SURGICAL MANAGEMENT OF THYROID/PARATHYROID DISEASE

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Pituitary, Thyroid and Parathyroid Update
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Disclaimer

- I have no financial interests with any of the companies or technologies discussed in this presentation.
Overview

- Thyroid Surgery
  - History
  - Anatomy
  - Workup
  - Thyroid Cancer Subtypes
  - Complications

- Parathyroid Surgery

- Case Studies

- Future Trends
History

- Medical treatment of goiters
  - 1600 BC – Chinese used burnt sponge and seaweed

- Surgery first discussed in 990 AD in the Middle East

- 1880-Ludwig Rehn – 1st known thyroidectomy
History

- By 1920s, fairly commonplace
- William Halstead
  - “feat which today can be accomplished by any competent operator without danger or mishap”
Anatomy

- Parathyroid
  - Paired superior and inferior
  - Inferior can be more variable in location
  - Inferior glands are ventral to the recurrent laryngeal nerve
  - Superior glands are dorsal to the nerve
Thyroid Nodule

- Palpable in up to 5% of women
  - 1% of men
- Evident by U/S in up to 68% of population
- Thyroid cancer present in 7-15% of all nodules
- Physical exam
- Incidentaloma
  - U/S, CT Scan, PET Scan

Haugen, B., et al. 2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid. Jan 2016 26(1):1-133
Nontoxic Thyroid Nodule - Symptoms

- Can Cause
  - Pressure
  - Dysphagia
  - Dyspnea

- Does Not Cause
  - Weight gain
  - Fatigue
  - Hair loss
  - In general does not cause pain!
  - Hemorrhagic cyst, thyroiditis
Indications for Thyroid Surgery

- Symptoms of compression
  - Nodule generally has to be at least 3 cm
    - Much larger nodules can be asymptomatic

- Cancer or question of cancer by FNA

- Inability to tolerate antithyroid medication/treatment in hyperthyroid state
Thyroid Nodule - Workup

- TFTs/Ultrasound
- FNA
  - Best diagnostic test
  - Establishes tissue diagnosis
  - Benign - 50-60%
  - Suspicious – 10%
  - Cancer - 5%
  - Nondiagnostic - 20%
    - Gene expression classification / 7 gene testing
      - Aims to reduce need for diagnostic thyroid surgery

Thyroid Cancer Statistics

- ACS 2018 Estimated Data
  - New Cases
    - 8th most common
      - 53,990
    - >3:1 Female to Male Ratio
      - 5th most common cancer in women

- Deaths
  - 23rd most common
    - 1,980 deaths
  - 24th is Bone and Joint cancer
  - 1:1 Female to Male ratio for deaths

American Cancer Society, Key statistics for thyroid cancer, 2018
Thyroid Cancer Statistics

- 5 yr survival (2015 NCI/SEER data)
  - Localized – 99.9%
  - Regional - 97.8%
  - Distant – 55%

- 5 yr survival by type
  - Papillary cancer (PTC) – 98%
  - Follicular – 85%
  - Medullary – 75%
  - Undifferentiated/Anaplastic – <5%

SEER stat fact sheets: Thyroid Cancer – 2016
AJCC Cancer Staging Manual 7th Edition – Thyroid
2015 ATA Guidelines for WDTC (Well Differentiated Thyroid Cancer)

- For WDTC 1.0-4.0 cm that are low risk,
  - No Extrathyroidal extension
  - Clear margins
  - Clear lymph nodes

- May consider hemithyroidectomy as being curative

- Otherwise, would consider total thyroidectomy, prophylactic central nodal dissection

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2017 AJCC Staging Manual, 8th Ed. for Differentiated Thyroid Cancer

- All patients less than 55yo with any T and N status is Stage 1
- All patients 55 yo or older with tumors <4cm confined to the thyroid have stage 1 disease
- All patients 55 yo or older with tumors >4cm confined to the thyroid have stage 2 disease regardless of LN status

Neck Dissection in Thyroid Cancer

- Central nodal dissection for WDTC
  - Area between hyoid bone, carotid artery and suprasternal notch/innominate artery
  - Decreases risk of nodal recurrence
  - Decreased risk of injury to RLN, parathyroid in re-do operations
Neck Dissection in Thyroid Cancer

