Primary Hyperparathyroidism

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Hyperparathyroidism

- An increase in parathyroid hormone (PTH) production
- Divided into Primary, Secondary and Tertiary based on the underlying pathology
- Primary – autonomous, spontaneous overproduction of PTH
- Secondary & Tertiary – usually seen as sequelae of chronic renal failure
Primary Hyperparathyroidism

- More common in women than men
- Incidence is estimated to be 25 in 100,000
- Most cases occur in the 50’s or later
- Symptoms may include:
  - Muscle weakness, constipation, bone pain, renal stones, depression
Diagnostic Workup

- Diagnosed by chemical assays often before the patient is symptomatic
  - A serum PTH level that is elevated in the presence of hypercalcemia confirms the diagnosis
- ~40% of cases are diagnosed before there is radiologic evidence:
  - osteopenia
  - subperiosteal resorption
Our Patient

- 70 year old female with a history of lymphoma
- An elevated serum calcium level was found at routine follow-up
- Further evaluation revealed an elevated PTH level
- Preoperative imaging of the parathyroid glands was obtained
Differential Diagnosis

• Causes of Primary Hyperparathyroidism:
  – Single Adenoma  80-90%
    • Involves any of the 4 glands with equal frequency
  – Multiple gland enlargement  10-20%
    • Most commonly hyperplasia
      – Usually involves all 4 glands
    • Rarely multiple adenomas
      – Involves only 2 or 3 glands
  – Carcinoma  <1%
Anatomy

Courtesy of Dr. McArdle, BIDMC
Anatomy

Courtesy of Dr. McArdle, BIDMC
Imaging Modalities

• Nuclear Medicine
  – Technitium-99m sestamibi
• Ultrasound
Nuclear Medicine

- Technitium-99m Sestamibi
  - Small radiolabeled protein taken up by metabolically active organs
  - Images taken at intervals
    - 20 minutes
    - 2 hours

Courtesy of Dr. Donohoe, BIDMC
Our Patient at 20 minutes

- 20 minute image shows diffuse uptake by the salivary glands, thyroid, and the heart
- On closer examination, there appears to be some increased signal in the right inferior parathyroid

Courtesy of Dr. Donohoe, BIDMC
Our Patient at 2 hours

- After 2 hours, there has been considerable washout
- On a coned-down view, an area of hyperintensity remains near the right inferior parathyroid

Courtesy of Dr. Donohoe, BIDMC
Our Patient at 2 hours

- Tc99m sestamibi is absorbed by the hyperactive parathyroid
- The normal parathyroid glands are inactive secondary to the hypercalcemia

White arrows point to markers

Courtesy of Dr. Donohoe, BIDMC
**Ultrasound**

- High resolution sonographic evaluation of the neck is performed
- Patient is positioned with neck hyperextended
- A 10MHz or 7.5 MHZ transducer is used for adequate penetration of the thyroid
- Normal parathyroid glands are generally not visualized

Transverse view of the thyroid/parathyroids.
- Black arrows point to the adenoma.
- C-common carotid artery

Complimentary Patient #1

- Sagital view of a large parathyroid adenoma
  - A discrete, sharply marginated, solid nodule
  - Usually oblong or teardrop shaped
  - Less echogenic than the adjacent thyroid tissue due to the uniform hypercellularity

Courtesy of Dr. McArdle, BIDMC
Complimentary Patient #1

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Courtesy of Dr. McArdle, BIDMC
Complimentary Patient #2

- Sagital view with multiple adenomas
- Same characteristics as the previous adenomas

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Courtesy of Dr. McArdle, BIDMC
Our patient

• Patient was taken to the OR for a parathyroidectomy
• The right inferior parathyroid gland appeared enlarged and was removed
• Pathology reports confirmed the diagnosis of a parathyroid adenoma
• Hypercalcemia resolved
References


• http://www.endocrineweb.com/sestamibi.html
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