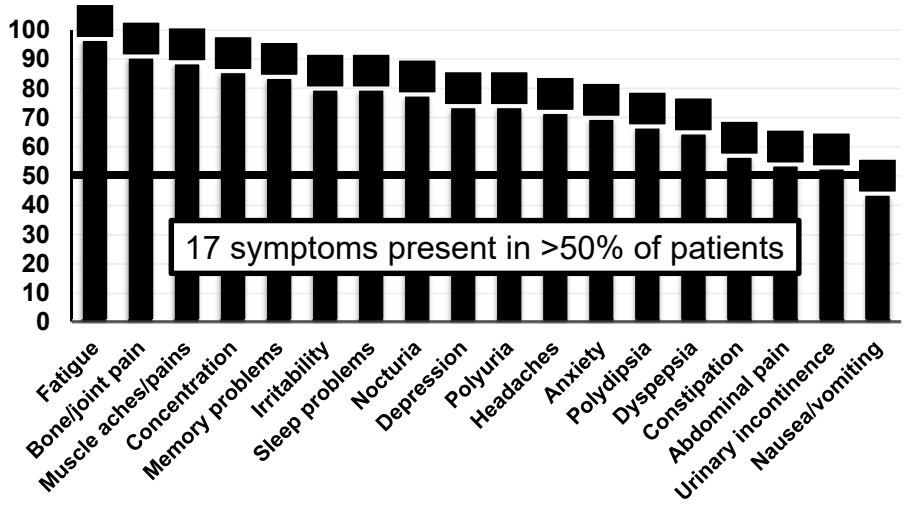
## Symptoms in patients with PHPT




No patient in this cohort was truly asymptomatic!

Murray, Surgery 2013.

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## Does calcium level predict symptoms?

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## Hypercalcemia does not predict symptoms

| No difference | Increased with Ca <11.2 | Increased with Ca ≥11.2 |
|---|---|---|
| Fatigue | Bone / joint pain | Kidney stones |
| Weakness | Depression | |
| Difficulty concentrating | Constipation | |
| Memory problems | | |
| Anxiety | | |
| Abdominal pain | | |
| Nausea/Vomiting | | |
| Heartburn | | |
| Polyuria/Nocturia | | |

Certain symptoms are more common with milder hypercalcemia

Bargren, JACS 2011.

54


**Do patients who meet NIH guidelines have more symptom improvement after parathyroidectomy?**

55

## Non-NIH patients also see improvement in symptoms

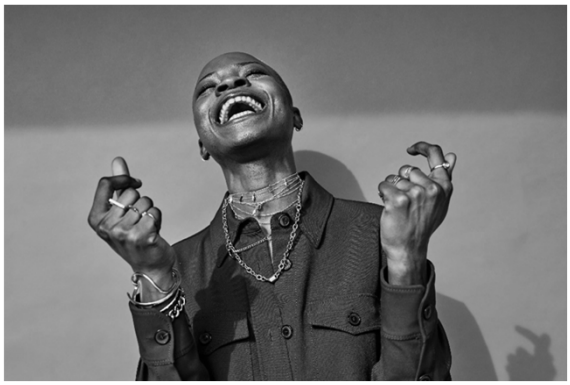
**No difference in symptom improvement between NIH and non-NIH**

| | |
|---|---|
| Fatigue | Constipation |
| Muscle aches | Dyspepsia |
| Back pain | Depression |
| Weakness | Memory loss |
| Polydipsia | Nausea |

50% of patients have improvement in 10 symptoms!

Eigelberger, Ann Surg 2004.

