Using Neck US for Pre-Operative Surgical Planning

R. Mack Harrell MD, FACP, FACE, ECNU
Memorial Center for Integrative Endocrine Surgery
Hollywood, Weston and Boca Raton, Florida
The Case That Built Us 2009

• 44 year old pastor of a Ft. Lauderdale church noted to have a 3.2x2.2x1.8 cm R thyroid mass on exam and fullness in the R neck

• Outside FNA demonstrates papillary Ca in the thyroid nodule

• Three hospital US’s performed pre-operatively reveal no evidence for lateral malignant nodes
Ultrasound # 1

• “The right lobe measures 5 x 2.5 x 2.0 cm in size. The left lobe measures 4.8 x 1.9 x 2.3 cm in size. In the mid portion of the right lobe, there is a solid nodule measuring 3.2 x 2.2 x 1.8 cm in size. The nodule is indeterminate and biopsy is suggested unless otherwise clinically indicated.”
Conclusion: “A 3.3 cm heterogeneous nodule in the right lobe of the moderately enlarged thyroid gland. No other focal lesion demonstrated. Adjacent to the thyroid is a group of lymph nodes having benign architecture and representing the palpable abnormality indicated by the patient.”
Post Operative Peculiarities

• 11/11 central neck nodes positive for papillary cancer metastases
• 2 cm R thyroid papillary cancer primary in a Hashimoto’s Gland
• Patient placed on Cytomel with 3 week post op quantitative thyroglobulin of 106
• Patient continued to describe a fullness in R neck
Lymph Node Mapping
Outcome

• Patient returns to the OR on 10/13/2009
• Selective right lateral neck dissection in levels 2-4 with 9 of 19 LN’s positive for papillary cancer
• Level 5 clean
• 1 week post op TG 0.9 with low titer TG abs
• Patient subsequently received 200 mCi of RAI after thyroid hormone withdrawal
• Post RAI TG 0.4 with ab titer near normal
2018- Ten Years Later

• Still preaching, now in Texas
• US is clean 7/2018
• TG <0.2 by LCMS with TG abs 10- 8/2018
• 7000 thyroid nodule and parathyroid patients later
  DNB and I are are still working together
Papillary Thyroid Cancer and Lateral Lymph Node Metastasis

• Retrospective South Korean study of 245 patients who underwent Tx and Central Lx or Tx with Central and Lateral Lx based on imaging

• Cervical LN mets in 26.5% overall

• Cervical LN mets in the lateral neck-15%

• Skip metastasis in 7.7% -no central LN’s, just lateral

• MUST IMAGE LATERAL NECK PRIOR TO THYROID CANCER SURGERY !!!!

We do neck ultrasound – not thyroid US

All of the anterior and lateral neck is evaluated, not just the thyroid

We integrate imaging, biopsy and on site adequacy testing with endocrine surgery

Focused and shorter surgical procedures, requiring less invasion and less anaesthesia

Minimize unnecessary surgery
Thyroid Cysts and Funny L Level 3 LN

• 56 yo Hasidic Jewish male presents with thyroid nodularity discovered incidentally on MRI eval for neck pain

• US reveals bilateral complex cystic disease RLP and LLP with calcifications and a peculiar L level 3 complex cystic LN

• FNA R and L complex cysts to Veracyte “Favor benign (cystic) with abundant colloid and macrophages but no thyrocytes”
FNA R Complex Calcified Cyst
Thyroid Cysts and Funny L Level 3 LN

- FNA L level 3 LN to hospital cytology: “Blood, histiocytes and proteinaceous fluid- no lymphocytes or epithelial cells present”
- TG on L level 3 LN 222
- S/P Tx with central and L lateral LN dissection 11/19/2011 for multifocal cystic papillary thyroid carcinoma (predominantly classic features) with extra-thyroidal extension and lymphovascular invasion. 19 of 46 lymph nodes demonstrate metastatic disease (mostly central LN's). One left lateral compartment lymph node (level III) contains metastatic papillary thyroid carcinoma. The remainder of the lymph nodes in the left lateral compartment are free of metastatic disease.
Eight Years Later

• Patient is disease free by neck US and TG 0.2, no abs
• A correctly executed first thyroid cancer surgery is your best chance to render patients disease free
• No amount of radioactive iodine can fully make up for a poorly executed first surgery
• The imaging endocrinologist’s job is to make his or her endocrine surgeon’s first neck surgery the patient’s last
We Do Neck Ultrasound

- Evaluate the entire anterior neck
  - Thyroid measurements- length, width and depth
  - Thyroid abnormality search- 13 images at a minimum
    - 6 in each lobe, one transverse isthmus at a minimum
  - Nodule evaluation- location, characteristics, vascularity
  - Central and lateral LN assessment 2,3,4,5, 6
  - Midline neck eval- thyroglossal duct remnants, low isthmic nodules, pyramidal lobes
  - Other neck anomalies: vascular, neural, developmental cysts, salivary, thymic
• Sent for pre-surgical evaluation

