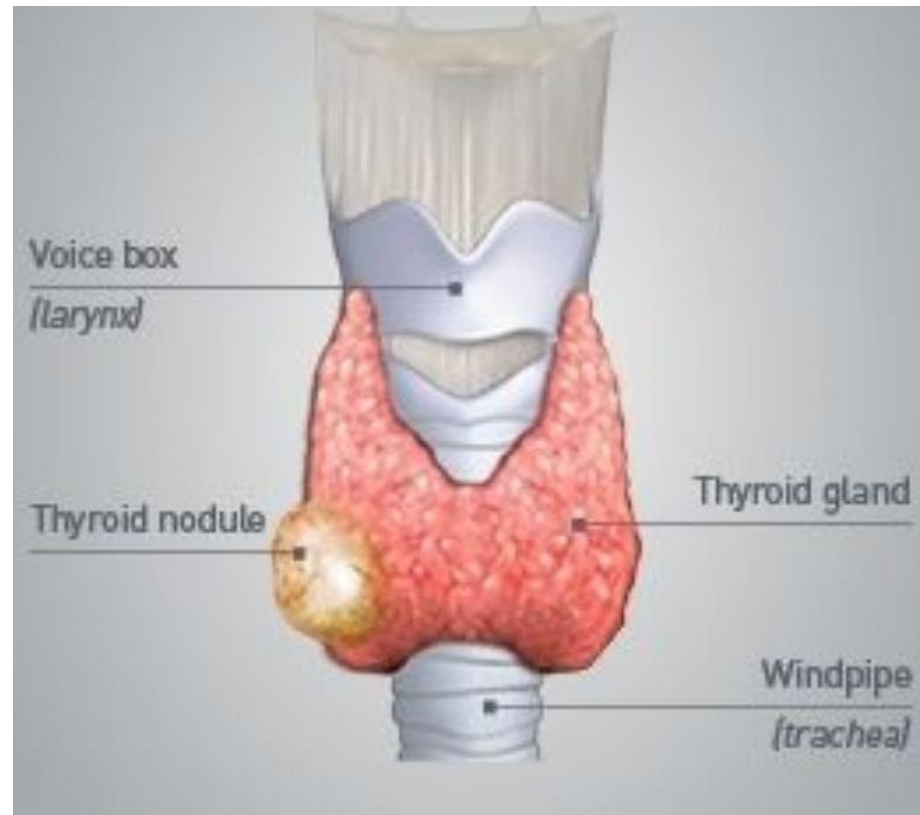
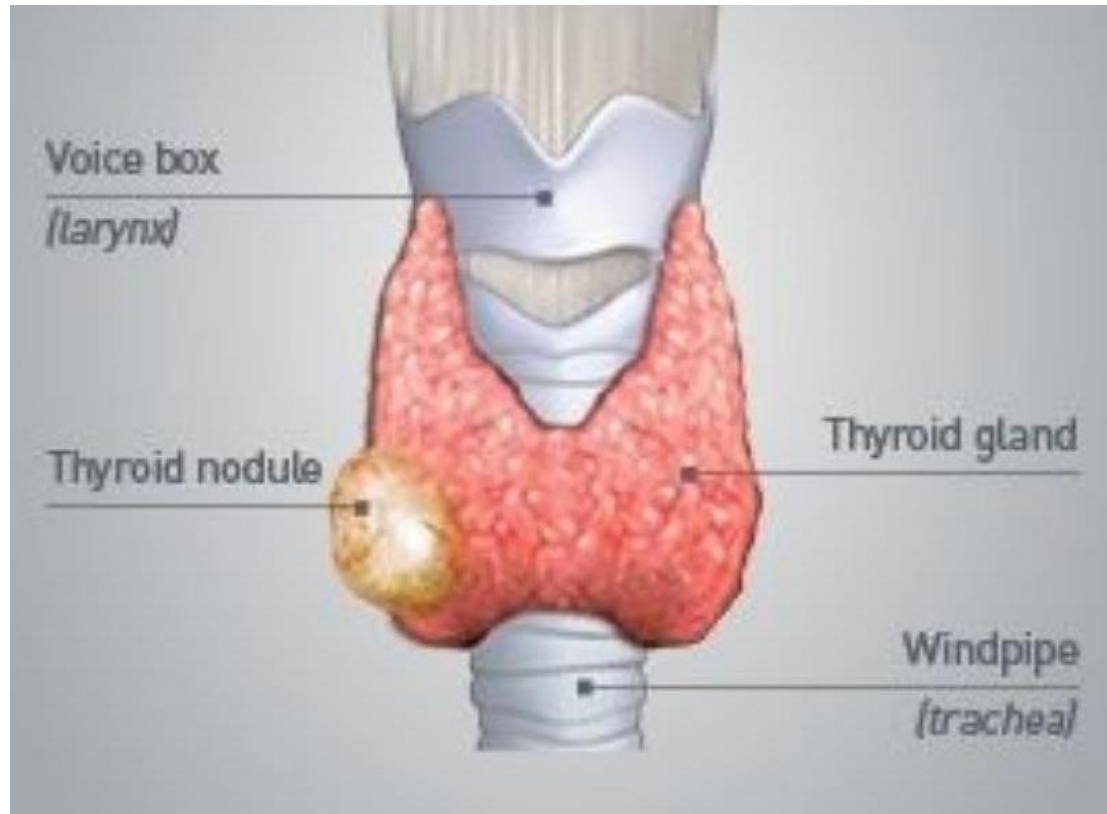


# Thyroid nodules

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**Dr Tin Nilar Win**



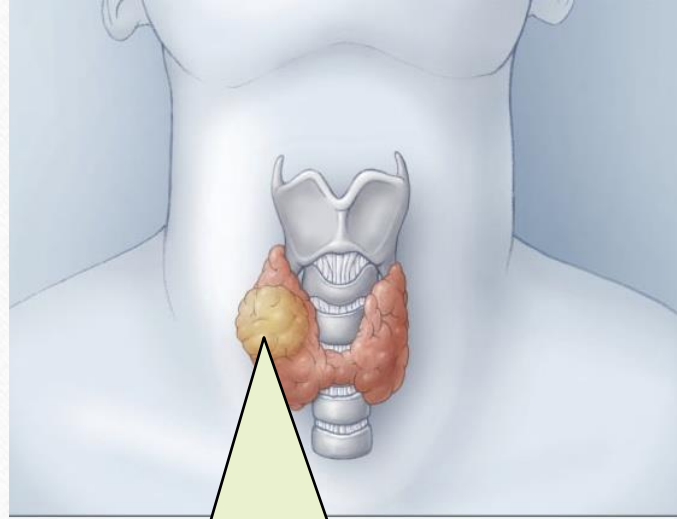
Discrete radiologically distinct lesion from the surrounding thyroid parenchyma

### Clinically palpable

- Identified by the doctor on examination or even noticed by the patient themselves

### Incidentaloma

- Identified incidentally in imaging studies.



