HYPERPARATHYROIDISM: A CASE FOR SURGERY

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• No Disclosures
OBJECTIVES

Understand the indications for surgery for HPT
Highlight the benefits of surgery for HPT
Explore surgical techniques
Explore controversies
PARATHYROID GLANDS
PARATHYROID HORMONE
PRIMARY HPT

Elevated PTH. Normal or increased serum Ca
Due to:

- Parathyroid adenoma (85%)
- Parathyroid hyperplasia (15%)
- Parathyroid carcinoma (<1%)
SECONDARY HYPERPARATHYROIDISM

Caused by Renal Failure
- Elevated PTH
- Normal or low Calcium levels
- High phosphorus
- Responds to Vit D and phosphate binders
TERTIARY HYPERPARATHYROIDISM

Elevated PTH
Elevated Ca
No longer responds to Vit D
Responds to Sensipar
TYPICAL PATIENT

Hypercalcemic 56 year old woman with osteoporosis by DEXA scan.

- Ca of 10.9
- PTH 85
- T score < -2.5 at the hips
Differential Diagnosis

- Hyperparathyroidism
- Malignancy
  - Lytic metastases to bone
  - PTHrP producer
- Sarcoidosis / granulomatous disease
- Vit D deficiency
- Thiazides
- Hyperthyroidism
- Familial hypocalciuric hypercalcemia
Signs and Symptoms

- Bone loss
- Psychiatric disturbances
- Kidney disease
- Abdominal symptoms
Most common symptoms in primary hyperparathyroidism

% individuals reporting symptom

- Fatigue or exhaustion
- Muscle and bone pain
- Back pain
- Weakness
- Excessive thirst
- Frequent urination
- Constipation
- Depression
- Memory loss
- Nausea
- Itching

[Legend: Parathyroid, Controls]
Symptomatic or Asymptomatic

Symptomatic

Asymptomatic
HYPERPARATHYROIDISM
DIAGNOSTIC TESTS

- Serum Calcium
- Serum PTH
- Dexe Scan
- Urine Calcium
- Phosphorus
- Vitamin D
- KUB
- GFR
ULTRASOUND
SESTAMIBI SCAN
4D-CT
When to use 4D-CT

- Not needed in sporadic primary HPT
  - Costs more
  - No improvement in failure rate (need for reop)

- Reoperative neck
- Findings on US and sestamibi scanning are discordant or negative
- Preop imaging is poor quality


PRIMARY HYPERPARATHYROIDISM FINDINGS

- Hypercalcemia
- Elevated Parathyroid Hormone Level PTH
- Elevated Urine Ca
- Decreased Bone Density
- Normal GFR, Vit D, Normal Phosphorus, No Stones
NIH Guidelines 1990-2002-2008

- All symptomatic
- If asymptomatic
  - Serum Calcium above 1.0 mg/dL
  - GFR<60 mL/min
  - T score < -2.5 at any site and/or fracture fragility
  - < 50 years old

- Elevated urine calcium
- Creatine clearance
When monitoring is not “suitable”

- Patient requests surgery
- Consistent follow up is unlikely
- Coexistent illness complicates management
- Young age
Follow up 1-3 years

- Serum calcium
- Serum creatinine
- Repeat bone density measurement after 1 to 2 years

24 hour urine calcium
Abdominal xray

51 people on panel 2 were surgeons....
Silverberg, NEJM 1990

Bone mineral density improves after parathyroid surgery

Lumbar spine
% change in bone density

Femoral neck (hip)
% change in bone density
Parathyroid surgery improves bone mineral density in all patients with primary hyperparathyroidism

% change in bone density

Forearm

Lumbar spine

Mild disease
Severe disease
Risk of kidney stone events after parathyroid surgery

Fold risk above normal

Time

Before surgery  <1 year after surgery  1-4 years after surgery  5-9 years after surgery  >10 years after surgery
Symptoms improve after parathyroid surgery

% individuals reporting improvement

- Fatigue or exhaustion
- Muscle and bone pain
- Back pain
- Weakness
- Excessive thirst
- Frequent urination
- Constipation
- Depression
- Memory loss
- Nausea
- Itching

Parathyroid vs Controls
Weaker Evidence

• HPT = increased risk of death from cancer and CV disease
• Swedish population study found that for those over age 70 risk of death with HPT 1.5 times higher than matched controls
• Death rate improves
• Hypertension improves
• Diabetes and obesity improve
• Elderly (>80) patients enjoy same benefits


Controversies

• MIP or 4 gland exploration?
• Preop sestamibi injection?
• Routine use of IOPTH?
• Routine use of nerve stimulators?
• Low volume centers?

