

Surgical management of thyroid disorders

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What are the indications for surgery in thyroid disorders?

- To treat thyroid cancer
 - Proven malignancy
 - Suspicious malignancy
- To relieve compression symptoms
- To control hyperthyroidism
 - Graves
 - Toxic MNG/adenoma
 - Autonomous nodules
- Neck discomfort
 - Recurrent goiter
 - Thyroiditis





Thyroid nodule

- **Discrete** lesion within the thyroid gland that is radiologically distinct from the surrounding parenchyma
- **Non palpable nodules detected on US or other anatomic imaging are termed incidentally discovered nodules or “incidentalomas”**





Thyroid Nodule/ Differential

Thyroid Nodules - Causes

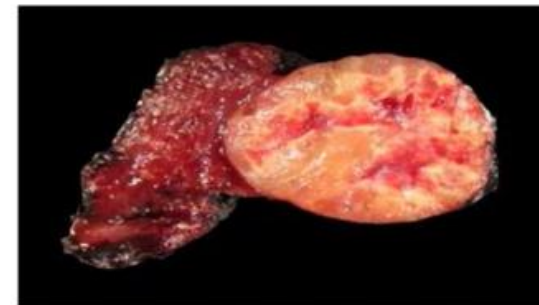
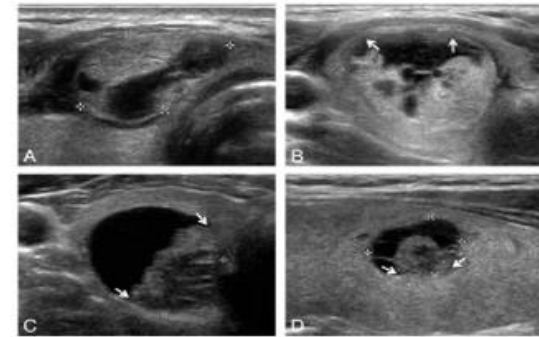
BENIGN (95%)	MALIGNANT (5%)
Multinodular (sporadic) goitre	Papillary carcinoma
Hashimoto's (chronic lymphocytic thyroiditis)	Follicular carcinoma
Cysts: colloid, simple, or hemorrhagic	Minimally or widely invasive
Follicular adenomas	Hurthle-cell (oxyphilic) type
Macrofollicular adenomas	Medullary carcinoma
Microfollicular or cellular adenomas	Anaplastic carcinoma
Hurthle-cell (oxyphil-cell) adenomas	Primary thyroid lymphoma
Macro- or microfollicular patterns	Metastatic carcinoma (breast, renal cell, lung, others)





Thyroid Nodule/ prevalence

- Thyroid nodules are common
- Prevalence 1-5%
- Prevalence on high resolution U/S 20-68%
- In an autopsy study, 12% of thyroid glands contained one nodule, 37% multiple nodules; 2.1% of all glands contained thyroid cancer Mortensen JD, et al, JCEM 15: 1270, 1955
- Risk of cancer in Clinically detected thyroid nodules **6-15%**





Thyroid Nodule/ approach

1. What is the problem of the patient?

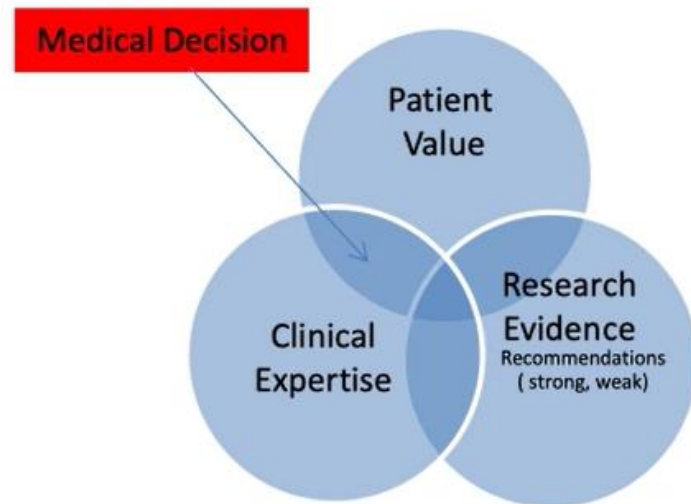
1. History taking
2. Physical examination
3. Investigation