**Thyroid Nodule**

**Benign (95%)**

**malignant (5%)**

---

**Hyperplastic nodule (85%)**

**Papillary (80%)**

**Adenoma (15%)**

**Follicular & Hurthle cell (15%)**

**Cyst (<1%)**

**Medullary (3%)**

**Anaplastic (2%)**

# Prevelance

## Mandalay

**2017 - 542**

**2018 - 477**

**2019 - 363**

## NOGH

**2018 - 140**

**2019 - 170**

## YGH

**2018 - 503**

**2019 - 746**

ENT Registry

Concern,  
Clinical  
importance  
and Line of  
management

Patients' concern

Malignancy?

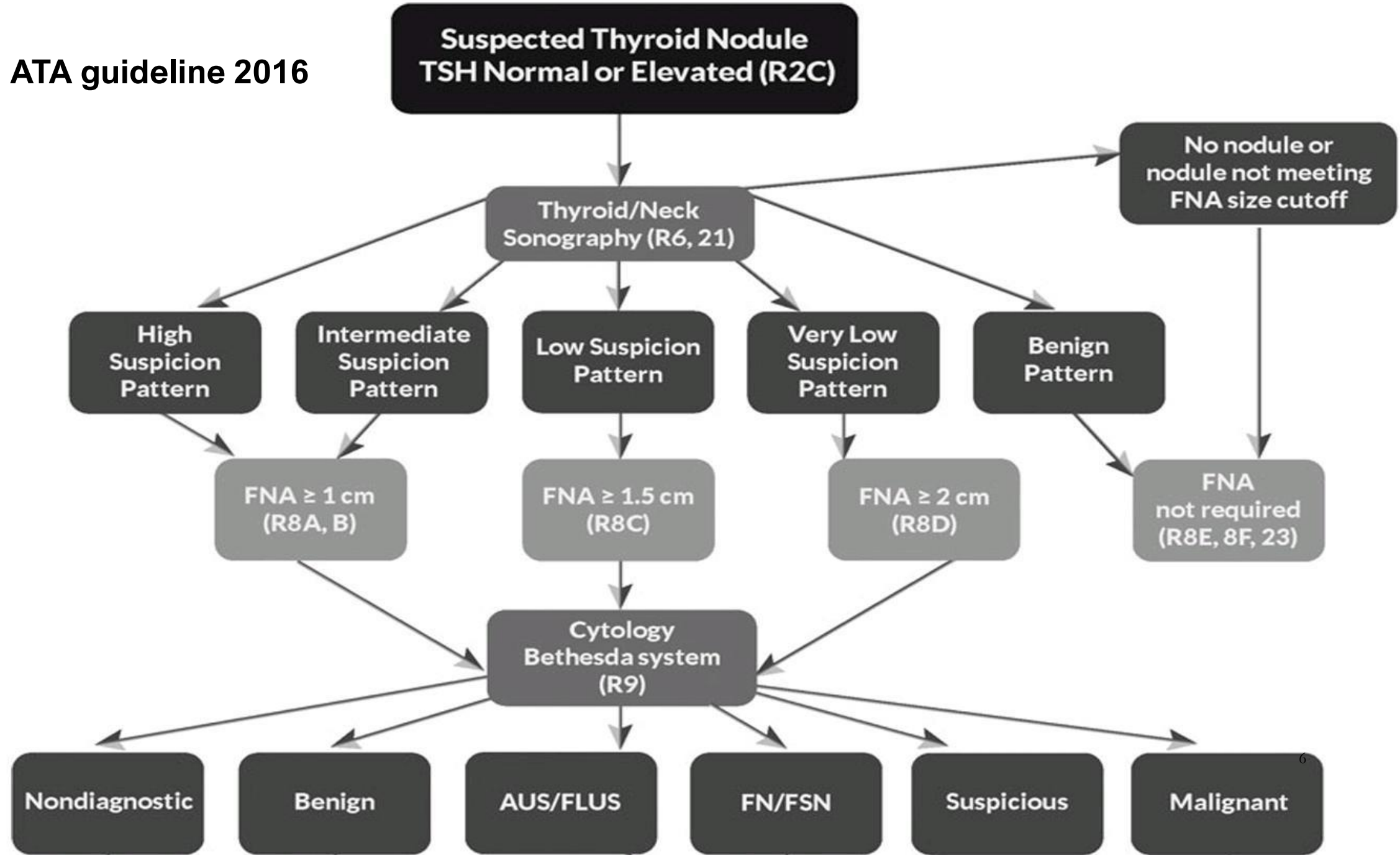
Doctors' concerns

malignancy

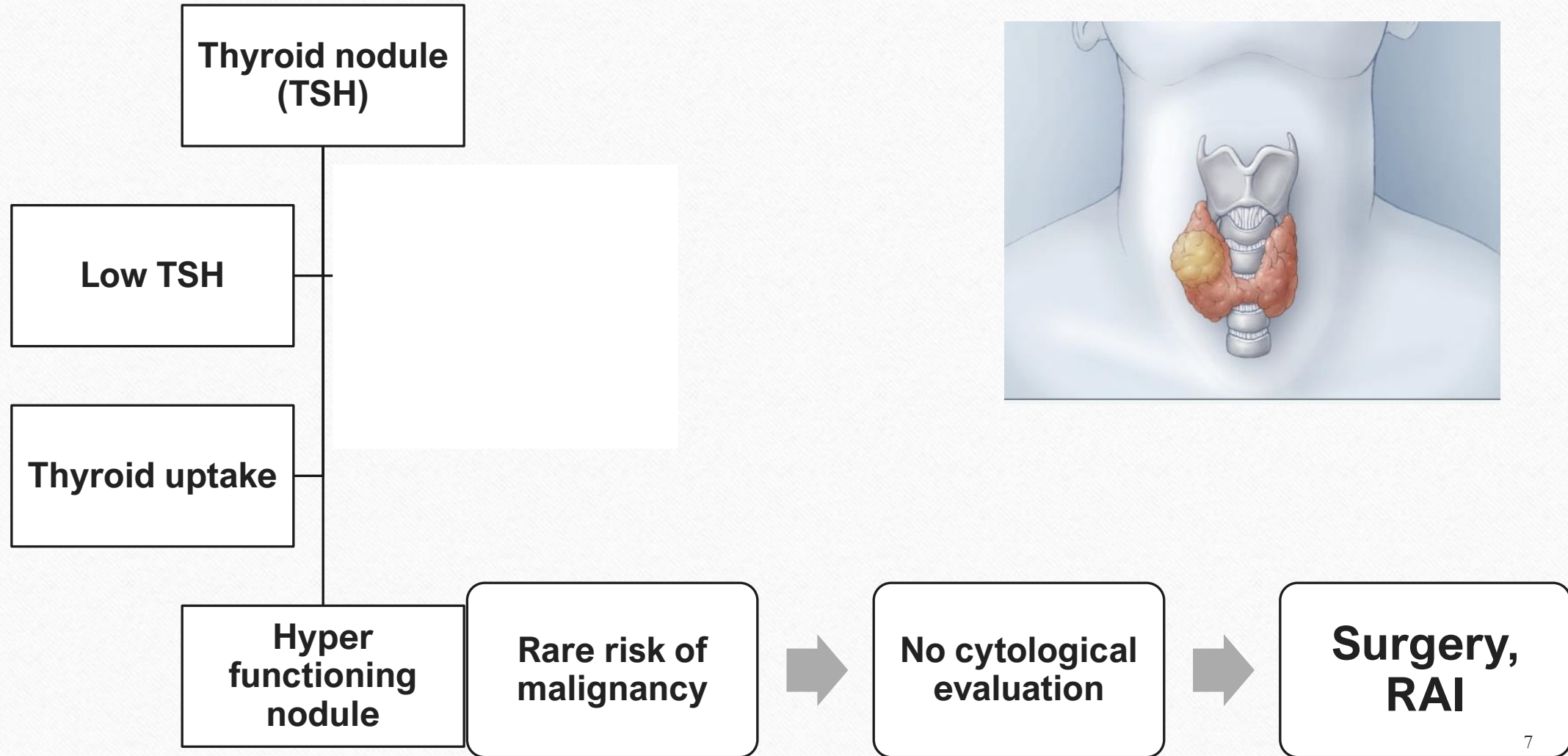
Dysfunction

Compression<sub>5</sub>

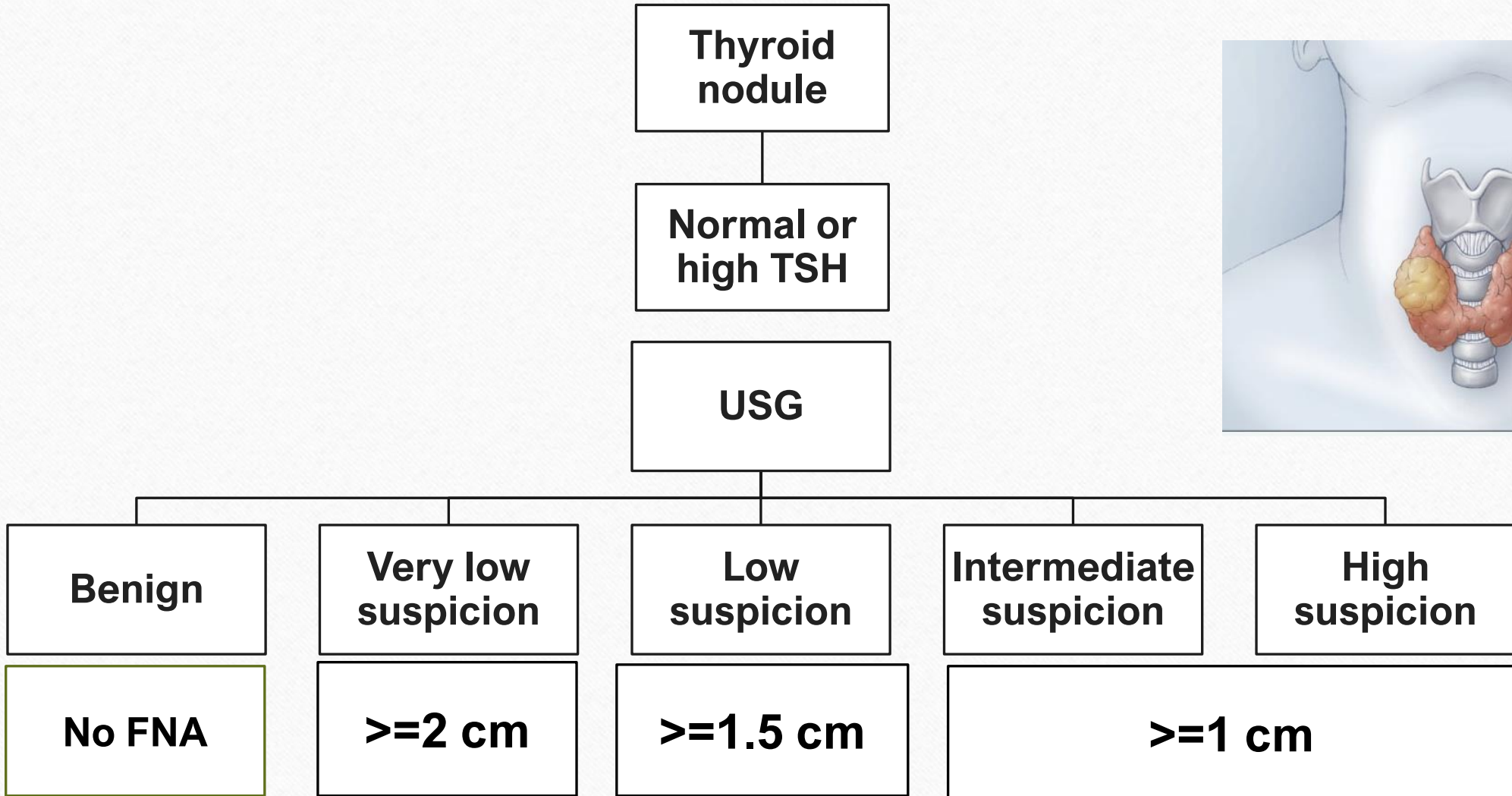
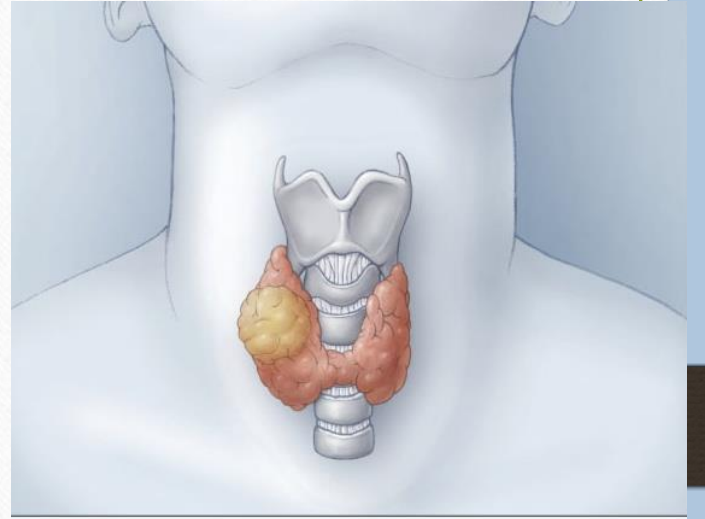
ATA guideline 2016



