THE UNIVERSITY OF JORDAN | School of MEDICINE

Surgical Management of Thyroid Nodules

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4th year lectures 2024

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Surgical management of thyroid nodules

Definition of thyroid nodule

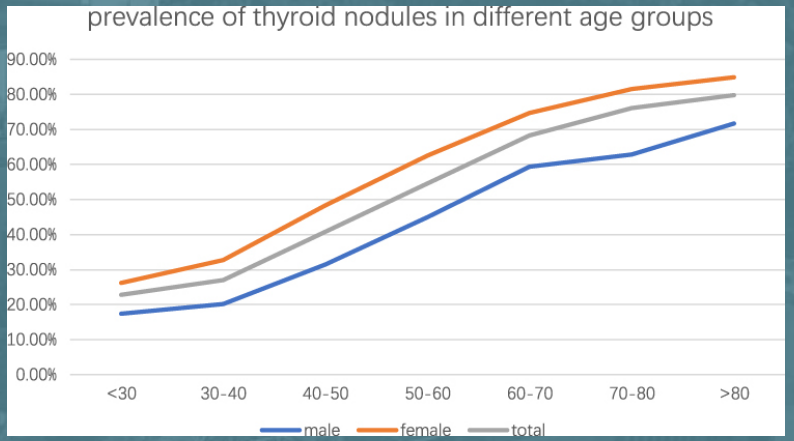
more common in females

- 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”

Surgical management of thyroid nodules

prevalence of thyroid nodule

- General population is 3% to 7%
- high-definition ultrasound is 20% to 76%.2
- In an autopsy study, 12% of thyroid glands contained one nodule, 37% multiple nodules; 2.1% of all glands contained thyroid cancer.



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Surgical management of thyroid nodules

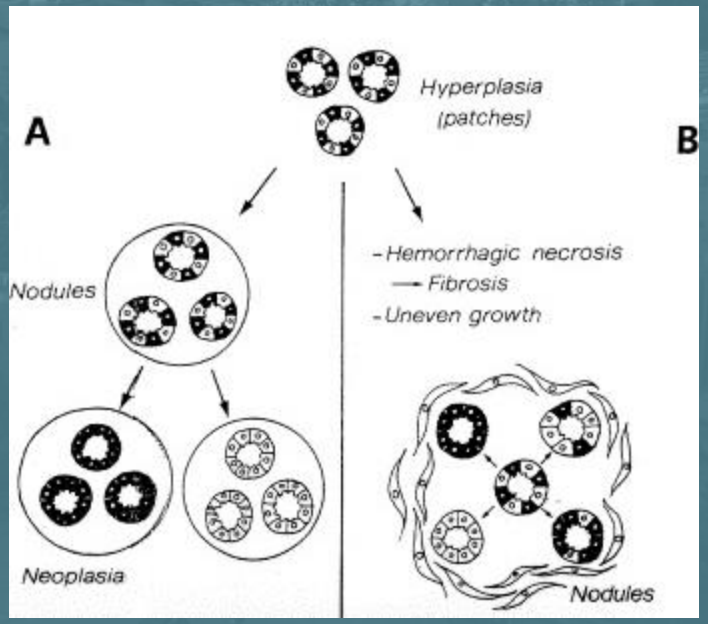
Etiology of thyroid nodule

Benign: most cases

- MNG multi nodular goiter
- Hashimoto's thyroiditis
- Subacute thyroiditis
- Thyroid cyst
- Follicular adenoma

Malignant:

