

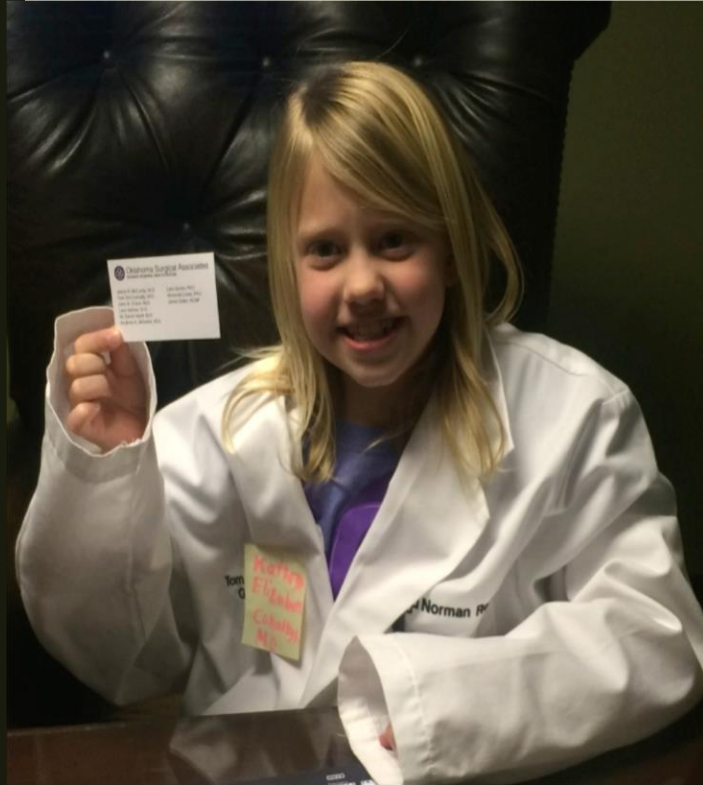
Surgical Management of Thyroid Disease

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Norman Regional
HEALTH SYSTEM

Disclosures



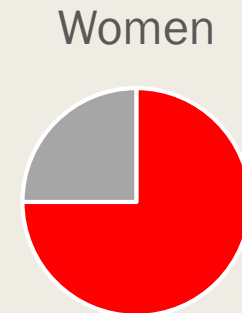
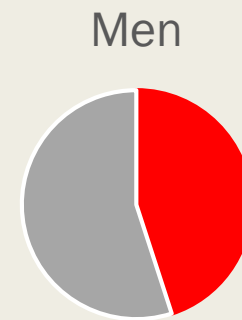
- Speaker Bureau:
 - *Veracyte*
 - *Castle
Diagnostics*

Objectives

- Understand the role of ultrasound and FNA in managing thyroid cancer
- Review surgical management of thyroid cancer
- Outline follow up for patients with thyroid cancer and thyroid nodules

Goal: Identify most clinically significant cancers while reducing biopsies and surgeries on benign nodules¹

- Most nodules are benign or indolent -- goal is not 100% diagnosis
- 68% of hi-resolution ultrasound will discover a thyroid nodule
- 98% of cancer has 10 year survival
- Overtreatment defined as intervention on thyroid tumors that would not result in symptoms or death if left alone²



1. Tessler FN, et al. *J Am Coll Radiol* 2017
2. Vaccarella S, et al *NEJM* 2016

Case: Incidental Thyroid Nodule

- 40 yo female otherwise healthy
- CT chest in ER
 - *Not palpable on physical exam*
- TSH normal at last office visit 1 month ago
- Follow up ultrasound right 1.5 cm nodule, left lobe normal

Next steps in management?....