# Evaluation and Management of hyperfunctioning nodule



# Evaluation and Management of non functioning nodule





Palpation



Suspected thyroid nodules



Imagings

History and physical examination

Laboratory tests

Imagings

FNAC

## Malignancy Dysfunction Compression

- nervousness, weight loss despite increased appetite, tremors, palpitations, heat intolerance and sweating

thyroid

- fatigue, constipation, cold intolerance

### Compressive symptoms

- dyspnoea, dysphagia, and hoarseness of voice with compression of trachea, oesophagus and recurrent laryngeal nerves

## 2. Laboratory evaluation

**Competing interests:** The authors have declared that no competing interests exist.

solitary nodule on US as independent risk factors for malignancy in patients with thyroid nodules. Additional analyses using TSH levels as a categorical variable, defined by ROC curve analysis, showed that the risk of malignancy was approximately 3-fold higher in patients with TSH levels  $\geq 2.26$   $\mu\text{U/mL}$  than in patients with lower TSH levels ( $P = 0.00$ ).

### Conclusions

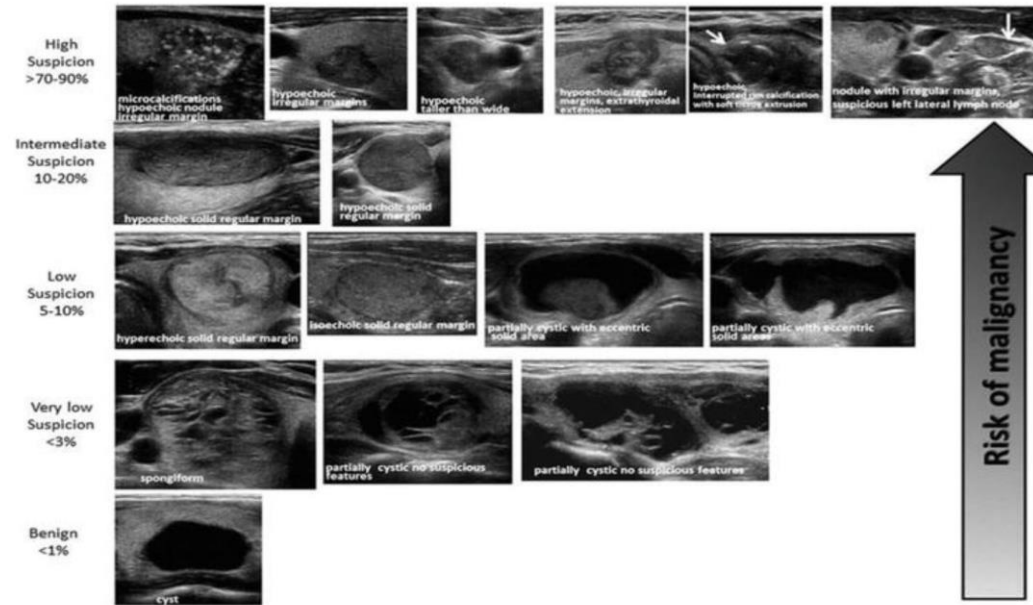
Higher serum TSH levels are associated with an increased risk of thyroid cancer in patients with thyroid nodules. Using TSH levels as an adjunctive diagnostic test for stratifying the risk of malignancy associated with a thyroid nodule may help on defining the best therapeutic approaches.

**Other  
laboratory**

**TSH**

- Serum thyroid antibodies – anti TPO, TRab
- Serum thyroglobulin –  
cannot differentiate malignancy in a thyroid nodule with certainty.
- a role in postoperative monitoring for residual, recurrent or metastatic disease
- Calcitonin - a marker for medullary thyroid cancer (MTC) and no recommendations for the routine use of calcitonin in evaluation of thyroid nodules

# 3. Imagings



## Ultrasonography

- Indispensable tool for the evaluation of thyroid nodules.
- easily available, non-invasive and invaluable for dileniation and prognostication in these patients.

## **What informations?**

Thyroid US can answer the following:

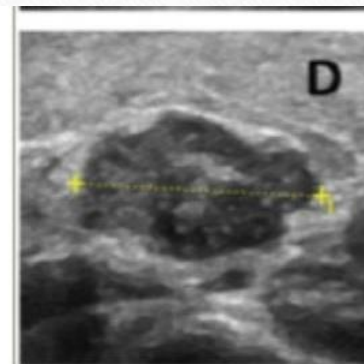
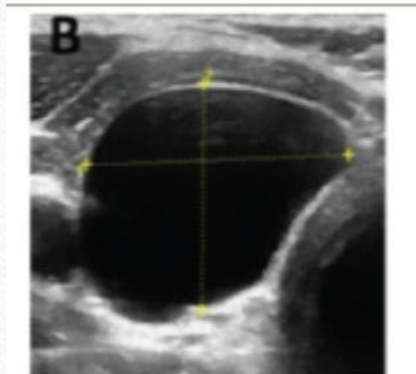
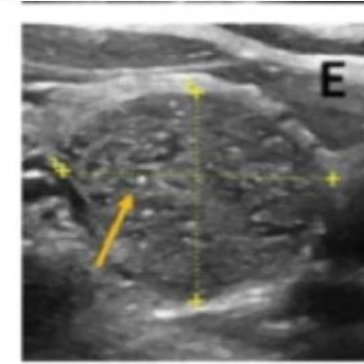
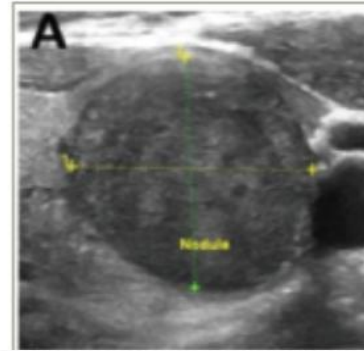
- Is there truly a nodule?
- How large is the nodule?
- What is the nodule's pattern of ultrasound imaging characteristics?
- Is suspicious cervical lymphadenopathy present?
- Is the nodule greater than 50% cystic?
- Is the nodule located posteriorly in the thyroid gland?