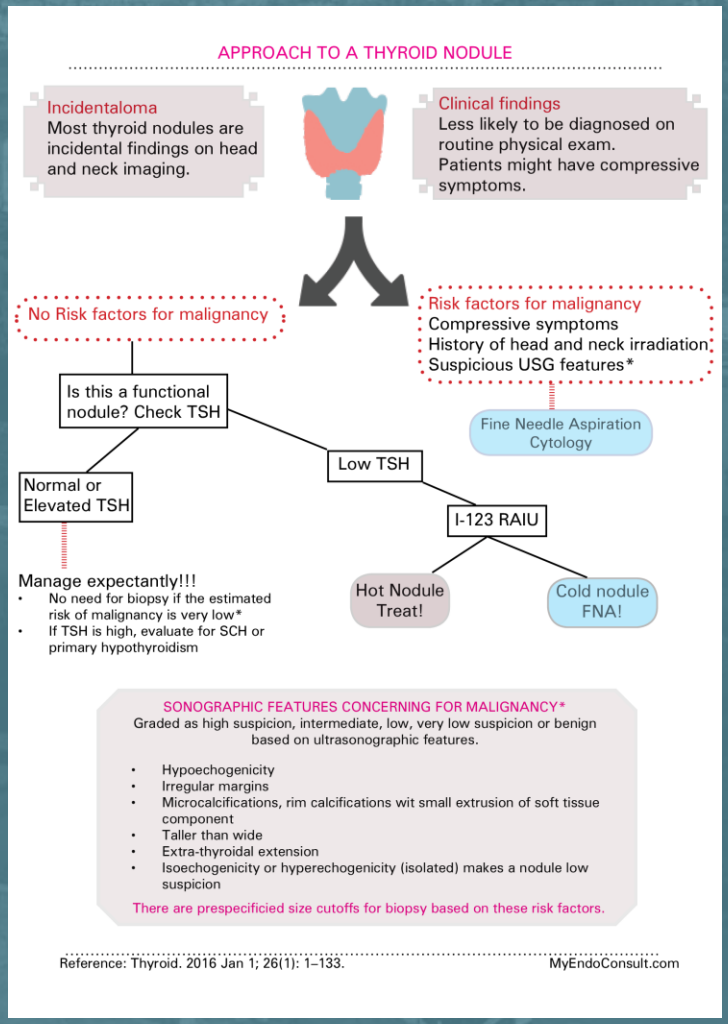
- Papillary carcinoma
- Follicular carcinoma
- Hurthle cell carcinoma
- Medullary carcinoma
- Anaplastic carcinoma
- Primary thyroid lymphoma
- Metastatic malignant lesion



Surgical management of thyroid nodules

Approach to thyroid nodule

1. What is the problem of the patient?
    1. History taking
    2. Physical examination
    3. Investigation serum TSH / US / FNA
2. Diagnosis
    1. Clinical
    2. Micro
    3. Pathologic.. etc
3. Management
    1. Medical
    2. Surgical
    3. others



Surgical management of thyroid nodules

History taking

- **Radiation** x-ray / radioactive or any radiation
- **Time of onset**
- **Age &sex** increase age increase risk of malignancy
- **Voice change**
- **Drugs** amidarone
- **Family history** thyroid problem / thyroid cancer
- **Compression/obstruction** dyspnea / dysphagia
- **Functional disturbance** hyperthyroidism or hypothyroidism