Missing information:

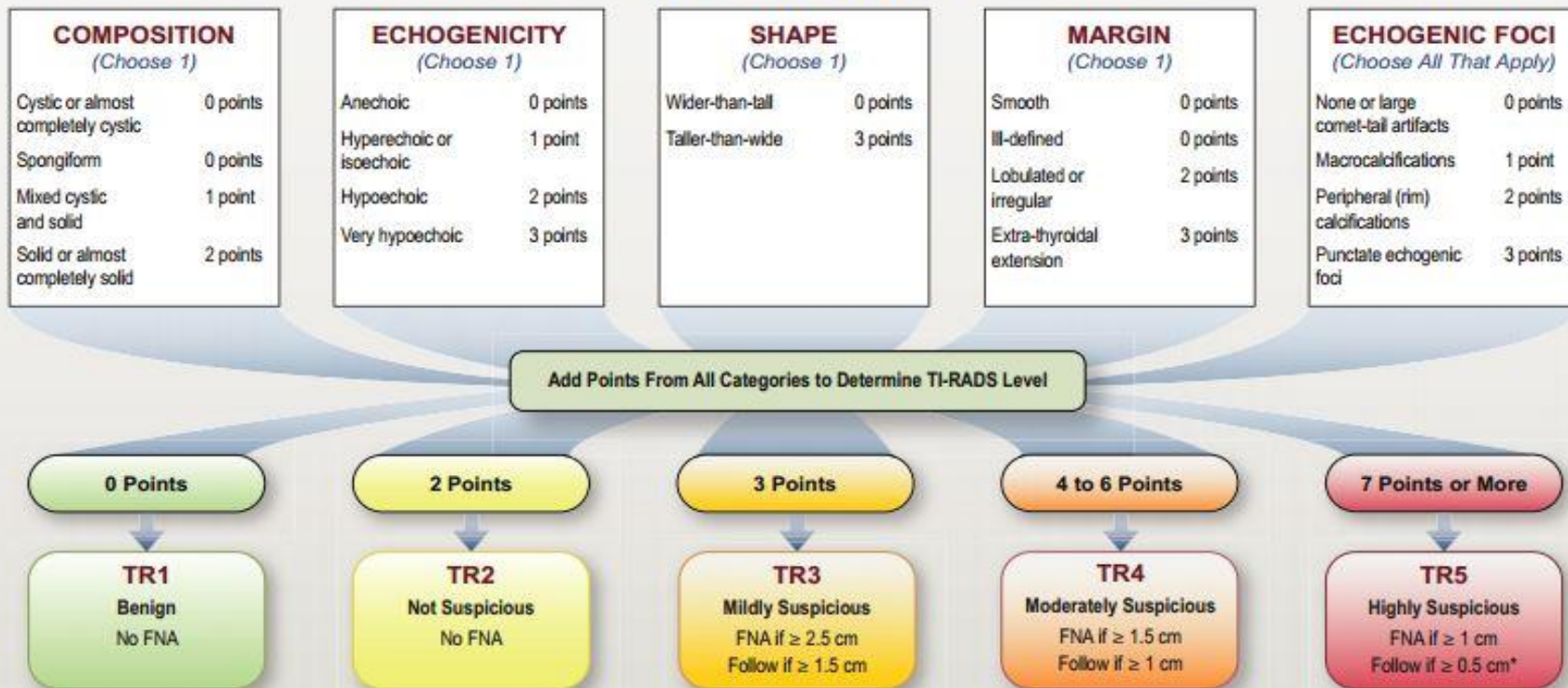
- **Ultrasound features of the nodule**
- **Status of anterior cervical chain and central neck lymph nodes**
- **Pertinent personal/family history**
- **Patient preference**

Role of Thyroid Function Tests

- Only need a TSH level
- TSH level directs management of thyroid nodules
- Most patients euthyroid
- For a normal TSH or elevated TSH proceed with FNA as indicated by ultrasound findings
- Low TSH suggests hyperthyroidism
 - *Workup with further labs and imaging before FNA*
 - *FNA of a functional nodule not indicated as risk of malignancy low*