2. Diagnosis

1. Clinical
2. Micro
3. Pathologic..

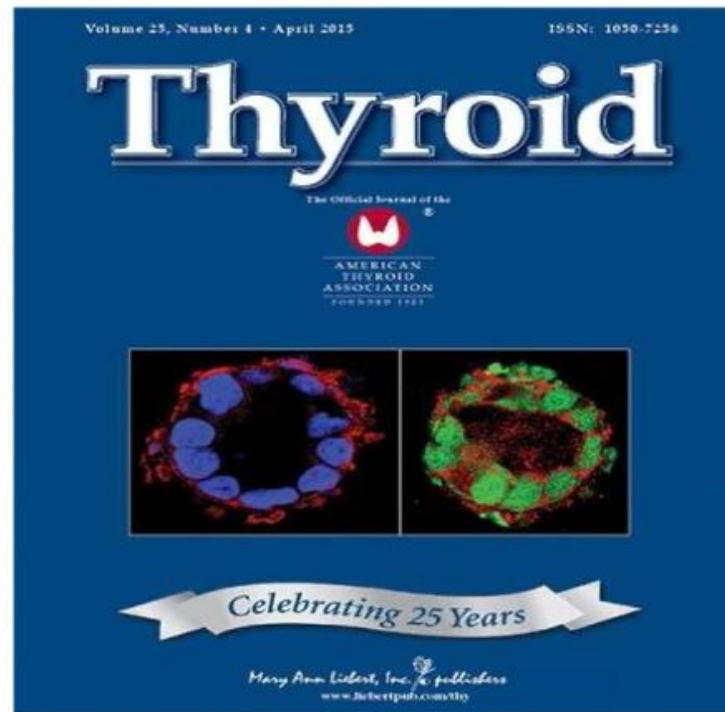
3. Management

1. Medical
2. Surgical
3. others





Thyroid Nodule/ guidelines



Revised American Thyroid Association Management Guidelines for Patients with Thyroid Nodules and Differentiated Thyroid Cancer. The American Thyroid Association (ATA) Guidelines Taskforce on Thyroid Nodules and Differentiated Thyroid Cancer, *Thyroid*, 26: 1, 2016.



Thyroid Nodule/ history taking

- **Radiation**
- **Time of onset**
- **Age &sex**
- **Voice change**
- **Drugs**
- **Family history**
- **Compression/obstruction**
- **Functional disturbance**





Thyroid Nodule/ past history of irradiation

- Increased risk of malignancy
 - Hx of head and neck irradiation
 - Hx total body irradiation
 - Hx exposure to ionizing radiation
 - Familial thyroid CA
 - Rapid nodule growth





Thyroid Nodule/ physical examination

- Increased risk of malignancy
 - Hard nodules
 - Cervical lymphadenopathy