Surgical management of thyroid nodules

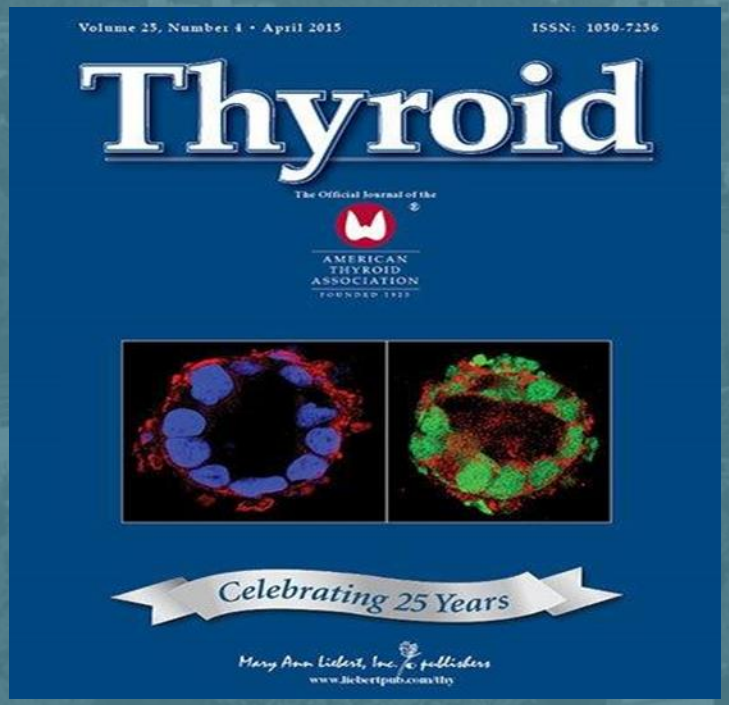
Risk factors

History

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

Physical

- Vocal cord paralysis
- Cervical lymphadenopathy — increase the suspension of papillary thyroid cancer
- Fixation to surrounding tissues — especially for strap muscles (anterior to thyroid gland)



Mary Ann Liebert, Inc. publishers Thyroid®

Thyroid. 2016 Jan 1; 26(1): 1–133.
doi: 10.1089/thy.2015.0020
PMCID: PMC4739132
PMID: 26462967

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

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Abstract Go to: ▸

Background: Thyroid nodules are a common clinical problem, and differentiated thyroid cancer is becoming increasingly prevalent. Since the American Thyroid Association's (ATA's) guidelines for the management of these disorders were revised in 2009, significant scientific advances have occurred in the field. The aim of these guidelines is to inform clinicians, patients, researchers, and health policy makers on published evidence relating to the diagnosis and management of thyroid nodules and differentiated thyroid cancer.

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.

Surgical management of thyroid nodules

Investigations of thyroid nodule

A. Serum thyrotropin (TSH) should be measured during the initial evaluation of a patient with a thyroid nodule.

hyperactivity (can be solitary / diffuse / nodular nodule)

B. If the serum TSH is subnormal, a radionuclide (preferably 123I) thyroid scan should be performed.

no need for radioactive iodine

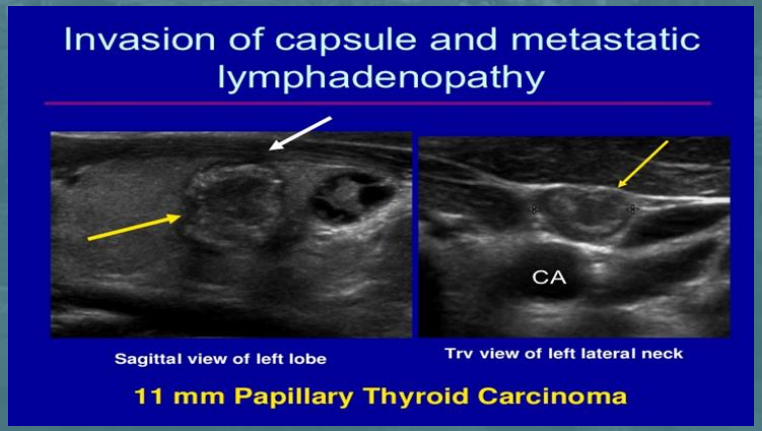
C. If the serum TSH is normal or elevated, a radionuclide scan should not be performed as the initial imaging evaluation.