TiRADS Scoring

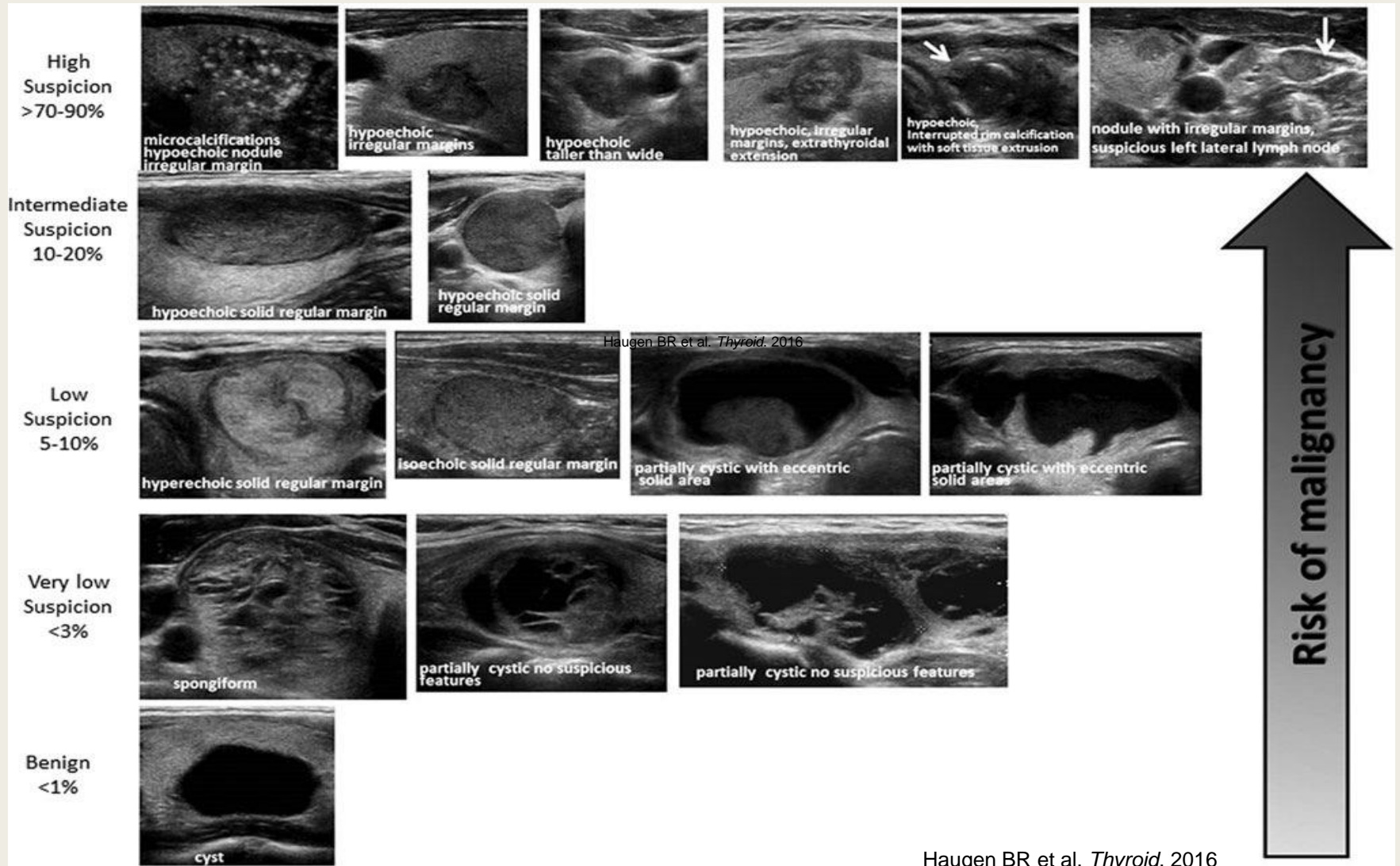
ACR TI-RADS



COMPOSITION	ECHOGENICITY	SHAPE	MARGIN	ECHOGENIC FOCI
<p><i>Spongiform</i>: Composed predominantly (>50%) of small cystic spaces. Do not add further points for other categories.</p> <p><i>Mixed cystic and solid</i>: Assign points for predominant solid component.</p> <p>Assign 2 points if composition cannot be determined because of calcification.</p>	<p><i>Anechoic</i>: Applies to cystic or almost completely cystic nodules.</p> <p><i>Hyperechoic/isoechoic/hypoechoic</i>: Compared to adjacent parenchyma.</p> <p><i>Very hypoechoic</i>: More hypoechoic than strap muscles.</p> <p>Assign 1 point if echogenicity cannot be determined.</p>	<p><i>Taller-than-wide</i>: Should be assessed on a transverse image with measurements parallel to sound beam for height and perpendicular to sound beam for width.</p> <p>This can usually be assessed by visual inspection.</p>	<p><i>Lobulated</i>: Protrusions into adjacent tissue.</p> <p><i>Irregular</i>: Jagged, spiculated, or sharp angles.</p> <p><i>Extrathyroidal extension</i>: Obvious invasion = malignancy.</p> <p>Assign 0 points if margin cannot be determined.</p>	<p><i>Large comet-tail artifacts</i>: V-shaped, >1 mm, in cystic components.</p> <p><i>Macrocalcifications</i>: Cause acoustic shadowing.</p> <p><i>Peripheral</i>: Complete or incomplete along margin.</p> <p><i>Punctate echogenic foci</i>: May have small comet-tail artifacts.</p>

*Refer to discussion of papillary microcarcinomas for 5-9 mm TR5 nodules.

ATA Ultrasound Stratification



Comparison of TIRADS to ATA

U/S Risk Stratification & FNA Recommendations

>1cm U/S @ ≥2y <1cm no f/u needed	Consider repeat scan @ 1-2y			Repeat scan @ 6-12m	U/S F/U