## USG scoring system adapted by ATA guideline

<i>Sonographic pattern</i>	<i>US features</i>	<i>Estimated risk of malignancy, %</i>	<i>FNA size cutoff (largest dimension)</i>
High suspicion	Solid hypoechoic nodule or solid hypoechoic component of a partially cystic nodule <b>with</b> one or more of the following features: irregular margins (infiltrative, microlobulated), microcalcifications, taller than wide shape, rim calcifications with small extrusive soft tissue component, evidence of ETE	>70–90 <sup>a</sup>	Recommend FNA at ≥1 cm
Intermediate suspicion	Hypoechoic solid nodule with smooth margins <b>without</b> microcalcifications, ETE, or taller than wide shape	10–20	Recommend FNA at ≥1 cm
Low suspicion	Isoechoic or hyperechoic solid nodule, or partially cystic nodule with eccentric solid areas, <b>without</b> microcalcification, irregular margin or ETE, or taller than wide shape.	5–10	Recommend FNA at ≥1.5 cm
Very low suspicion	Spongiform or partially cystic nodules <b>without</b> any of the sonographic features described in low, intermediate, or high suspicion patterns	<3	Consider FNA at ≥2 cm Observation without FNA is also a reasonable option
Benign	Purely cystic nodules (no solid component)	<1	No biopsy <sup>b</sup>

# US Signs Predictive of Cancer

	Sensitivity	Specificity	
■ Micro-calcifications	40%	90%	←
■ Absence of halo	66%	46%	
■ Irregular margins	64%	84%	←
■ Hypo-echoic	83%	49%	←
■ Intra-nodular flow	70%	65%	
■ MicroCa. & irreg m.	30%	95%	←
■ MicroCa. & hypoechoic	28%	95%	←
■ Solid & hypoechoic	73%	69%	





## Radionuclide scan

- No longer initial investigation

## CT or MRI

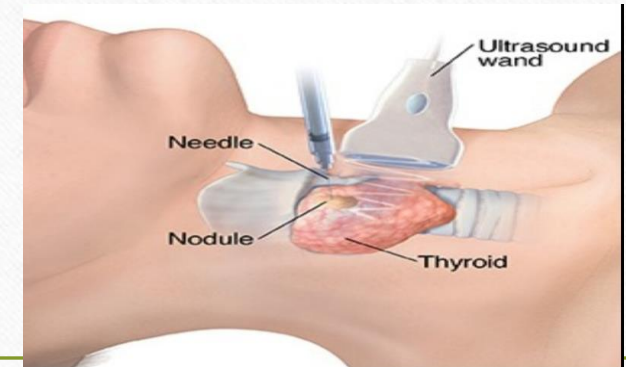
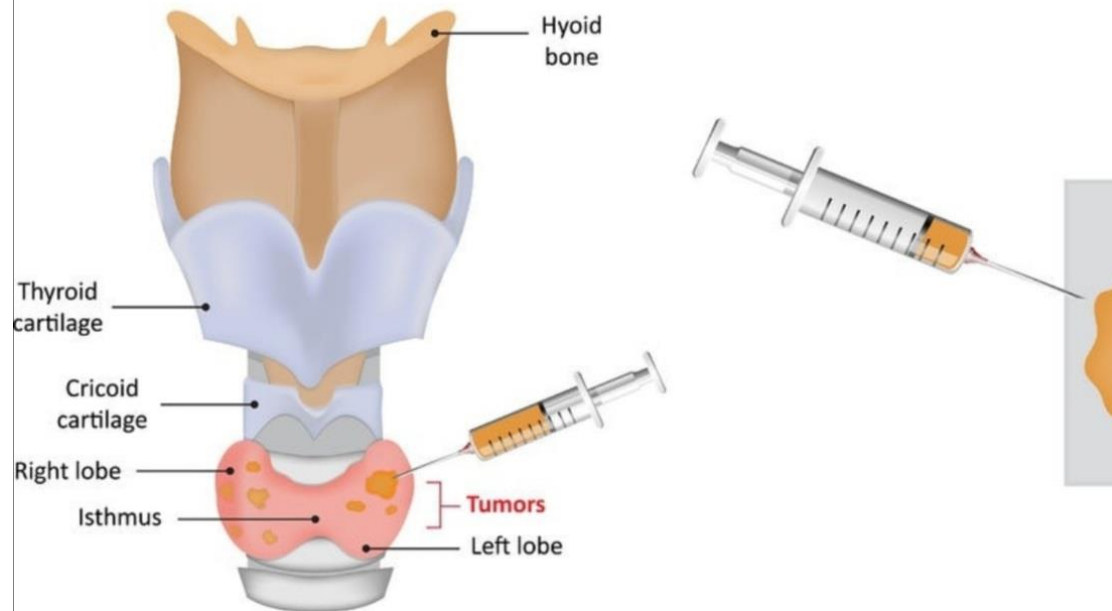
- No cost effectiveness

## PET scan

- Useful in evaluation of metastasis

# Other Imagings

## Fine Needle Aspiration of Thyroid Nodules



- FNA is the single most valuable, cost effective and accurate method in the evaluation of a nodular goitre.
- a sensitivity and specificity of 65–98 and 72–100%, respectively

# Clinical decision based on FNA results

- The Bethesda System, 2007

Category	Risk of Malignancy (%)	Management
Non-diagnostic	1-4	Repeat FNA w/ US
Benign	<1	Follow
AUS / FLUS	~5-15	Repeat FNA
(Sus. for) Follicular Neoplasm	15-30	Lobectomy
Sus. for Malignancy	60-75	Lobectomy or total thyroidectomy
Malignant	97-99	Total thyroidectomy

## Case 1



6 mth later, Dysp  
feeling something  
throat.  
USG thyroid

A 64 yrs old lady, T2 DM, Hypertension  
Thyroid swelling on regular F/U for DM

### Finding:

Both lobes of thyroid are moderately enlarged with multiple solid and subsolid thyroid nodules up to 3.1cm.