• No previous history of thyroid disease
My US, On Site Cytology and Map
Never Accept An Outside Radiology Report When You Are Guiding Surgery

- This was diffuse sclerosing PTC in an 18 year old
- Patient underwent Thyroidectomy with Central and Lateral LN dissection for lymph nodule positive disease centrally and laterally
- Tg abs 758 post op 8/2016, 75 6/2018, 61 8/2018
- He subsequently received a thyroid bed ablation with 102 mCi RAI after Thyrogen and is under follow-up at Sloan Kettering in NYC by Mike Tuttle
Regions of the Anterolateral Neck
Hypercalcemia 9 Years after Bariatric Surgery

- 52 yo obese female (BMI 48) S/P Roux-en-Y gastric bypass in 2005 sent to DNB with:
  - Neurocognitive symptoms
  - Calcium 11.0
  - PTH 106 (nml 15-65) with an estimated GFR 92
  - 25OHD 22
  - DEXA fem neck T score -1.8
  - Urine calcium- not low (>100 mg per 24 hrs)
  - Outside gamma camera Sestamibi RLP parathyroid tracer uptake 12/2013
Parathyroid Localization
Anaesthesia Planning
• MAC anaesthesia
• LLP parathyroid adenoma 540 mg easily located and removed
• PTH Post removal 18
Excised Parathyroid Gland
Pearls

• Everything that smells like hyperplasia is not necessarily hyperplasia
• Sestamibi scanning has a high false negative and false positive rate
• Superficial lower pole glands in the thyrothymic ligament can be done under MAC anaesthesia with local and only an upper airway breathing apparatus-no laryngeal intubation
Parathyroid Disease and Thyroid Cancer Occasionally Co-Exist

Liverpool Australia Retrospective Review 1993-1998

- 26 of 65 HPT surgery cases had co-existent thyroid nodules
- 4 of 65 (6%) had co-existent Pap Ca
- Campbell, P. Thyroid pathology associated with primary HPT. Australian and New Zealand Journal of Surgery 70:4; 2000. pages 285-287
When Evaluating HPT Patients with Thyroid Nodules

• Think MEN II

• Strongly consider checking serum calcitonin if you are not FNA’ing thyroid nodules because of small size
Lobe vs Complete Thyroidectomy Decision-Making

**Lobe**
- Unilateral follicular lineage tumor
  - No microcalc
  - Typically hypervasc
  - Clean boundaries, no invasion
  - No suspicious contralateral central nodes or lateral nodes
- Hx of non-adherence to medication regime
- Malabsorptive bariatric surgery with mineral deficiencies
- Preference for generic LT4
- Small unilateral PTC without metastatic nodes on US
- Very large unilateral goiter with tracheal displacement and a small or inobtrusive contralateral lobe
- Contralateral RLN injury
- Patient preference

**Complete Tx**
- MTC (with at least a central neck dissection)
- Suspected PTC Variant
- Multiple genetic abnormalities
- PTC in diffusely damaged Hashimoto’s gland
- Recurrent nerve involvement
- Invasion on CT or US
- TSH greater than 3 pre-surgery
- In general, if you have a strong suspicion that you will be treating with RAI after surgery (distant metastatic disease)
- Patient preference
Improvizizational Case

• 63 yo bf presents with an enlarging isoechoic 2 cm avasc mass in a pyramidal lobe
• FNA 4 years previous was benign by Veracyte when the nodule measured 1.4 cm
Surgical Discussion

• Patient was euthyroid and had negative thyroid abs
• Her number one priority was: “No thyroid hormone”
• We offered “Pyramidal Lobectomy”
Pathology

• 2 cm FV of PTC (infiltrative) with penetration to the inked margin and not beyond

• Pt offered completion Tx and she refused

• 2 years later TG’s:
  • 6/2017 5.4
  • 12/2017 11.7
  • 4/2018 9
  • 5/2019 –Pending

• US- no evidence of recurrence
Summary

• So much depends on active conversation between endocrinologists and endocrine surgeons prior to thyroid and parathyroid surgery

• The endocrinologist/endocrine surgeon relationship is a marriage-cultivate it

• The relationship centers on reliable neck ultrasound expertise

• When performing neck US to plan for thyroid and parathyroid surgery, think like a surgeon and image the central and lateral neck

• The best relationships allow endocrinologists and endocrine surgeons both to say: “No”
  • To each other
  • To referring doctors and
  • To patients

• Only asking for endocrine consultation after thyroidectomy is not only sub-optimal care, it is a bad business model