≥ 2.0cm	≥1.5cm	≥1cm	≥1cm		FNA threshold
Very Low (<3%)	Low Risk (5-10%)	Int. Risk (10-20%)	High Risk (70-90%)		ATA
TR1 (2%) Benign	TR2 (2%) Not Suspicious	TR3 (5%) Mildly Suspicious	TR4 (5-20%) Moderately Suspicious	TR5 (>20%) Highly Suspicious	ACR-TIRADS
No FNA	≥2.5cm	≥1.5cm	≥1cm		FNA threshold
No f/u scans necessary	Scans at 1, 3, & 5y	Scan at 1, 2, 3, & 5y	Annual scans for up to 5 years		U/S F/U

- Biopsy most suspicious regardless of size and no more than 2
- Hard to find a system to include all pattern combinations possible

Ultrasound Summary

- Expect to see ATA or TIRADS format in ultrasound reports
- Use the associated recommendations for nodule management and follow up
- Cervical LN status important in the management of thyroid cancer—make sure there are comments in the ultrasound report regarding lymph node status

Case Continued:

Incidental Thyroid Nodule – TIRADS update

- 40 yo female otherwise healthy
- CT chest in ER
 - *Incidental thyroid nodule – not palpable on physical exam*
- TSH normal at last office visit 1 month ago
- Follow up ultrasound dominant right 1.5 cm nodule, left lobe normal

- U/S revision using TIRADS

- Right lower lobe 1.5 cm, TR4 mod suspicious
- No suspicious lymphadenopathy
- ATA equivalent would be an intermediate risk
- Both guidelines same recommendation: proceed with obtaining tissue to aid in diagnosis, FNA

FNA/Cytology

Non-Diagnostic Definition:

At least 6 well-visualized follicular cell groups with ≥ 10 epithelial cells in each group, preferably on same slide¹

**60-80% get dx on repeat FNA;
most benign**

Rates should be <10%* (per NCI)²

NOT the same as indeterminate, which is a specific result based on cell morphology and NOT due to a sampling issue.