56



**Does parathyroidectomy improve quality of life?**

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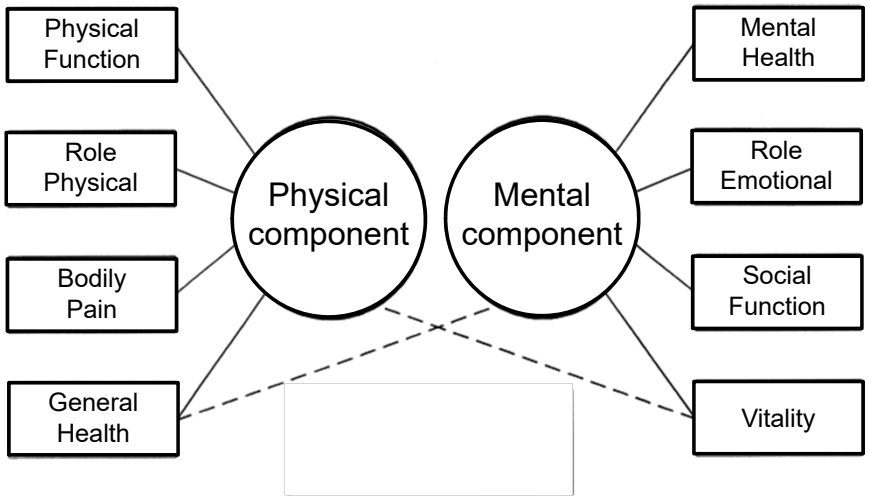
# SF-36 quality of life assessment

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# Parathyroidectomy Improves Quality of Life

| Improvement at 6 months |
| --- |
| Mental health |

| Improvements at 12 months |
| --- |
| Mental Health |
| Bodily pain |
| Physical role function |
| General health |

Ambrogini, J Clin Endocrinol Metab 2007.

59

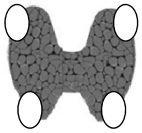
# Too good to be true?


http://www.marines.mil/unit/mcascherrypoint/PublishingImages/2009/IMG_8542.JPG

60

# Symptomatic improvement is not a placebo effect

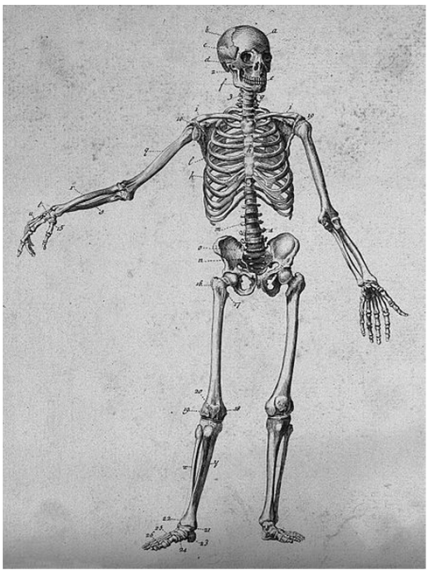
- **VS.**



| Improved with parathyroidectomy | No difference |
|---|---|
| Fatigue | Constipation |
| Muscle aches | Dyspepsia |
| Back pain | |
| Polydipsia | |
| Polyuria/Nocturia | |
| Depression | |
| Memory loss | |
| Nausea | |
| Polyuria/Nocturia | |

Eigelberger, Ann Surg 2004.

61



Wellcome Images

# Bone disease improvement after parathyroidectomy

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# Parathyroidectomy improves BMD in osteoporotic patients

| | Parathyroidectomy | Observation | |
|---|---|---|---|
| Lumbar spine | 5% increase in BMD | 2% decrease in BMD | P<0.01 |
| Total hip | 2% increase in BMD | 2% decrease in BMD | P<0.01 |

Ambrogini, J Clin Endocrinol Metab 2007.

63

https://commons.wikimedia.org/wiki/File:Ganzk%C3%B6rperDEXAscan2.jpg

# What about patients without osteoporosis?

64

# Parathyroidectomy improves BMD in normal patients

| | Parathyroidectomy | Observation | |
|---|---|---|---|
| Lumbar spine | 3.5% increase in BMD | 1% decrease in BMD | P<0.01 |
| Total hip | 3.5% increase in BMD | 1.5% decrease in BMD | P<0.01 |

Ambrogini, J Clin Endocrinol Metab 2007.

65

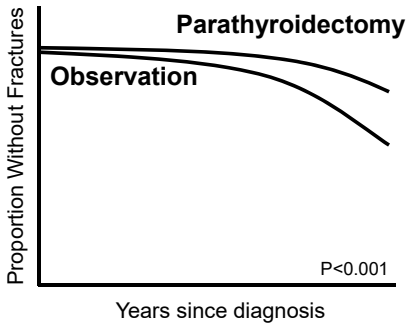
https://commons.wikimedia.org/wiki/File:Ganzk%C3%B6rperDEXAscan2.jpg

https://commons.wikimedia.org/wiki/File:Fracture_both_bones_of_the_left_arm.jpg

# Does parathyroidectomy improve risk of fractures?

66

# Parathyroidectomy improves fracture risk




At 10 yrs 41% have fx with observation vs 27% with PTX

VanderWalde, Arch Surg 2006.