Strong recommendation, Moderate-quality evidence, R2 ATA 2015

Surgical management of thyroid nodules

Investigation/ US the US will decide the next step

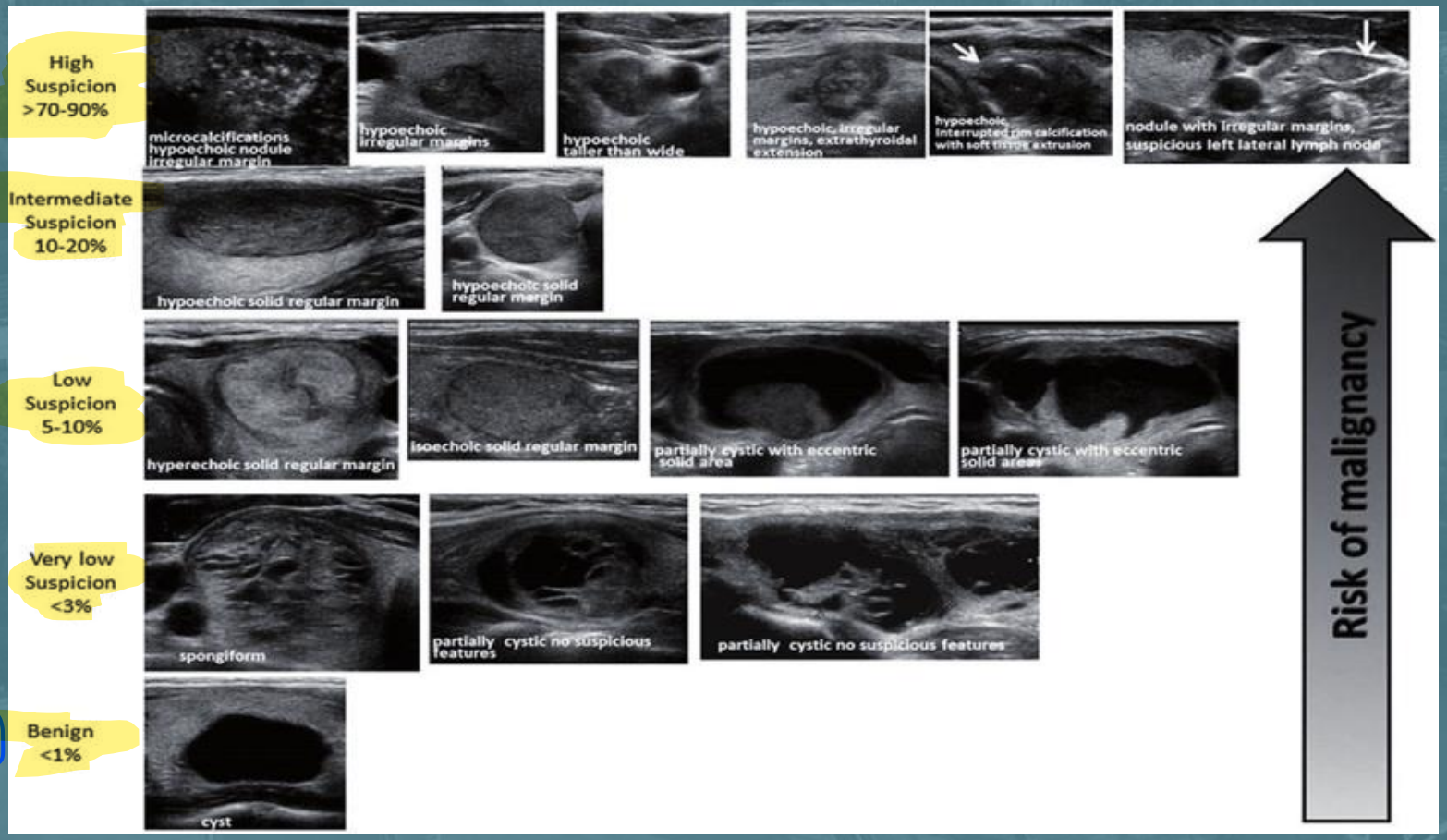
- Thyroid sonography with survey of the cervical lymph nodes should be performed in all patients with known or suspected thyroid nodules.
  - Is there truly a nodule?
  - How large is the nodule?
  - What is the nodule's pattern of ultrasound imaging characteristics?
  - Is suspicious cervical lymphadenopathy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

Surgical management of thyroid nodules

ATA ultrasound risk stratification



Surgical management of thyroid nodules

Investigations of thyroid nodule/ FNA

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

we do FNA if the *Size* nodule > 2cm 1-2cm intermediate to high suspicion

U/S features

three recommendation
US --> based on high quality
FNA --> based on high quality
TSH --> based on moderate quality of evidence