Rate Can Depend On³:

- Skill of operator
- FNA technique (SPATULA)
 - Size of needle (25-27 gauge)
 - Pass number (2-4)
 - Alternating molecular with cytology passes
 - Time in nodule (3-5 seconds)
 - Ultrasound gel (wipe off insertion site)
 - Location (room set up)
 - Angle (Tangential to allow needle to remain visible)
- Preparation of cytology specimen itself
 - Smear more variable than liquid based cytology

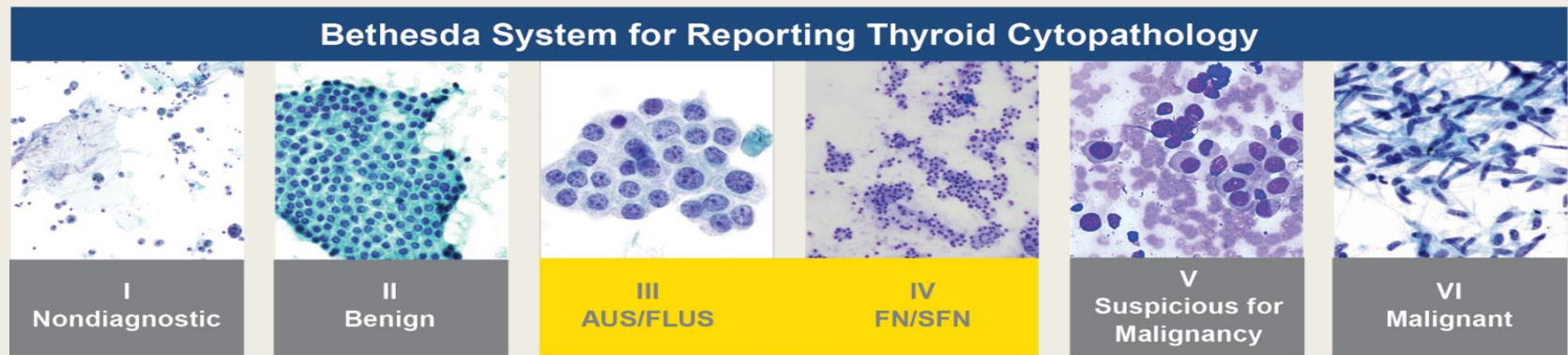
1. Haugen BR et al. *Thyroid*. 2016

2. Pitman MB, et al. *Diagn Cytopathol*. (2008), 36(6).

3. Baloch ZW, et al. . *Cytojournal*. 2008 Apr 7;5:6.

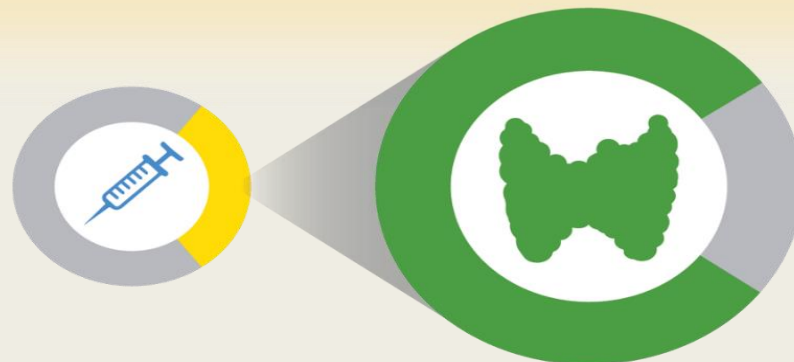
FNA Cytopathology: Avoid diagnostic thyroid surgery is the goal

ATA Recommendation #9 — FNA cytology should be reported using Bethesda System for Reporting Thyroid Cytopathology¹



Indeterminate

Published guidelines state cytopathology delivers indeterminate results in **~15-30%** of thyroid cases.¹



These patients often undergo diagnostic thyroid surgery. **70–80%** of nodules in these cases are ultimately found to be benign.^{2,3}

1. Haugen BR et al. *Thyroid*. 2016
2. Wang CC, et al. *Thyroid*. 2011.
3. Bongiovanni M, et al. *Acta Cytologica*. 2012.