• Total with reimplantation or subtotal with portion of gland left in situ
• Cryopreservation
MIP
4 GLAND EXPLORATION
BENEFITS OF PREOPERATIVE LOCALIZATION

- Smaller incision
- Shorter operative time
- Different anesthesia options
- Ambulatory vs. overnight
- Decrease rate of missed or multiple adenomas (controversy)
Two Weeks Post-op

MIP

Four gland exploration
Parathyroid Adenoma
Rate of missed double adenoma too high w/MIP
4 gland exploration indicated in all patients
This saves time and money
IOPT

Finally Here!!
Used routinely in some centers
Used selectively
Re operative neck
Difficult localization
Need for Second Parathyroid Surgery is Determined by Whether or Not the Surgeon Tested All Four Parathyroid Glands at the First Operation.

Cure Rate (%) vs Years After Parathyroidectomy

- Blue line: All Four Parathyroid Glands Examined
- Red dashed line: Tumor Removed and Operation Concluded
CASE PRESENTATION

56 year old female with osteoporosis and mild symptoms
- Ca of 10.9
- PTH 85
- Sestamibi lights up in the right lower station
- US Confirms lesion in right lower station
- Hx of right thyroid lobectomy for a benign follicular adenoma 4 years ago.
At surgery…

After a brief search, a plump parathyroid “adenoma” was found right where it was supposed to be, weighed 1.2 grams and on frozen looked like parathyroid tissue but the pathologist was unsure if it was an adenoma, hypercellular or normal gland. Remainder of the right side is normal, smaller superior gland found and confirmed. The case was concluded. No IOPT available/used.
Post op…

- Ca level is 10.2
- PTH is 87
- Pathology: normal parathyroid gland

“After a century of incredible discovery, most diseases have proved to be far more particular and difficult to treat.”

- Atul Gawande
  
  *The Checklist Manifesto*
Surgical Pitfalls

- Aberrant Location: 5-10%
- Multiple Adenomas: 10-20%
- Non recurrent laryngeal nerve
- Inflammatory states
- Misleading preoperative localizations
- Misdiagnosis
- Unreliable pathology
Misleading Preoperative Studies
How to Prevent Surgical Misadventure

Do the right operation the first time

- Concordant imaging
- Concordant labs
- 4D CT if necessary
- Full neck exploration if not satisfied
- Use IOPTH
Experience at Sacred Heart

2011
128 Cases

- single adenoma
- multiple adenoma
- 4 gland hyperplasia
Primary HPT

- Outpatient: 80%
- Came back for Hypocalcemia: 0%
- Couldn't find: 0%
- Found but did not cure: 0%
Personal Experience
Community Surgeon since 2001

289 cases

- Outpatient
- Inpatient
- Found/Cured
- Did not find/cure

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Summary

**Strongest evidence (High likelihood of benefit)**
- Improved bone health
- Improved sense of well being and quality of life
- Reduction in risk of kidney stones

**Intermediate evidence (Possible benefit)**
- Improvement in muscular and skeletal complaints
- Improvement in abdominal complaints

**Weakest evidence (Benefit uncertain)**
- Improved blood pressure
- Reduced risk of diabetes
- Reduced risk of early death from cardiovascular disease
Summary

- HPT affects many organ systems of the body.
- Significant health problems are associated with the condition.
- Individuals with mild parathyroid disease and severe parathyroid disease are very similar, and likely to benefit from parathyroid surgery.
- Bone health is improved
- Kidney stone events decrease
- About 70% of people experience improvements in health-related quality of life
- Elderly individuals should not be denied this option.
- Surgical technique improvements
Thank You