Management of Recurrent Hyperparathyroidism

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Primary Hyperparathyroidism

Background

- 100,000 new cases/year in US
- 0.5-1% of general population
- More common in the elderly (up to 2%)

Highly UNDERDIAGNOSED and UNDERTREATED
Primary Hyperparathyroidism

Autonomous PTH production from one or more parathyroid glands

GOOD NEWS
80% single adenoma

CHALLENGE
20% > 1 gland
5-10% are ectopic
Surgical Treatment of Hyperparathyroidism

- **Traditional** = Bilateral Exploration
  - No preoperative imaging
  - Cure rate of 95%
  - Only localization – “a good surgeon”

- **New Standard** = Minimally Invasive Parathyroidectomy (MIP)
  - Requires accurate preoperative localization
  - Utilizes IOPTH testing to determine cure
Minimally Invasive Parathyroidectomy

The Evolution

1. Highly experienced surgeons
2. Strict patient selection- (clear localization)

Great Outcomes

Worse Outcomes

1. Less experienced surgeons
2. Expanded it to all pts. (Less obvious localization, multiple imaging studies)

- Increased reliance on preoperative imaging
- Decreased comfort and competence doing a bilateral exploration
Growing reluctance to operative on negative imaging

What Happened to:

“The only localization study you need is to find “a good surgeon”?”

Primary Hyperparathyroidism and Negative Targeted Sestamibi Scan: To Operate or Not?

Benzon M. Dy, MD, Melanie L. Richards, MD, David R. Farley, MD, and Clive S. Block, MD

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Research Question: Do Technetium-99m Sestamibi Targeted Imaging Studies Increase Preoperative Localization Assisted for Patients with Primary Hyperparathyroidism who Have Negative Sestamibi Scan Results?

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Reasons for a Failed Parathyroidectomy

1. Overlooked adenoma (ectopic or normal location)
2. Multiple abnormal parathyroid glands (hyperplasia/double adenoma)
3. Parathyroid carcinoma/parathyromatosis
4. Subtotal resection of parathyroid tumor
5. Familial disease (recurrence)
3 Questions To Ask Every Patient with Parathyroid Disease

1. Do they have primary hyperparathyroidism?
2. Would they benefit from surgical treatment?
3. What surgical approach would be best?

This is the stage that we start considering imaging.
Evaluation of Recurrent Primary Hyperparathyroidism

Do they have the disease?

1. Don’t assume the diagnosis was accurate
2. Rule out FHH (24 hr urine)
3. Ensure biochemical diagnosis is clear
Evaluation of Recurrent Primary Hyperparathyroidism

Would they benefit from treatment?

1. Do they have bone disease/kidney stones
2. Non-specific symptoms
3. Is it compromising their quality of life?
Benefits of Parathyroidectomy

1. Symptomatic Improvement
2. Improved Quality of Life
3. Improvements in Bone Mineral Density/Fracture Rates
4. Cardiac Benefits
5. Decreased Mortality
Evaluation of Recurrent Primary Hyperparathyroidism

Can you offer additional surgery?

- Review previous operative notes and pathology notes
- What glands were seen— which were removed – what is left?
- Adenoma or Hyperplasia?
- Review previous imaging
Recurrence after a Minimally Invasive Parathyroidectomy

• **Cure rate:** 6 mo=98%
• If not cured after an MIP-> bilateral exploration
• Imaging isn’t critical
• **Bilateral exploration**
  • Commit to identify all remaining glands
  • Don’t remove >1 gland until you have found all glands
  • When leaving a remnant, preferably leave a lower gland
Recurrence after an “Extensive” Bilateral Exploration

- Achieving a cure is much harder
- Important to understand what glands were found and removed
- Is this adenomatous disease or hyperplasia?
- Good localization is essential
What Imaging should you order?

*Ultrasound is the Imaging of choice*

**Neck Ultrasound**
- First line in everyone
- Clear localization
- User dependent
Parathyroid Glands on US

- Parathyroids are hypoechoic
  - range from cyst like in appearance to a similar echogenecity to the thyroid parenchyma
  - Have a single vascular pedicle
  - Can be confused with lymph nodes or hypoechoic thyroid nodules
Lower Parathyroid Glands on US

- Typical location
  - Located anteriorly (just posterior to the strap muscles)
  - Just inferior to the thyroid gland in the superior thyrothymic ligament
  - Also can be just posterior to inferior pole of thyroid
Upper Parathyroid Glands on US

- **Typical location**
  - Located posterior to the mid to upper thyroid gland
  - Medial to the carotid
  - Often fairly deep, can be retroesophageal
  - **Left**: sandwiched between the carotid and esophagus
  - **Right**: can be adjacent to the trachea
What If the US is negative? What next?

How likely is it multi gland disease?

- Mild disease
- Family history of HPT
- Lithium exposure
- History of Kidney disease

HOW MANY glands are you missing? WHICH glands are you missing?
Where can ectopic glands be?

**Upper Glands** – 4th pharyngeal pouch. Start near midline and descend posterior to the recurrent nerve into posterior mediastinum.

**Lower Glands** – 3rd pharyngeal pouch. Start in carotid sheath and migrate anterior to the recurrent nerve to the thymus.
Imaging of Recurrent Primary Hyperparathyroidism

Ideally I would like **BOTH** anatomic and functional imaging

**Anatomic Imaging**
- Neck US
- 4DCT

**Functional Imaging**
- Sestamibi Scan
- FNA for PTH
- Selective venous sampling
Combining Localization

*Sestamibi and Ultrasound*
What Imaging should you order?

Accuracy of Tests Varies

- 4D CT Scan
  - Larger neck
  - Prior neck surgery

- Tc 99 m Sestamibi
  - Concurrent Hashimotos
  - Concern about ectopic glands
What if Traditional Imaging Fails?

**Invasive Localization**

- FNA of a lesion
- Needs to be seen on US
- Send for PTH **NOT** cytology

- Selective Venous Sampling
  - Requires special expertise
  - Localizes a quadrant or area
Re-operative Parathyroidectomy

Surgical Technique

- Can usually use a “minimally invasive” incision
- Transverse 2-3 cm in length
- Incision site based on localization
- If original operation was an MIP, then do a 4-gland exploration regardless of imaging
Intra-operative Localization

Re-operative Surgery

- Intraoperative US
- Radioguidance
- Intraoperative PTH testing
- ?autofluorescence
Intra-operative Localization

Radioguided Surgery

- 1-4 hours before surgery
- 10 mCi Tc99m-sestamibi
- Gamma probe used to localize lesion in OR
Intra-operative Localization
Radioguided Surgery

Post-resection gland counts

- Scan gland after excision
- >20% background = parathyroid
- <20% background = lymph node, fat
- avoids frozen section
Intraoperative PTH Testing

1. Criteria should be more stringent for a re-operation.
2. Make sure you track how low this PTH goes, repeat again in PACU
Re-operative Parathyroid Surgery

Goals at Surgery

- Identify a target based on imaging and focus your dissection
- Resect diseased glands
- Save a portion in the fridge and check a PTH in the recovery room (may need to do an autotransplant)
Summary

1. Failure after an MIP operation is common
2. Prior to considering a reoperation, confirm the diagnosis and determine if the patient would benefit
3. Review all op notes and pathology records, figure out what is left and what is missing.
4. Strive for dual localization (anatomic and functional)
5. Utilize intraoperative adjuncts to ensure success
UW Health
Parathyroid Operative Volume

- About 1/3 are re-operative cases
- Primary operation- >50% are getting/need a bilateral exploration
Questions?

UW Endocrine Surgery Program

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