67

# Fracture risk is lowest after parathyroidectomy

| | Parathyroidectomy | Observation | Bisphosphonates |
|---|---|---|---|
| Hip fracture | | | |
| 2-year | ↓ -2.8 events | 10.2 | ↑ +5.9 |
| 5-year | -16.0 | 24.9 | +14.0 |
| 10-year | ↓ -35.5 | 55.9 | ↑ +29.7 |

- Risk for any fracture is 3-10x higher
- Parathyroidectomy is associated with ↓ fracture risk
- Bisphosphonates is associated with ↑ fracture risk

Yeh. Ann Int Med 2016.

68

https://commons.wikimedia.org/wiki/File:202007_A_patient_undergoing_fracture_treatment_illustration.svg

# Bone health after parathyroidectomy

- BMD improves after parathyroidectomy
- Fracture risk improves after parathyroidectomy
- Bisphosphonates worsen fracture risk

69

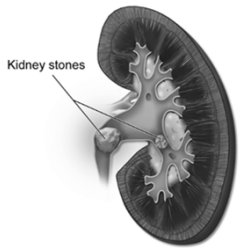
Medical gallery of Blausen Medical 2014

**Renal, cardiovascular, and mortality benefits after parathyroidectomy**

70

# Decreased kidney stones after parathyroidectomy

| | Before Parathyroidectomy | After Parathyroidectomy | |
|---|---|---|---|
| Incidence rate ratio of stones | 40.6% | 16.9% | P<0.01 |

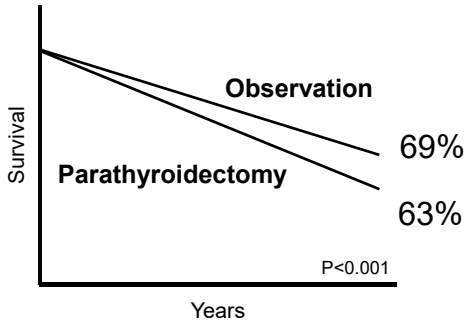


Medical gallery of Blausen Medical 2014

Mollerup, BMJ 2002.

71

# Improved mortality after parathyroidectomy



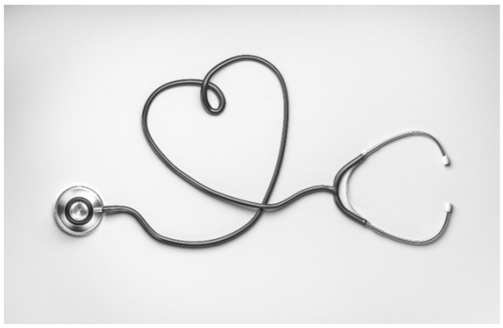

Obsevation = hazard ratio of 1.54, which is similar to untreated HTN!

Vestergaard, BMJ 2003.

72

# Renal, CV health after parathyroidectomy

- Risk of kidney stones is reduced after parathyroidectomy
- Risk of atherosclerotic CV disease is reduced after parathyroidectomy
- Survival is improved



73

# Disease progression in 5 years

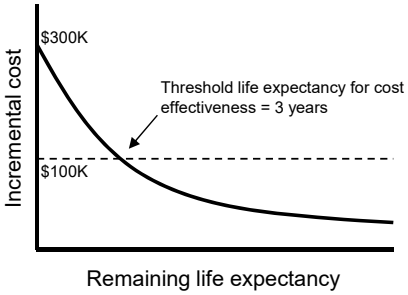
| Disease manifestation | % (n=6182) |
|---|---|
| Osteoporosis | 12% |
| Nephrolithiasis | 3% |
| Decrease in renal function | 15% |
| Hypercalciuria | 2% |

The majority of patients will meet criteria for parathyroidectomy in 5 years

Rubin JCEM 2008
Assadipour. Surgery 2019.