- Lateral compartment should be addressed for cervical nodal metastases
- All patients with suspicious/cancer thyroid FNA need neck mapping ultrasound
Active Surveillance for Low Risk Thyroid Cancer

- Papillary thyroid cancer < 1.5 cm with no LN or other concerning U/S findings
- Surveillance U/S every 6 mo for 2 yrs then yearly
- Surgery – if there is growth >3mm, +LN or patient preference
- 11/291 (3.8%) had interval growth >3mm by 5 years
- Patients <50 are more likely to need surgery

Complications of Thyroid/Parathyroid Surgery

- Bleeding (0.5-2%)
- Recurrent laryngeal nerve injury
  - Temporary (3%)
  - Permanent (0.5-8%)
- Hypoparathyroidism/hypocalcemia
  - Temporary (25-40%)
  - Permanent (1-9%)
- External branch superior laryngeal nerve injury (up to 56%)
- Complications are inversely related to surgeon volume

Meltzer C., Otolaryngology Head and Neck Surgery. 2016: 155 (3) 391-401
Complications of Thyroid Surgery

- Bleeding (0.5-2%)
  - Can cause dysphagia, airway compression
  - Treating team should be immediately notified with any question
  - If patient is in extremis, the incision should be opened immediately
    - Suture removal kit should always be at the bedside

RLN Injury

- Unilateral
  - Breathy, hoarse voice
  - Initially can be in paramedian position with relatively normal voice
  - Can get worse over days/weeks
  - Aspiration
  - Dysphagia

- Bilateral
  - Airway obstruction/Distress

Intraoperative Nerve Monitoring

- **Benefits**
  - Helps to confirm nerve anatomy
  - May help to decrease operative time

- **Con**
  - Studies are equivocal
  - Equipment malfunctions
RLN Injury

- **Diagnosis**
  - Laryngoscopy
  - EMG

- **Prevention**
  - 0.2-2% - if nerve is identified
  - 4-6% if nerve is not identified
  - 2-12% for repeat surgery

External Branch Superior Laryngeal Nerve injury

- Symptoms
  - Can’t sing/raise pitch
  - Choking
  - Aspiration

- Diagnosis
  - Rotated larynx
  - Loss of sensation on affected side

- Treatment
  - Voice therapy
Hypoparathyroidism/
Hypocalcemia

- Transient hypocalcemia 25-40%
- Permanent hypoparathyroidism occurs in 1-3%
- Percentage is inversely correlated with surgeon experience
- Treatment is oral calcium supplementation and Vitamin D
- Greater than 6 months is considered permanent
- Recombinant PTH - off label

Primary Hyperparathyroidism

- Hyperparathyroidism
- Symptoms
  - Fatigue, bone pain, depression, GERD, kidney stones, osteoporosis, hypertension, mental fogginess
  - Only 20% are symptomatic
- 1% of adult population
  - 2% above 55 yo
- 3 F : 1 M


Hyperparathyroidism

- **Primary Hyperparathyroidism**
  - Elevated PTH and Ca
    - 90% - Single Adenoma
    - 5% - Multiple Adenomas
    - 5% - 4 gland hyperplasia
    - <1% - Parathyroid cancer

- **Tertiary Hyperparathyroidism**
  - After prolonged secondary hyperparathyroidism
    - Kidney failure – inability to convert Vit D
    - Failed medical tx
Elevated PTH, Normal Calcium
- 10-15% - PTH levels at high range of normal
  - All other causes need to be ruled out
    - Vit D deficiency, low Ca intake, GI, Renal, hypercalciuria
  - 22% become hypercalcemic
- Need monitoring

Guidelines for Treatment

- 2 governing bodies
Consensus Surgical Indications for Symptomatic Primary Hyperparathyroidism

- Kidney Stones
- Osteoporosis
- Fragility fractures
Consensus Surgical Indications for Asymptomatic Primary Hyperparathyroidism

- 1.0 mg/dL above the upper limit of the reference range for serum calcium
- Creatinine clearance < 60 ml/min
- 24 urine Ca > 400 mg/day
- Age younger than 50 years
Additional recommendations (strong) for surgery (AAES)

- Suspected Parathyroid carcinoma
- Patients are unwilling/unable to comply with surveillance
- Patients with neurocognitive or neuropsychiatric symptoms attributable to pHPT
- Ideally should be conducted by those who perform >10 cases/year
- Operative management is more effective and cost effective than long-term observation or pharmacologic therapy
Parathyroid Surgery