 - Fixation to surrounding tissues





Thyroid Nodule/ investigation

- A. Serum thyrotropin (TSH) should be measured during the initial evaluation of a patient with a thyroid nodule.
 - B. If the serum TSH is subnormal, a radionuclide (preferably ^{123}I) thyroid scan should be performed.
 - C. If the serum TSH is normal or elevated, a radionuclide scan should not be performed as the initial imaging evaluation.



Strong recommendation, Moderate-quality evidence, R2 ATA 2015



Thyroid Nodule/ imaging

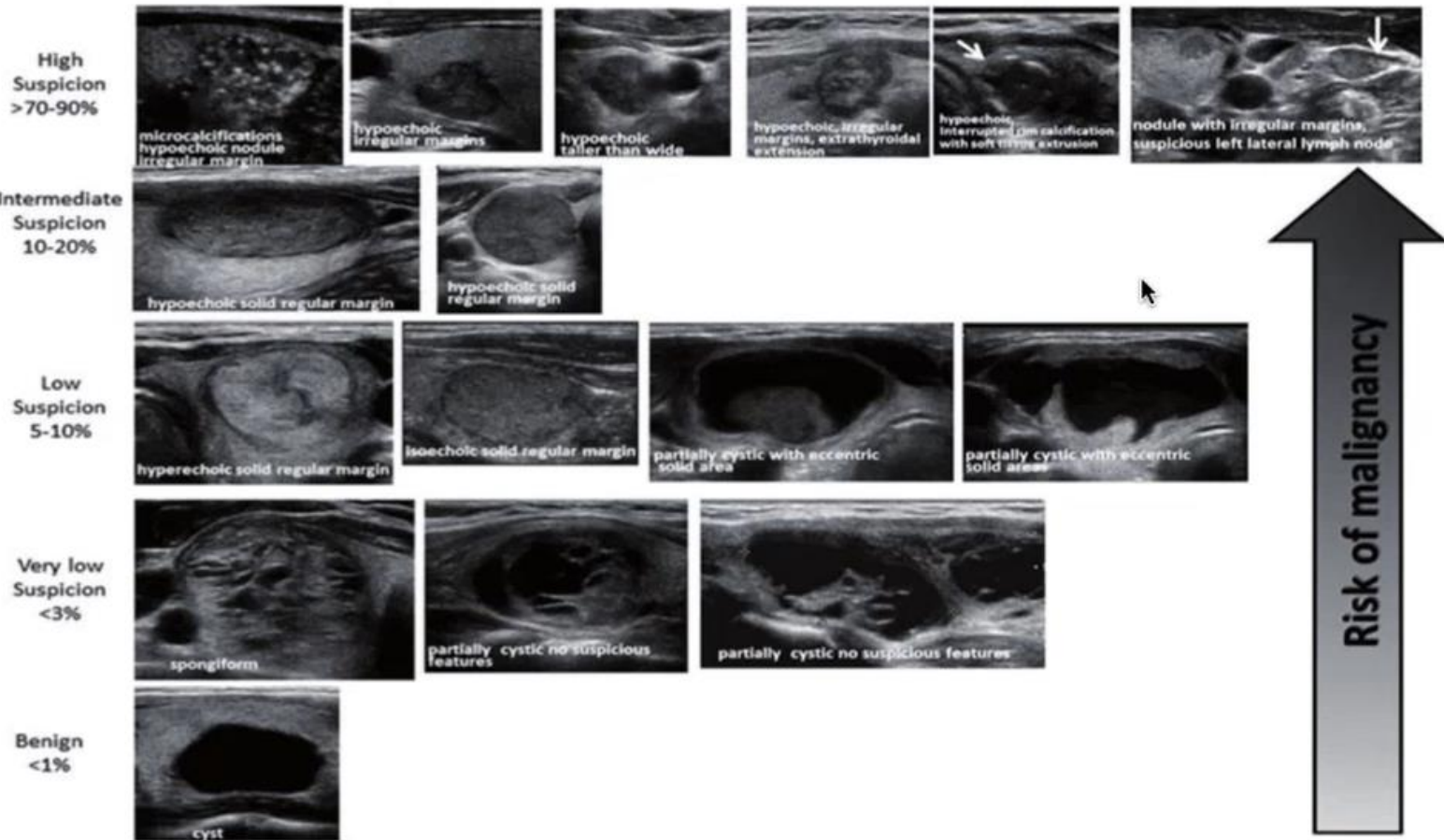
- Thyroid sonography with survey of the cervical lymph nodes should be performed in all patients with known or suspected thyroid nodules.
 - Is there truly a nodule?
 - How large is the nodule?
 - What is the nodule's pattern of ultrasound imaging characteristics?
 - Is suspicious cervical lymphadenopathy present?
 - Is the nodule greater than 50% cystic?
 - Is the nodule located posteriorly in the thyroid gland?