A cyst 2.4cm with internal echo and comet-tail artifacts seen in isthmus of thyroid.

Segmental thrombus seen in left internal jugular vein.

No size-significant nodes.

### Impression:

1. Multinodular goitre in both thyroid lobes.
2. Colloid cyst in thyroid isthmus.
3. Left internal jugular vein thrombosis.

23.4.2020

MACROSCOPIC : About 3 mls of brown fluid

**Non diagnostic**

Smear made from the aspirate show many polymorphs and some lymphocytes with colloid. Malignant cells are not seen.

INTERPRETATION / REMARKS : **Consistent with aspirate from infected cyst, isthmus of thyroid**

# (1) Non-diagnostic specimen by FNAC

Diagnostic specimen should contain a minimum of 6 groups of well-preserved thyroid epithelial cells, each group consisting of at least 10 cells.

## Causes of non diagnostic specimen

cystic nodules that yield few or no follicular cells

benign or malignant sclerotic lesions

nodules with a thick or calcified capsule

hypervascular or necrotic lesions

sampling errors or faulty biopsy techniques

# (1) Non-diagnostic specimen by FNAC

**Malignancy rate: about 10%**

**Repeat FNA with USG guidance**

**Re-FNA with US guidance can yield a diagnostic specimen in 50-80%.  
75% of solid nodules & 50% of cystic nodules (Alexander et al. JCEM 2002)**

**Repeated Non-diagnostic**

**Consulting  
USG findings**

**ND with high  
suspicion**

**ND without high  
suspicion**

**Surgical resection**

**Close F/U or surgical  
excision**

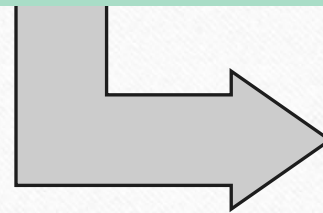
## Points to be noted in this case

1. MNG → Each and every nodule

2. Benign → Monitor

If size increase and compression → Surgery

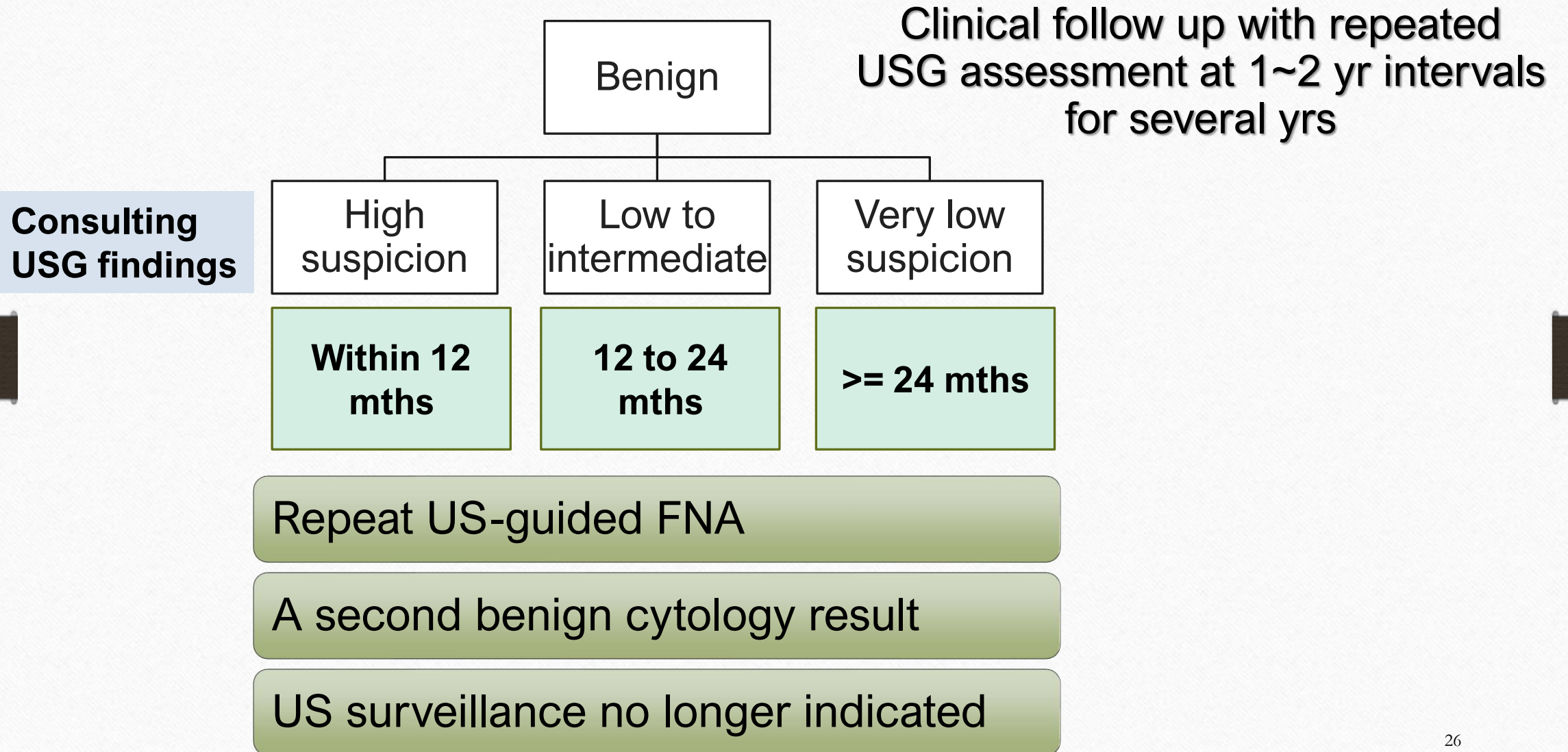
3. FNA → Non diagnostic → Surgery



T4 supply



## (2) Benign nodules by FNAC (I)



## (2) Benign nodules by FNAC (II)

- **Surgery may be considered in**
  - Growing nodule(s) that are large or with compressive symptom
- **Recurrent cystic nodules** (compression or cosmetic concern)
  - Surgery
  - Percutaneous Ethanol injection (PEI)
  - (+/-) Radiofrequency ablation (RFA)

## Case 2

History : A case of MNG  
USG (Neck)  
Small nodule (1.2 cm) at left superior pole  
Small spongiform nodules (+) in right lobe

1.12.20

Specimen Received : Received one unfixed and fixed fine needle aspirate smear slides from left thyroid nodule and stained with Pap and H&E, labelled as C396/20.