Strong recommendation, high-quality evidence, R7 ATA 2015

Surgical management of thyroid nodules

Clinically indicated FNA

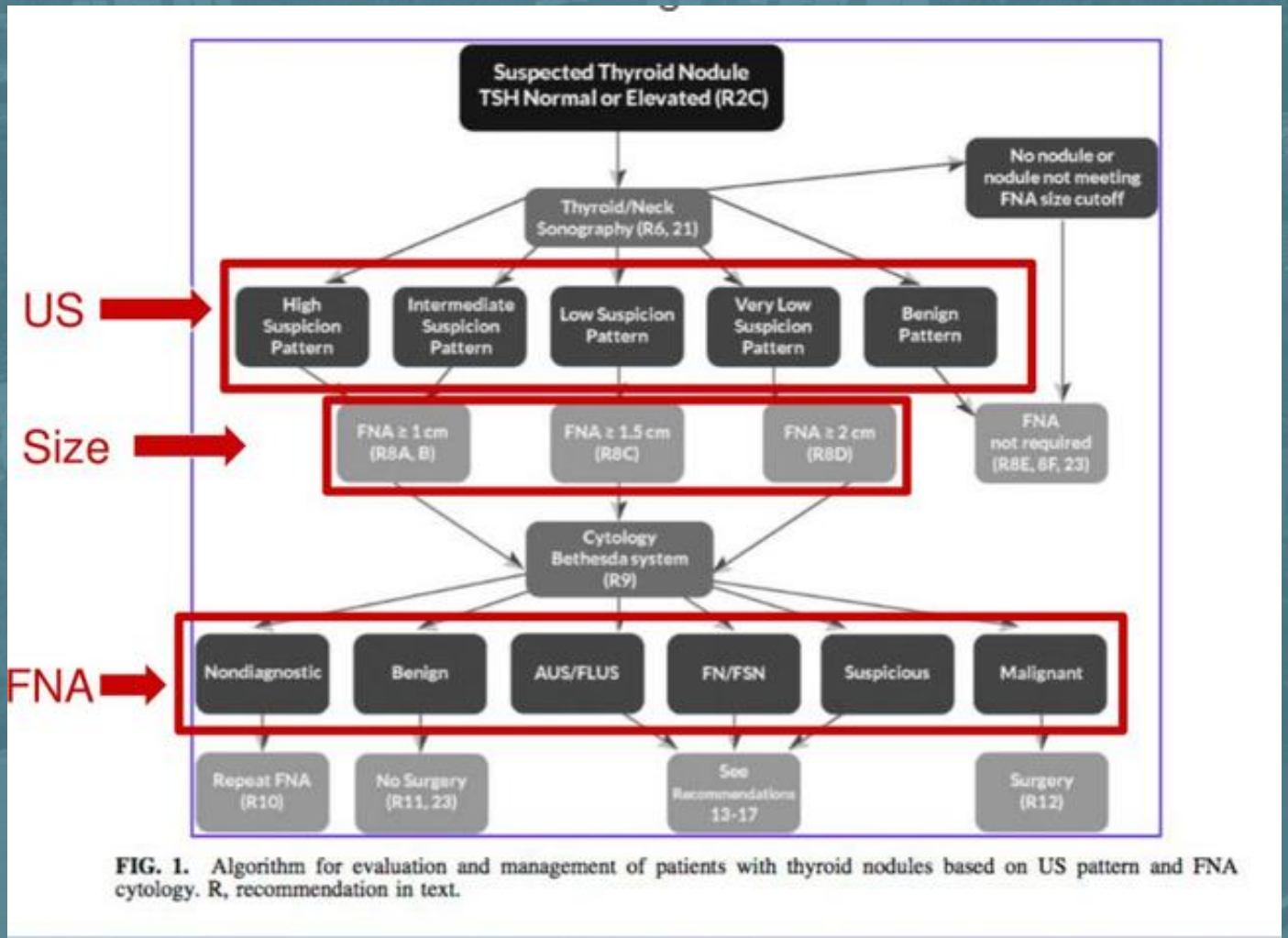
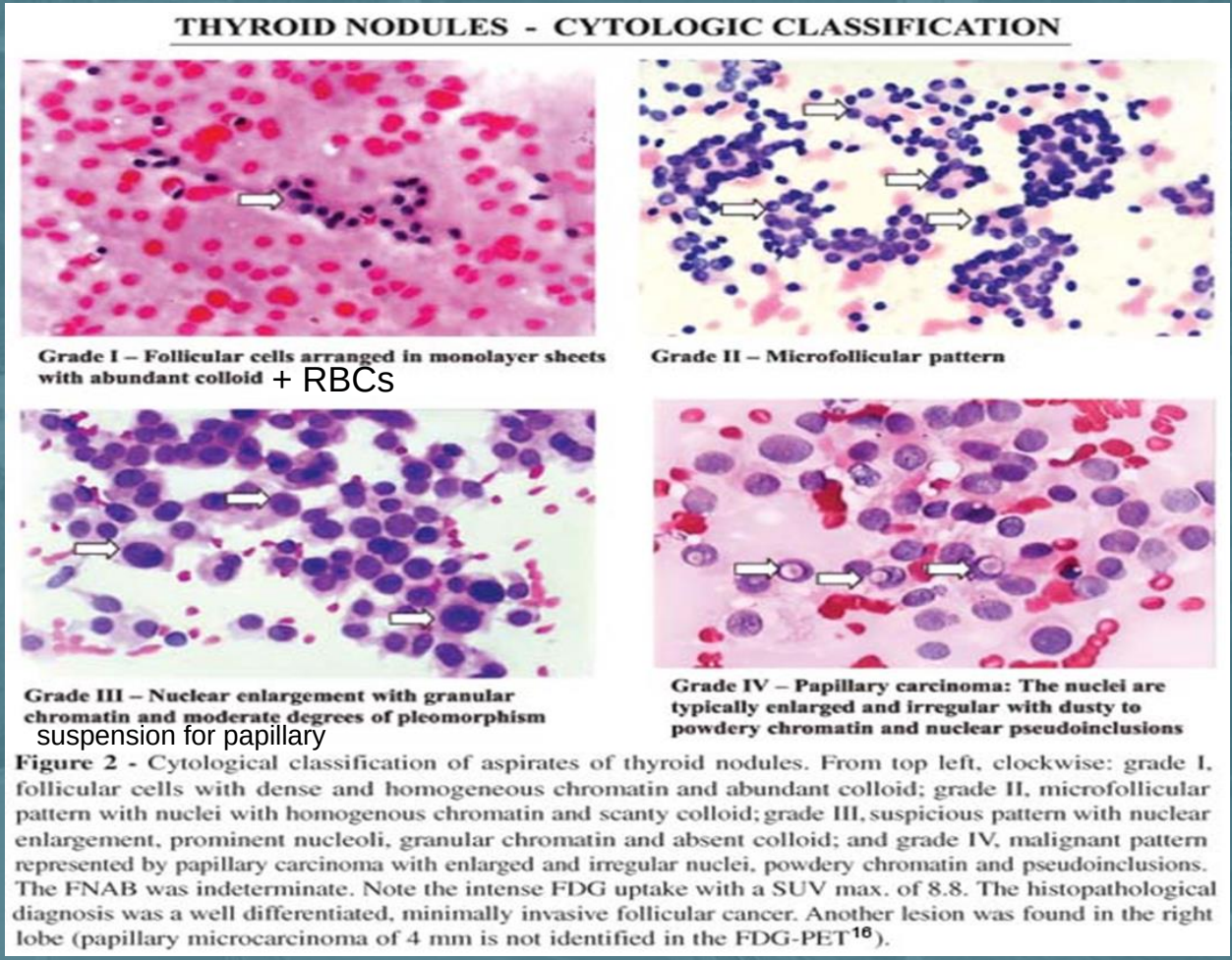