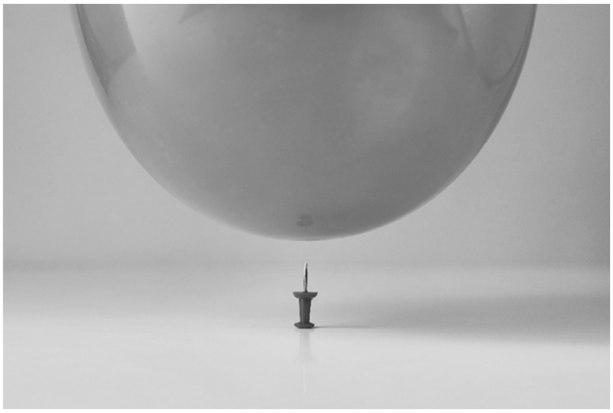
74

# Parathyroidectomy is cost-effective




Zanocco. Surgery 2017.

75



# Isn't surgery risky?

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# Surgical treatment

- Decision to operate is based on labs
  - Positive imaging is NOT required for surgery
  - Negative imaging in 20-30% of patients
  - Imaging can guide surgical plan
- Goals at surgery
  - Distinguish between adenoma vs. multi-gland disease
  - Clear neck at first operation

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# Operations

- Focused parathyroidectomy
- Four gland exploration

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# Focused parathyroidectomy

- Pre-operative localization
- Intra-operative PTH to confirm cure
  - Half-life is 4 minutes
- Advantages
  - Small incision size (2-3 cm)
  - Decreased operative time
  - Done as an outpatient
  - Less transient hypocalcemia

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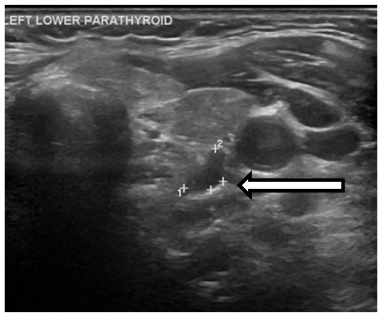
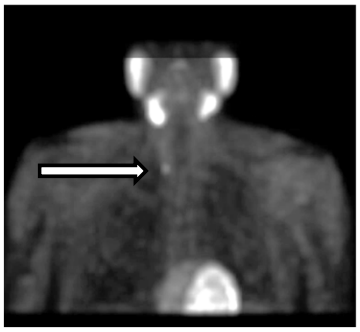
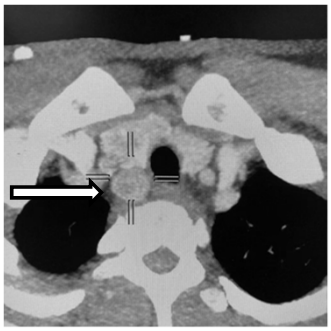
# Preoperative localization




Ultrasound



Sestamibi



4D CT

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**What if preoperative localization is negative?**

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# Four gland exploration

- All parathyroids are identified
- Only abnormal parathyroids are resected
  - 3.5 glands resected for 4 gland hyperplasia
- >95% success when performed by an experienced parathyroid surgeon
- Done as an outpatient

Adapted from
https://www.scientificanimations.com/wiki-images/

82

# Complications

- Failure to cure 1-5%
- Transient hypocalcemia
- Less than 1%
  - Hematoma
  - Recurrent laryngeal nerve injury
  - Wound infection
- Complications in elderly 5.1%
  - Cardiovascular complications 0.003%
  - Recurrent laryngeal nerve injury 0.005%


Adapted from https://commons.wikimedia.org/wiki/File:Risk_menecment.jpg

Morris, The Oncologist, 2010.

83

## 60 year-old woman with “asymptomatic” PHPT

- Underwent parathyroidectomy
  - 2-3 cm incision
  - Resection left inferior parathyroid
- Baseline PTH 200
- Post excision PTH 16
- Discharged on POD0

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## 60 year-old woman with "asymptomatic" PHPT

*"…improved recall of memory"*

*"It's the first time I can walk up the stairs without having to stop because of pain."*

*"I not only have a much better quality of life, I also have the gift of being able to be me."*

*"I can fall asleep faster & wake up not stiff"*

*"I am amazed I don't have to search for my words to communicate my ideas to others."*

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## Summary and conclusions

- PHPT is common
- Most patients are symptomatic
- Parathyroidectomy can:
  - Improve symptoms and QoL
  - Increase BMD/decrease fracture risk
  - Decrease cardiovascular risk and overall mortality
- Complication rates for parathyroidectomy are low
- Vast majority of patients benefit from parathyroidectomy


*And other things!*

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