Microscopic Description : Smears of fine needle aspirate from left thyroid nodule show follicular cells with nuclear enlargement and crowding, some cells show nuclear grooves and intranuclear inclusions. Colloid is scanty. No lymphocytes or macrophages are seen.

Thy3a



Bethesda III



AUS

Remark : Thy3a - Atypical fine needle aspirate from left thyroid nodule  
Suggest to take biopsy for definite histological diagnosis

### (3) Atypia of undetermined significance (AUS) Follicular lesion of undetermined significance (FLUS)

- nodules with focal features suggestive of PTC in an otherwise benign-appearing sample

**A repeat FNA can result in a definitive diagnosis**

Only about 20 – 25% of nodules are repeated AUS (Atypia of Undetermined Significance) in Bethesda system (Yassa et al. Cancer2007)

**Repeated FNA**

**Core needle Bx ?**

**Diagnostic surgery or observation**

(3) AUS by  
FNAC:  
Initial surgery

Lobectomy is the recommended initial surgery.

; but, modified based on the molecular testing if performed.

Total thyroidectomy may be done in cases with

- 1) positive cancer-specific mutation
- 2) large tumor (> 4cm)
- 3) familial thyroid carcinoma
- 4) Hx. of radiation exposure
- 5) bilateral nodular disease who had significant medical co-morbidities, or who wants bilateral op. to avoid second surgery.

**Bilateral nodular disease**

**Co morbidities and to avoid second surgery**



**Total thyroidectomy**

**T4 supplement**

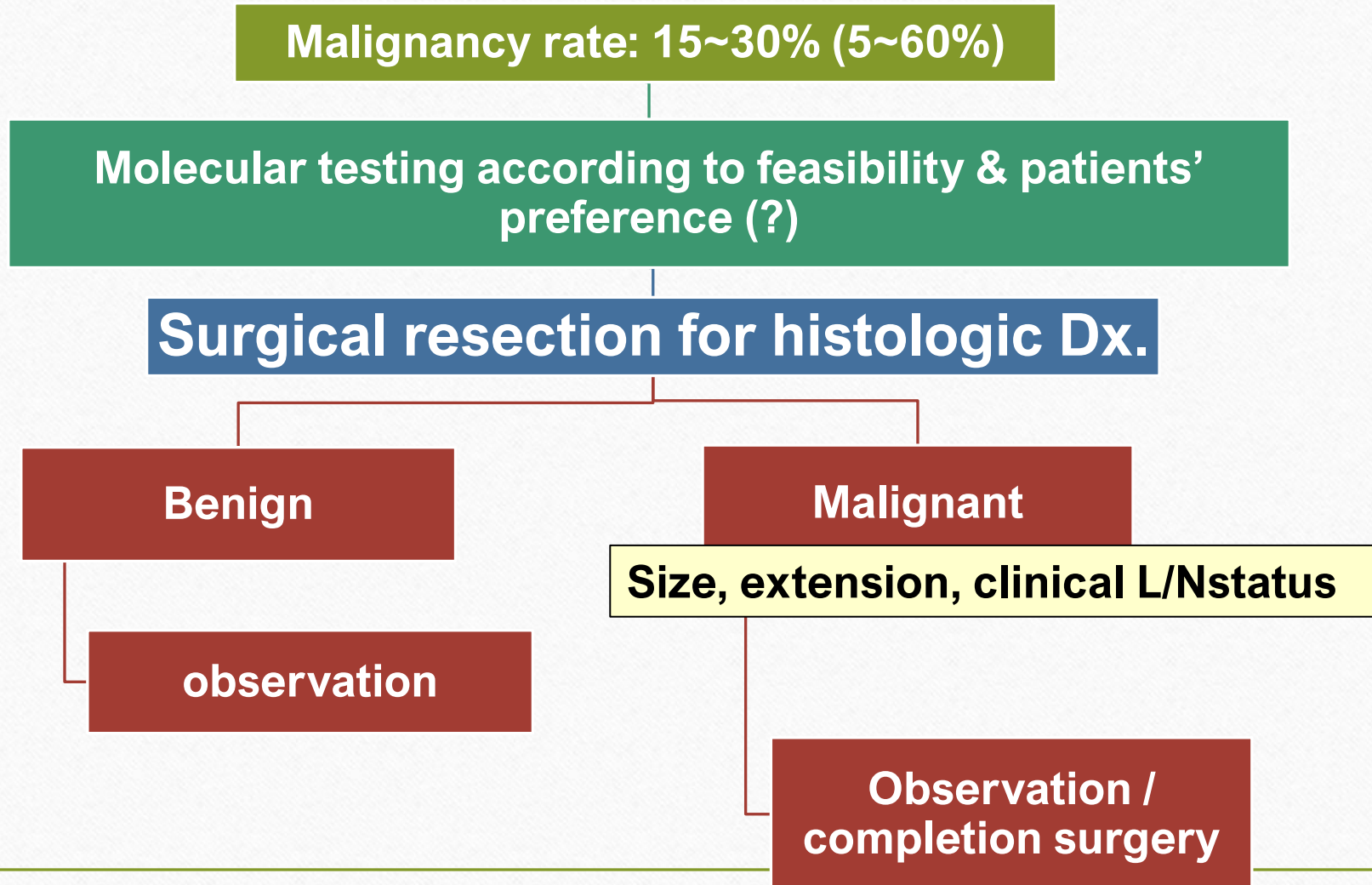
**NATURE OF SPECIMEN:** Both lobes of Thyroid gland and isthmus

**Gross Appearance:** See in attachment

**MICROSCOPIC :** Section of given biopsy shows various sizes of thyroid follicles lined by single layer cuboidal epithelial cells supported by fibrous tissue stroma. Colloidal material are noted within the follicles. No toxic features are noted. No malignant features are seen.