FIG. 1. Algorithm for evaluation and management of patients with thyroid nodules based on US pattern and FNA cytology. R, recommendation in text.

Surgical management of thyroid nodules

FNA cytology



suspension for papillary

Figure 2 - Cytological classification of aspirates of thyroid nodules. From top left, clockwise: grade I, follicular cells with dense and homogeneous chromatin and abundant colloid; grade II, microfollicular pattern with nuclei with homogenous chromatin and scanty colloid; grade III, suspicious pattern with nuclear enlargement, prominent nucleoli, granular chromatin and absent colloid; and grade IV, malignant pattern represented by papillary carcinoma with enlarged and irregular nuclei, powdery chromatin and pseudoinclusions. The FNAB was indeterminate. Note the intense FDG uptake with a SUV max. of 8.8. The histopathological diagnosis was a well differentiated, minimally invasive follicular cancer. Another lesion was found in the right lobe (papillary microcarcinoma of 4 mm is not identified in the FDG-PET[16]).

Surgical management of thyroid nodules

2017 *Bethesda system for reporting thyroid cytopathology*

FNA classification based on

Bethesda Category	Characteristics
Bethesda I Nondiagnostic or unsatisfactory	• Virtually acellular specimen; • Cyst fluid only; • Other (obscuring blood, clotting artifact, etc.).
Bethesda II Benign	• Consistent with a benign follicular nodule (includes adenomatoid nodule, colloid nodule, etc.) • Consistent with lymphocytic (Hashimoto) thyroiditis in the proper clinical context • Consistent with granulomatous (subacute) thyroiditis
Bethesda III Undetermined	• Atypia of undetermined significance or Follicular lesion of undetermined significance
Bethesda IV Undetermined	• Follicular neoplasm/suspicious for a follicular neoplasm • Specify if Hürthle cell (oncocytic) type
Bethesda V Suspicious for malignancy	• Suspicious for papillary carcinoma • Suspicious for medullary carcinoma • Suspicious for metastatic carcinoma • Suspicious for lymphoma
Bethesda VI Malignant	• Papillary thyroid carcinoma • Poorly differentiated carcinoma • Medullary thyroid carcinoma • Undifferentiated (anaplastic) carcinoma • Squamous-cell carcinoma • Carcinoma with mixed features (specify) • Metastatic carcinoma • Non-Hodgkin lymphoma

Bethesda Category

no enough material in FNA
we need to retry the biopsy

not clear to take decision
20-50% risk of malignancy

we can do observation and let the patient back after 3-6 months or do hemithyroidectomy

we need further surgical management to know if it is adenoma or carcinoma

suspension for malignancy

need surgical intervention

improved malignancy

approach
1- history / physical
2- TSH
3- US
4- FNA (BETHESDA)

Surgical management of thyroid nodules

FNA cytology and 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

it depends on the case and the doctor

undetermined

surgical management

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 [ ]