- **Surgical Treatment**
  - **Standard approach**
    - All 4 glands are explored and identified
  - **Minimally invasive approach**
    - Abnormal gland is localized and surgery is directed
    - Intraoperative PTH levels can be checked
  - **Radioguided parathyroidectomy**
    - Gamma probe
  - **Preoperative localization**
Parathyroid Surgery

- Preoperative Imaging
  - High definition Ultrasound
  - Sestamibi/SPECT CT Scan
  - CT Scan/MRI
    - 4D CT Scan
  - Helps to localize disease

- Decreases operative time and exposure

- Faster recovery

- 95% Surgical Cure rate, 83% after reoperation
Parathyroid Surgery

- 4 gland hyperplasia
  - 3.5 glands are removed
  - 0.5 gland is left or reimplanted in easily accessible muscle

- Ectopic glands, 3 or 5 glands
  - Retroesophageal, thymus, carotid sheath, anterior and posterior mediastinum

- Parathyroid Carcinoma

- Familial Hyperparathyroidism
Parathyroid Surgery

- Risks
  - Recurrent laryngeal nerve injury (0.1-5%)
  - Postoperative Hypocalcemia (1-30%)
    - 4 gland exploration, 4 gland hyperplasia, “Hungry bone syndrome”
    - Numbness, tingling, Chvostek’s sign
  - Failure to cure disease (5%)

- Outcomes
  - Failure to improve symptoms

Parathyroid Surgery - Outcomes

Case Study 1 - Thyroid

- 69 yo retired RN with long history of a substernal goiter
- Worsening dyspnea, orthopnea, dysphagia
- Followed by endocrine (not here)
  - Recommended not to have surgery given size
- Eventually sought care herself
Case Study 1 - “Thyroidzilla”

- OR – Substernal thyroidectomy, limited sternotomy
- 2 day hospitalization
- 2 week recovery
- Normal voice and calcium
- Normal swallowing and breathing
- Hiking at 1 month
Case Study 2 - Parathyroid

- 28 yo M with several month h/o enlarging facial mass
- Vague constitutional symptoms
Case Study 2- Parathyroid

- Lateral rhinotomy approach
- Subtotal maxillectomy, partial palatectomy
Case Study 2 - Parathyroid

- Post-op
  - Routine Ca was elevated
  - Ionized Ca – 1.91
  - PTH – 917

- Path
  - Brown tumor – Giant Cell tumor
  - More commonly seen in Africa

- Return to OR for neck exploration
Case Study 2 - Parathyroid

- Bilateral adenomas
- Intra-op PTH 917-579–84
Commonly asked Questions
Thyroid/Parathyroid Surgery

- Incision length
  - 4-5 cm for thyroid
  - 2.5-4 cm for parathyroid

- Operative time (removal of gland)
  - Hemithyroid - 40 min
  - Total thyroid – 75 min
  - Parathyroid – 15 min

- LOS
  - 1 day for total thyroid
  - Outpatient – hemithyroid, parathyroid

- Recovery/Return to work
  - < 1 wk. Minimal discomfort
Commonly asked Questions
Thyroid Surgery

- Can just the nodule be removed?
  - Almost always, no.

- Do I need to be on thyroid medication if half my thyroid is removed?
  - 2015 ATA guidelines – 24% of patients need replacement medication

- Am I going to feel the same if I need replacement medication?
  - In general, yes but 10-20% of patients initially have a difficult time with dosing
Future of Thyroid Surgery

- Personalized Medicine
  - BRAF, Afirma

- Trend towards less aggressive treatment of WDTC
  - Hemithyroidectomy instead of total thyroidectomy
  - Forego radioactive iodine ablation
    - Dependent on risk stratification

- Improved monitoring of the external branch of the superior laryngeal nerve (EBSLN)

- Recombinant PTH for hypoparathyrodism
Conclusion

- Thyroid and parathyroid surgery can be a safe and rewarding surgery for patients
- Indications for thyroid and parathyroid surgery are well studied
- Care pathways are continuously defined through the American Thyroid Association (ATA)
- Coordination of care with endocrinology and surgery can provide the best outcome for patient
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