Strong recommendation, high-quality evidence, R6 ATA 2015



Thyroid Nodule/ultrasound evaluation





Thyroid Nodule/ FNA

- FNA is the procedure of choice in the evaluation of thyroid nodules, when clinically indicated.



Strong recommendation, high-quality evidence, R7 ATA 2015

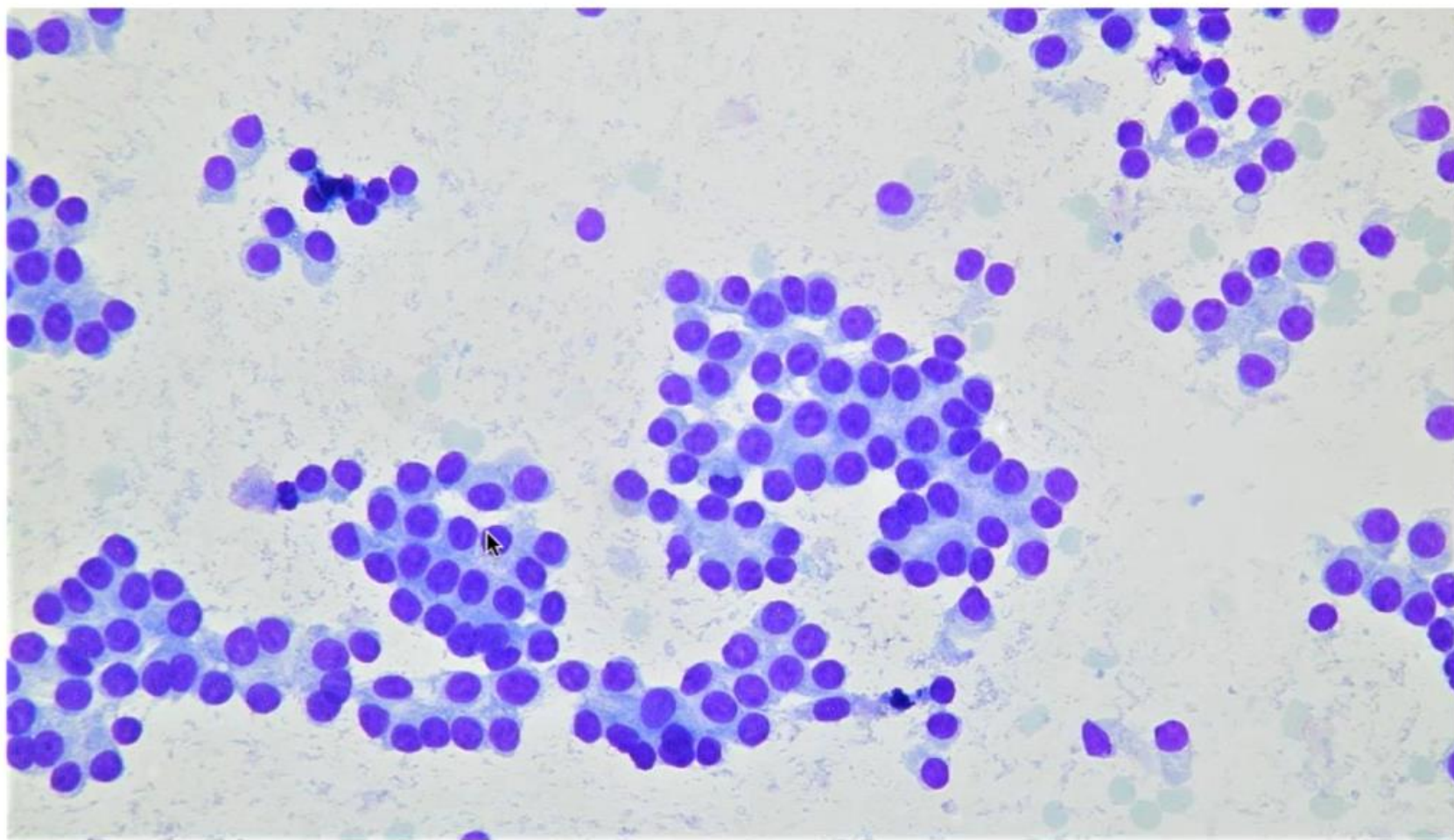


Thyroid Nodule/ FNA indications

Sonographic Pattern	Ultrasound Features	Estimated Risk of Malignancy	FNA Size Cutoff
High Suspicion	Solid hypoechoic nodule or solid hypoechoic component of a partially cystic nodule with 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% to 90% ^a	Recommend FNA at \pm 1 cm
Intermediate Suspicion	Hypoechoic solid nodule with smooth margins without microcalcifications, ETE, or taller than wide shape	10% to 20%	Recommend FNA at \pm 1 cm
Low Suspicion	Isoechoic or hyperechoic solid nodule, or partially cystic nodule with eccentric solid areas, without microcalcification, irregular margin or ETEc, or taller than wide shape.	5%–10%	Recommend FNA at \pm 1.5 cm
Very Low Suspicion	Spongiform or partially cystic nodules without any of the sonographic features described in low, intermediate, or high suspicion patterns	<3%	Consider FNA at \pm 2 cm Observation without FNA is also a reasonable option
Benign	Purely cystic nodules (no solid component)	<1%	No biopsy ^b