**REMARKS :** Multinodular Goitre (Both lobes of thyroid glands and Isthmus)

## (4) (Suspicious) Follicular Neoplasm by FNAC



## (5, 6) Suspicious for malignancy or malignancy by FNAC

- Suspicious for malignancy by FNAC
  - probability of malignancy (PTC) : 60~75%
- Malignancy by FNAC
  - probability of malignancy (PTC) : 97~99%

Very high probability of PTC

Surgical resection (Total T./ lobectomy)

### **Active surveillance without immediate surgery in**

- 1) Very low risk tumors (ex. mPTC's without invasion/metast.)
- 2) High surgical risk d/t co-morbid condition
- 3) A relatively short life span
- 4) Concurrent medical/surgical issues the need to be addressed prior to thyroid surgery



Size of tumor >4 cm,  
Tumor with gross extra-thyroidal  
extension (clinical T4)  
Clinically apparent metastatic disease  
to nodes (clinical N1)  
Clinically apparent metastatic disease  
to distant sites (M1)

- Total / near total thyroidectomy

Tumor >1 cm and <4 cm  
without extra-thyroidal  
extension and without clinical  
evidence of any lymph node  
metastases (cN0)

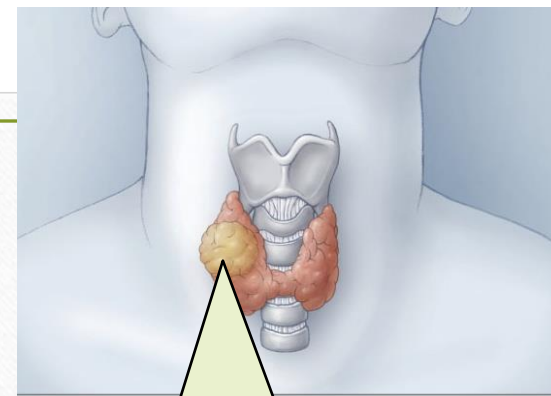
- Total / near total Thyroidectomy or  
Lobectomy

Tumor <1 cm without extra-  
thyroidal extension and cN0  
(If surgery is chosen rather  
than active surveillance)

- Lobectomy

# Evaluation

Thyroid nodule (TSH)



Thyroid Nodule

Normal or high TSH

Surgery  
RAIA

ioning

e

uptake

USG

Benign

Very low suspicion

Low suspicion

Intermediate suspicion

High suspicion

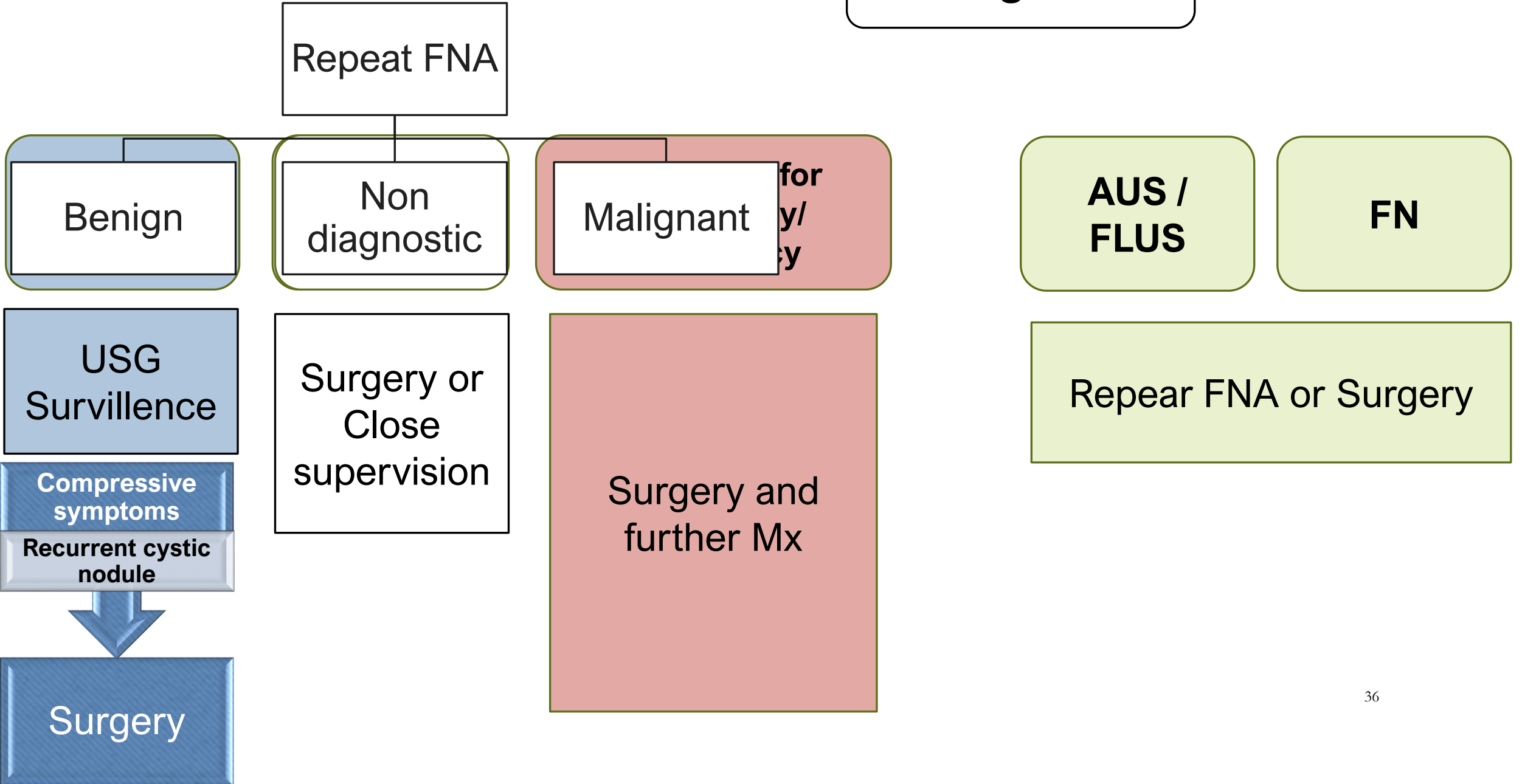
No FNA

$\geq 2$  cm

$\geq 1.5$  cm

$\geq 1$  cm

# Management



# Take home message

1. Hyper functioning → Surgery, RAI and no further cytologic evaluation
2. Non functioning → TSH – Initial evaluation of thyroid nodule and cost effectiveness
3. Normal TSH in thyroid nodule → Increased risk of Ca
4. USG – suspicious features, >1 cm - evaluate, >4cm - Surgery
5. If USG report cannot give enough information, correlate with clinical risk factor
6. USG suspicious features → FNA (USG guided FNA is preferable)
7. Benign – purely cystic, if >4 cm and compression, surgery
8. After total thyroidectomy, lifelong T4 supplement

# References



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

Haugen, Alexander, *et al.*, *Thyroid*. Jan 2016, 26(1): 1-133.



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Voice box  
*(larynx)*

**Thank you**

Thyroid gland

Windpipe  
*(trachea)*