Bethesda Cytology Reporting

Class: Diagnostic category	Cancer Risk (if NIFTP = cncr)	Management
I: Non-diagnostic/ Unsatisfactory	5-10%	Repeat FNA with U/S
II: Benign	0-3%	Follow
III: AUS/ FLUS	10-30% (6-18%)	Repeat FNA, lobectomy, or molecular
IV: FN/ SFN (specify HC)	25-40% (10-40%)	HT or molecular
V: SFM	50-75% (45-60%)	TT or HT*
VI: Malignant	97-99% (94-96%)	TT or HT

***mutational testing may be considered to aid surgical decision making (2015 ATA)**

1. Haugen BR et al. *Thyroid*. 2016

FNA/Cytology Summary

- “FNA is the procedure of choice in the evaluation of thyroid nodules, when clinically indicated”
- Bethesda criteria should be utilized in reporting cytology
 - *Indeterminate category is not the same as non-diagnostic*
- Accuracy may be diminished on repeat FNA

Bethesda Categories I, II, V, & VI

- Performance is high with clear action

Bethesda Categories III & IV (Indeterminate)

- Molecular testing may be used to supplement malignancy risk assessment
- Clinical considerations, U/S features, and patient preference should be considered

Molecular testing

- No FDA oversight in this field
- Rule out: identify benign patients for observation
- Rule in: identify those with high risk of malignancy
- Clinical utilization focused on Bethesda classes III and IV
- DNA, micro RNA, messenger RNA are all targets in the 3 tests currently available
- Products available: Thyroseq, Afirma, Interpace

Case Continued

Incidental Thyroid Nodule: Cytology

- FNA Bethesda III, AUS
- Patient preference
- Ultrasound findings
 - *Including LN status*
- Family/personal history
 - *Previous surgery for breast cancer, now disease free*
- Patient preference
 - *Our patient wished to proceed with surgery due to history of cancer*

Management Options Include:

Repeat FNA
Diagnostic Lobectomy
Molecular testing
Surveillance

Thyroid cancer

- 98% survival at 10 years—excellent prognosis for most
- Survival implies over treatment
- Surgery is the primary mode of therapy
- Observation for some patients is an option for some patients
- Differentiated thyroid cancer most common (>90%)¹
 - *Papillary* 85%
 - *Follicular* 12%
- Anaplastic <3%
- Medullary 1-2% ²

1. Haugen BR et al. *Thyroid*. 2016

2. *Thyroid* 2015; 25 (6): 567

Find a Specialist

- Endocrinologist or Endocrine surgeon
- Like all malignancies best managed using multidiscipline approach
- Less aggressive surgery (partial vs total) subjects patients to few complications without change in survival
- Low volume surgeons
 - *More thyroid surgeries performed by low volume surgeons than by high volume surgeons*
 - *American Association of Endocrine Surgeons (AAES) recommends >50 cases per year for high volume*

Surgical management of differentiated thyroid cancer

- ATA recommendation #35 (A):
- For patients with thyroid cancer >4 cm, or with gross extrathyroidal extension (clinical T4), or clinically apparent metastatic disease to nodes (clinical N1) or distant sites (clinical M1), the initial surgical procedure should include a near-total or total thyroidectomy and gross removal of all primary tumor unless there are contraindications to this procedure.
- If anterior cervical chain LN positive—concomitant modified neck dissection. Same for central neck compartment

Surgical management of differentiated thyroid cancer

- ATA recommendation #35 (B):
- For patients with thyroid cancer >1 cm and <4 cm without extrathyroidal extension, and without clinical evidence of any lymph node metastases (cN0), the initial surgical procedure can be either a bilateral procedure (near-total or total thyroidectomy) or a unilateral procedure (lobectomy)
- No indication for RAI for patients with low risk tumors