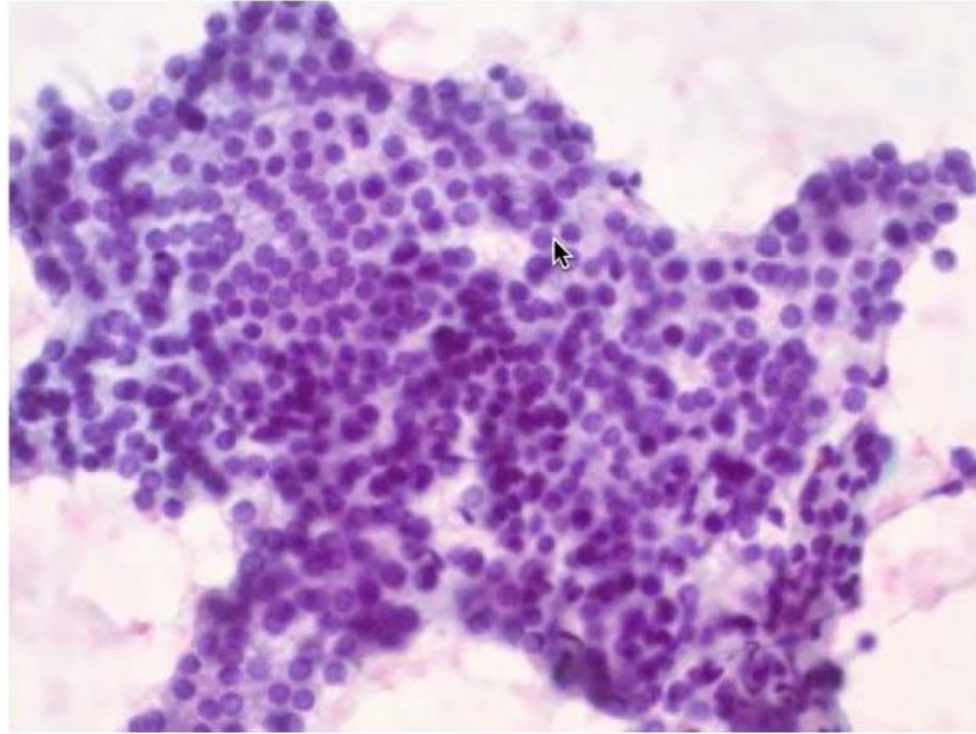


Thyroid Nodule/ benign cytology-2



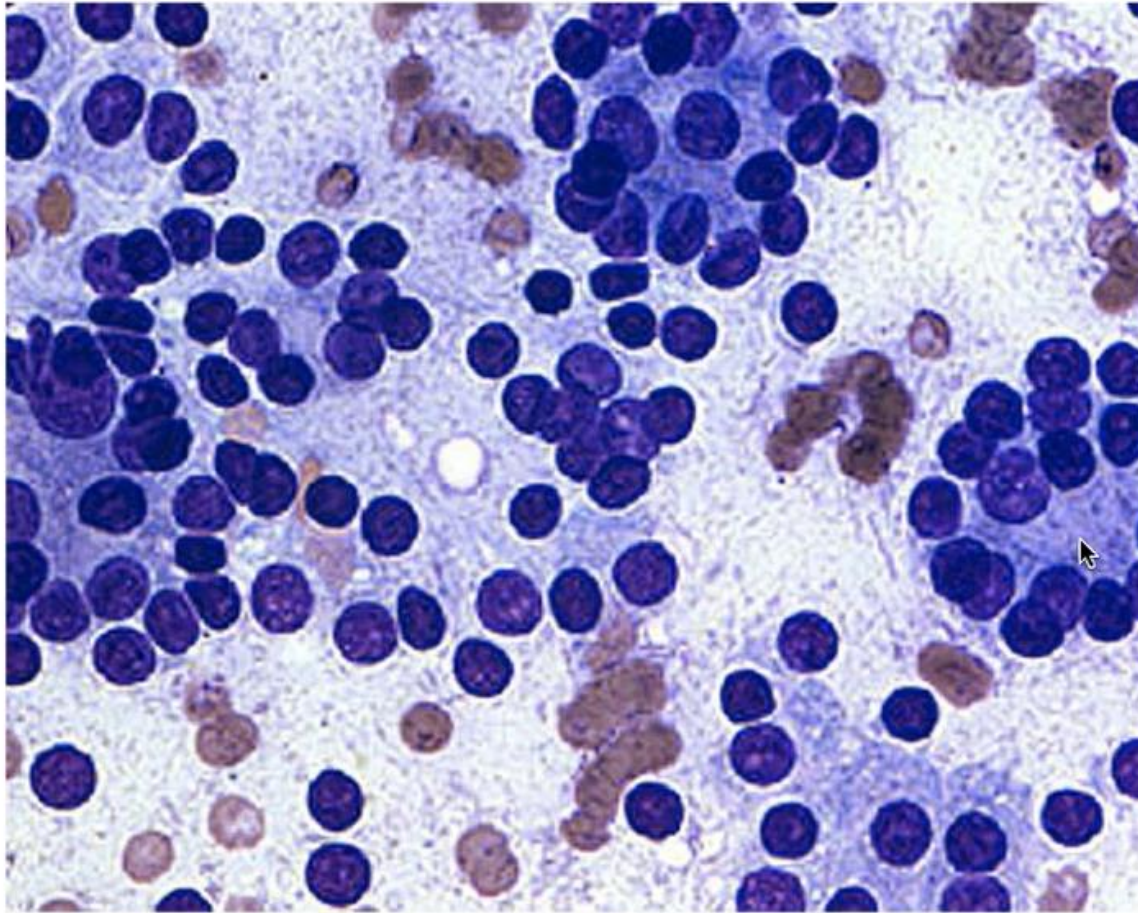


Atypia of undetermined significance/follicular lesion of undetermined significance cytology-3



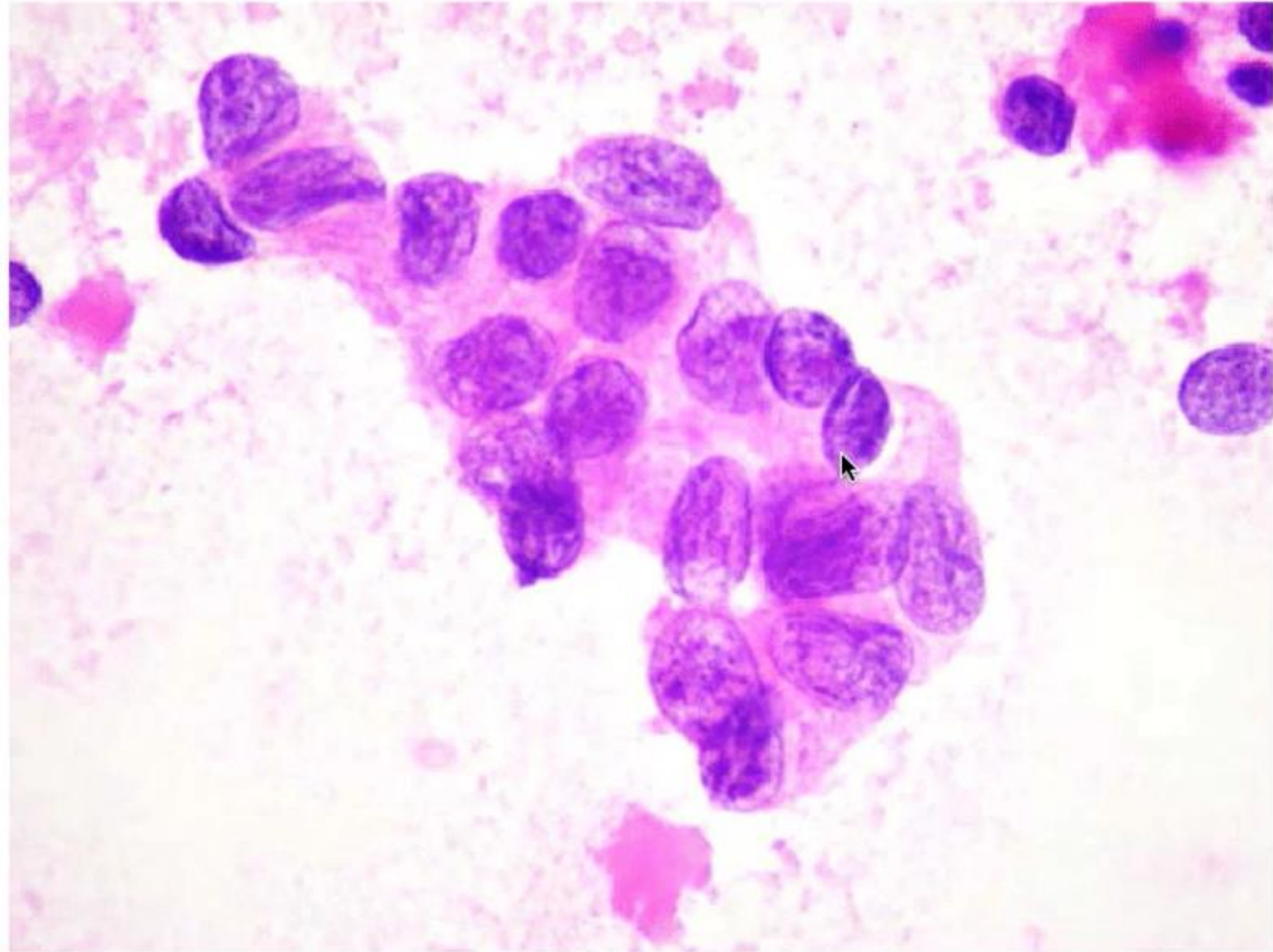


Thyroid Nodule/ FNA – follicular neoplasm-4



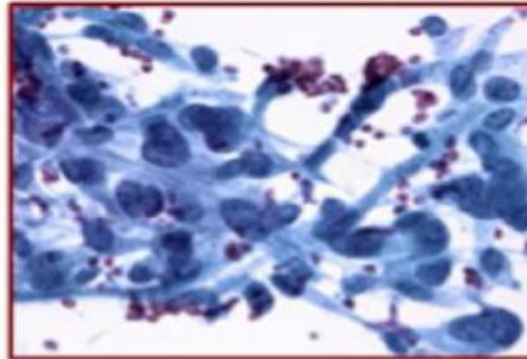
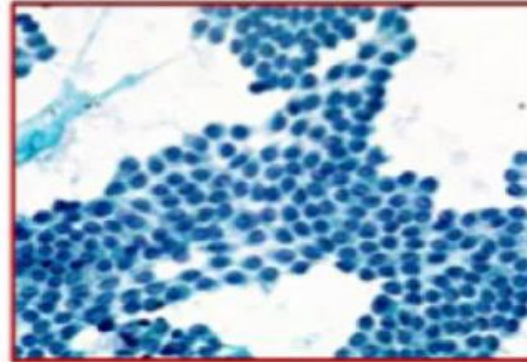
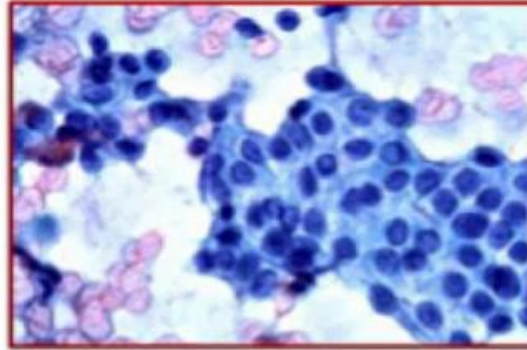


Thyroid Nodule/ suspicious for malignancy-5





Thyroid Nodule/ malignant cytology





Thyroid Nodule/ FNA risk of malignancy

Bethesda class	Diagnostic category	Cancer risk (%)
I	Nondiagnostic	1-4
II	Benign	0-3
III	AUS or FLUS	5-15
IV	FN/SN	15-30
V	SUSP	60-75
VI	Malignant	97-99

AUS: Atypia of undetermined significance, FLUS: Follicular lesion of undetermined significance, FN: Follicular neoplasm, SN: Secondary neoplasm, SUSP: Suspicious for malignancy. Adapted and modified from reference []