Pre operative considerations

- Risk assessment for general anesthesia
- Pre op calcium level to exclude hyperparathyroidism
- Hold anticoagulation/antiplatelet meds
 - *Aspirin and ibuprofen are ok*
 - *Bridge with lovenox if necessary*
- Screen for pre op RLN function
 - *Previous cervical or thoracic surgery*
 - *Voice change or concern for advanced disease*

Pre op discussion

- Surgery generally 1.5-3 hrs; depends on extent
- Totals generally spend the night, partials often outpatient
- 2 wks no lifting greater 20 lbs, no driving with pain or on pain meds
- Shower the next day and return to work as soon as the following week (limits apply)
- Post op pain often worse in the back of the neck than in the surgical incision
- Warn patients about post op headache which is common
 - *Can last for 2 wks*
 - *Likely tension from neck extension*

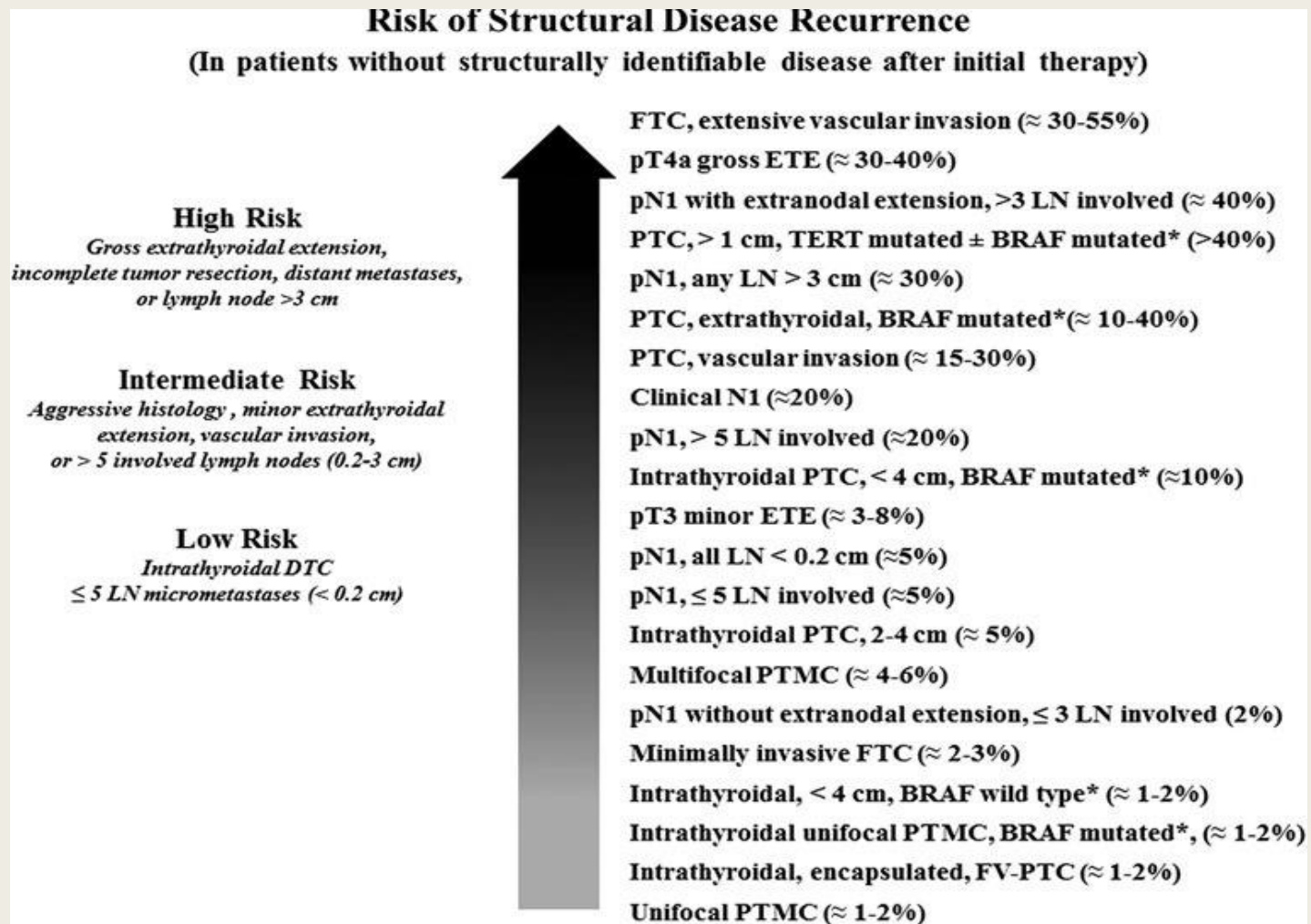
Complications

- RLN injury
- Hypoparathyroidism/hypocalcemia
- Hypothyroidism
- Wound infection
- Cervical hematoma rare
 - *Life threatening event, 1-300 cases reported*
 - *May require evacuation of the hematoma before intubation*
 - *A little swelling is expected at the incision; soft fullness noted at the incision only*

Post OP

- Review post op path report
- Determine if completion thyroidectomy necessary-- is it a low risk lesion
- Expect more completion thyroidectomies—not a bad thing
- Thyroid replacement starts immediately post op for total thyroidectomy
- Check TSH in 6 wks for partials

Thyroid cancer management



Case continued

- Right lobectomy
- No immediate post op complications
- Final path intermediate risk lesion classic papillary thyroid carcinoma 1.2 cm with ETE
- Recommend completion thyroidectomy
 - *Must be performed within a week of the initial procedure or delay for 3 months*
- Final path left lobe with 3 mm papillary carcinoma

Post surgical treatment

- RAI for those patients with intermediate and high risk cancers
- RAI scans post therapy to stage tumors