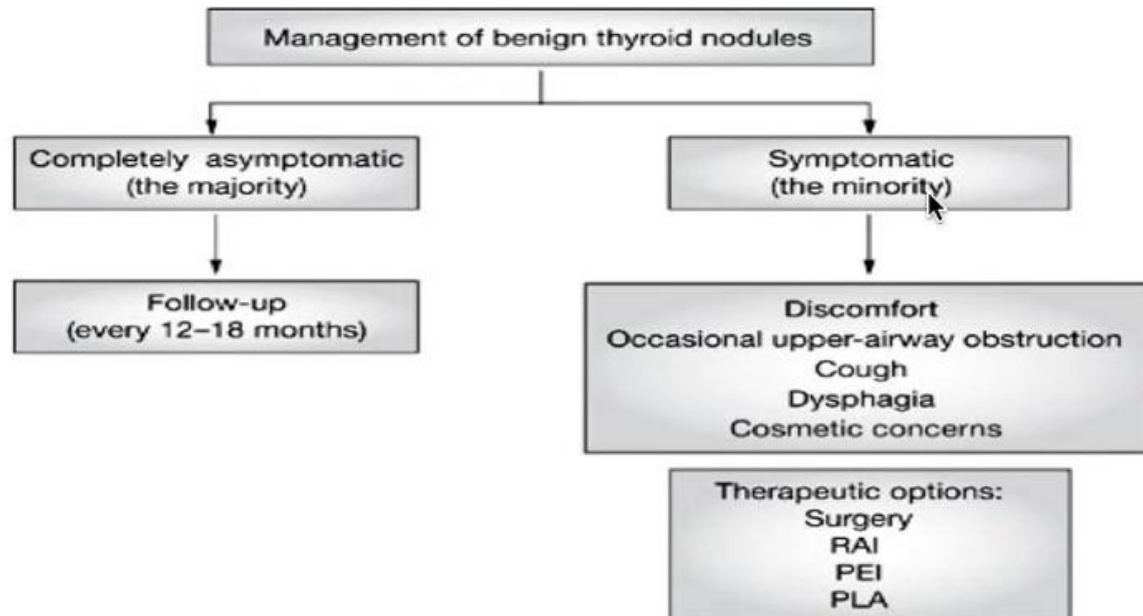


Thyroid Nodule/ Mx guidelines

Diagnostic category	Risk of malignancy (%)	Usual management
I. Nondiagnostic or unsatisfactory		Repeat FNA with ultrasound guidance
II. Benign	0-3	Clinical follow-up
III. Atypia of undetermined significance or follicular lesion of undetermined significance	5-15	Repeat FNA
IV. Follicular neoplasms or suspicious for a follicular neoplasm	15-30	Surgical lobectomy
V. Suspicious for malignancy	60-75	Near-total thyroidectomy or surgical lobectomy
VI. Malignant	97-99	Near-total thyroidectomy



Thyroid Nodule/ Mx guidelines- benign Nodule

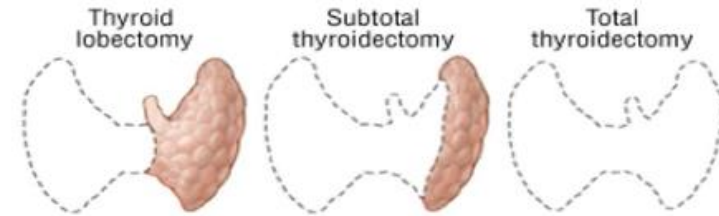




Thyroid Nodule/ surgery

Thyroid Surgery (Definitions)

- Total Thyroidectomy
 - Removal of all grossly visible thyroid tissue
- Near Total Thyroidectomy
 - Removal of all grossly visible thyroid tissue, leaving only a small amount [$<1g$] of tissue adjacent to the recurrent laryngeal nerve near the ligament of Berry
- Subtotal Thyroidectomy
 - leaving $>1g$ of tissue with the posterior capsule on the uninvolved side





Thyroid Nodule/ Mx malignant nodules

Staging

Degroot's* staging of thyroid carcinoma

Stage 1	Malignancy is intrathyroidal
Stage 2	Cervical nodal metastasis
Stage 3	Extrathyroidal invasion
Stage 4	Distant metastasis

*Applicable in all thyroid malignancies but mainly used in follicular carcinoma

Risk stratification

- High risk
- Intermediate risk
- Low risk



Thyroid Nodule/ risk stratification

Prognostic indicators in PTC

- ✓ Classify patients into **LOW RISK** and **HIGH RISK** groups
 - AGES scoring system
- **Age, Grade, Extrathyroidal invasion and Size.**
- LOW RISK patients are
 - Young <40 years
 - Well differentiated tumor
 - No mets
 - Small primary lesions (<4cm)
- HIGH RISH include
 - Older >40 years
 - Poorly differentiated tumor
 - Distant metastasis
 - Large primary lesion >4cm



Risk stratification of thyroid cancer

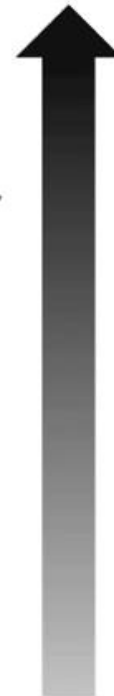
Risk of Structural Disease Recurrence

(In patients without structurally identifiable disease after initial therapy)

High Risk
*Gross extrathyroidal extension,
incomplete tumor resection, distant metastases,
or lymph node >3 cm*

Intermediate Risk
*Aggressive histology, minor extrathyroidal
extension, vascular invasion,
or > 5 involved lymph nodes (0.2-3 cm)*


Low Risk
*Intrathyroidal DTC
≤ 5 LN micrometastases (< 0.2 cm)*



FTC, extensive vascular invasion (≈ 30-55%)
pT4a gross ETE (≈ 30-40%)
pN1 with extranodal extension, >3 LN involved (≈ 40%)
PTC, > 1 cm, TERT mutated ± BRAF mutated* (> 40%)
pN1, any LN > 3 cm (≈ 30%)
PTC, extrathyroidal, BRAF mutated*(≈ 10-40%)
PTC, vascular invasion (≈ 15-30%)
Clinical N1 (≈20%)
pN1, > 5 LN involved (≈20%)
Intrathyroidal PTC, < 4 cm, BRAF mutated* (≈10%)
pT3 minor ETE (≈ 3-8%)
pN1, all LN < 0.2 cm (≈5%)
pN1, ≤ 5 LN involved (≈5%)
Intrathyroidal PTC, 2-4 cm (≈5%)
Multifocal PTMC (≈ 4-6%)
pN1 without extranodal extension, ≤ 3 LN involved (2%)
Minimally invasive FTC (≈ 2-3%)
Intrathyroidal, < 4 cm, BRAF wild type* (≈ 1-2%)
Intrathyroidal unifocal PTMC, BRAF mutated*, ≈ 1-2%)
Intrathyroidal, encapsulated, FV-PTC (≈ 1-2%)
Unifocal PTMC (≈ 1-2%)



Thyroid Nodule/ surgery

- Thyroid cancer >4 cm:
 - ± extrathyroidal extension (clinical T4)
 - clinically apparent Mets disease to nodes (clinical N1)
 - distant sites (clinical M1)
 - initial surgical procedure  near-total or total TX and gross removal of all primary tumor unless there are contraindications to this procedure

Strong recommendation, high-quality evidence, R735-A, ATA 2015



Thyroid Nodule/ surgery

- Thyroid cancer thyroid cancer <1 cm
 - without extra thyroidal extension and cN0
initial surgical procedure → thyroid lobectomy

Strong recommendation, high-quality evidence, R735-C, ATA 2015





Thyroid Nodule/ surgery

Thyroid cancer thyroid cancer >1 cm and <4 cm

A) without extrathyroidal extension

B) and without clinical evidence of any lymph node metastases (cN0)

- Initial surgical procedure can be  near-total or total thyroidectomy)
 unilateral Lobectomy

Strong recommendation, high-quality evidence, R735-B, ATA 2015



Thyroid Nodule/ hemithyroidectomy

- Removal of one lobe with or without the isthmus
 - Follicular adenoma/carcinoma +PTC less than 4cm in good risk group
 - benign disease involving one lobe
 - Solitary toxic or nontoxic nodule
thyroid cyst



Thyroid Nodule/Near total thyroidectomy

- Both lobes are excised except for less than 2 gm near the RLN & Parathyroid glands
 - Mostly in papillary thyroid carcinoma
 - Follicular CA



Thyroid Nodule/ total thyroidectomy

- Age <15or>45[†]
- Tumor >4cm
- Radiation Hx
- Known distant mets
- Bilateral nodularity
- Extrathyroidal invasion
- Cervical LN mets
- Aggressive variant



Thyroid Nodule/thyroidectomy complications

- **Immediate complications**
 - **HEMORRHAGE**
 - **INFECTION**
 - **RECURRENT LARYNGEAL NERVE PALSY**
 - **THYROID CRISES OR STORM**
 - **RESPIRATORY OBSTRUCTION**
 - **PARATHYROID INSUFFICIENCY OR TETANY**
- **Late complications**
 - **THYROID INSUFFICIENCY**
 - **RECURRENT THYROTOXICOSIS**
 - **PROGRESSIVE EXOPHTHALMOS**
 - **HYPERTROPHIC SCAR OR KELOID.**



Thyroid Nodules

MARK A. KNOX, MD, Hawaii Island Family Medicine Residency, Hilo, Hawaii
Am Fam Physician..196-193:(3)88;1 Aug 2013

<https://www.aafp.org/afp/2013/0801/p193.html>