- Follow thyroglobulin levels initially at 6-12 months
- Serial ultrasounds to evaluate for local and regional recurrence/LN mets at 6-12 months then adjust to patients risk for recurrence
- Thyroid replacement with TSH targets depending on the overall cancer risk

Follow up thyroid nodules

- For thyroid nodules that do not require surgical intervention at initial diagnosis follow up directed by initial and subsequent ultrasound findings
- Employ the recommendations as directed by ATA or TIRADS guidelines
- For a thyroid nodule with 2 benign biopsies no further follow up necessary¹

Medullary thyroid cancer

- Sporadic and familial
- RET proto oncogene
 - *Prophylactic surgery indicated*
- Associated with MEN2
 - *MTC 90%*
 - *Hyperparathyroidism 20%*
 - *Pheochromocytoma 50%*
 - *Hirschsprung's disease*

Anaplastic cancer

- Rare
- Undifferentiated thyroid cancer
- Mortality approaches 100%
- Often non resectable at time of diagnosis

Website for Patient Education

- Endocrinediseases.org
 - *Maintained by AAES (American Association Endocrine Surgeons)*
 - *Excellent review for patients*
 - *Disease description and treatment options*
 - *FAQ*
 - *Includes what questions to ask your surgeon*
 - *Very well organized and up to date info*
 - *Encourages patients to see a surgeon with expertise in the field of endocrine surgery*
- American thyroid association
 - *www.thyroid.org*

Guidelines for management

- 2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer
- The American Thyroid Association Guidelines Task Force on Thyroid Nodules and Differentiated Thyroid Cancer
 - *Thyroid* Vol 25, Number 1, 2016
- Bryan R. Haugen,^{1,*} Erik K. Alexander,² Keith C. Bible,³ Gerard M. Doherty,⁴ Susan J. Mandel,⁵ Yuri E. Nikiforov,⁶ Furio Pacini,⁷ Gregory W. Randolph,⁸ Anna M. Sawka,⁹ Martin Schlumberger,¹⁰ Kathryn G. Schuff,¹¹ Steven I. Sherman,¹² Julie Ann Sosa,¹³ David L. Steward,¹⁴ R. Michael Tuttle,¹⁵ and Leonard Wartofsky¹⁶

Thank you

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