Surgical management of thyroid nodules

Management

The 2017 Bethesda system for reporting thyroid cytopathology

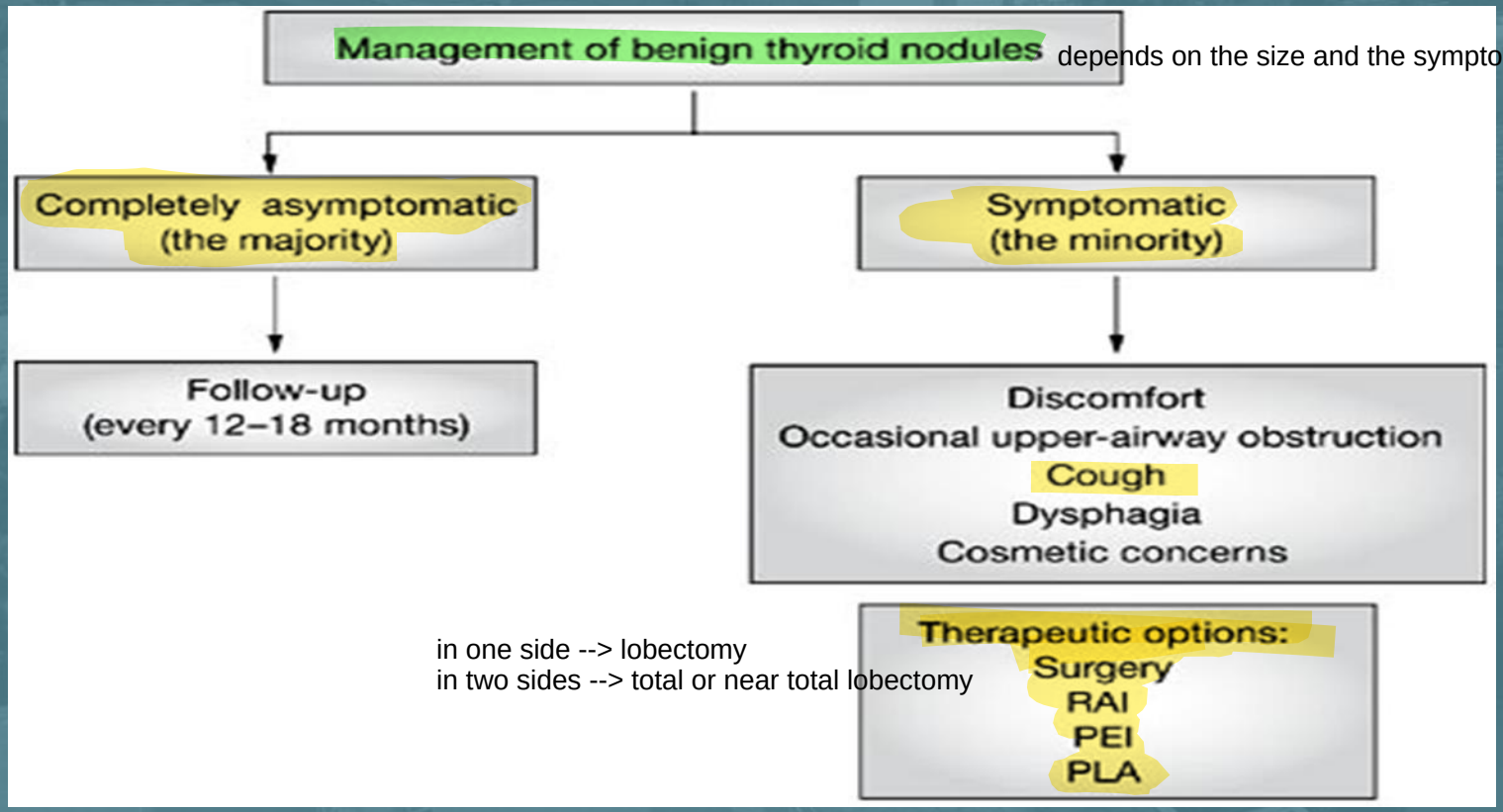
Implied risk of malignancy and recommended clinical management (simplified)

Diagnostic category	Risk of malignancy		Usual management
	NIFTP ≠ cancer	*NIFTP = cancer*	
I. **Nondiagnostic**	5–10%	5–10%	Repeat FNA with ultrasound guidance over 3-6 months
II. **Benign**	0–3%	0–3%	Clinical and sonographic follow–up follow the patient after 6 months
III. **AUS/FLUS**	6–18%	≈ 10–30%	Repeat FNA, molecular testing, or lobectomy
IV. **FN/SFN**	10–40%	25–40%	Molecular testing, lobectomy not in jordan
V. **Suspicious for malignancy**	45–60%	50–75%	Near–total thyroidectomy or lobectomy
VI. **Malignant**	94–96%	97–99%	Near–total thyroidectomy or lobectomy

Molecular testing

Surgical management of thyroid nodules

Management of benign nodules

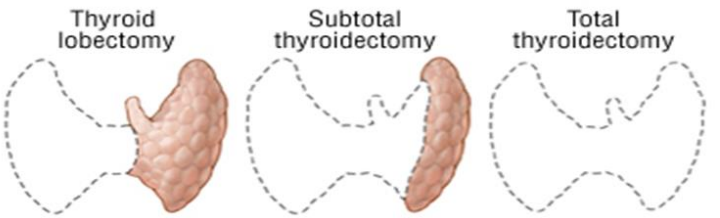


Surgical management of thyroid nodules

surgery

Thyroid Surgery (Definitions)

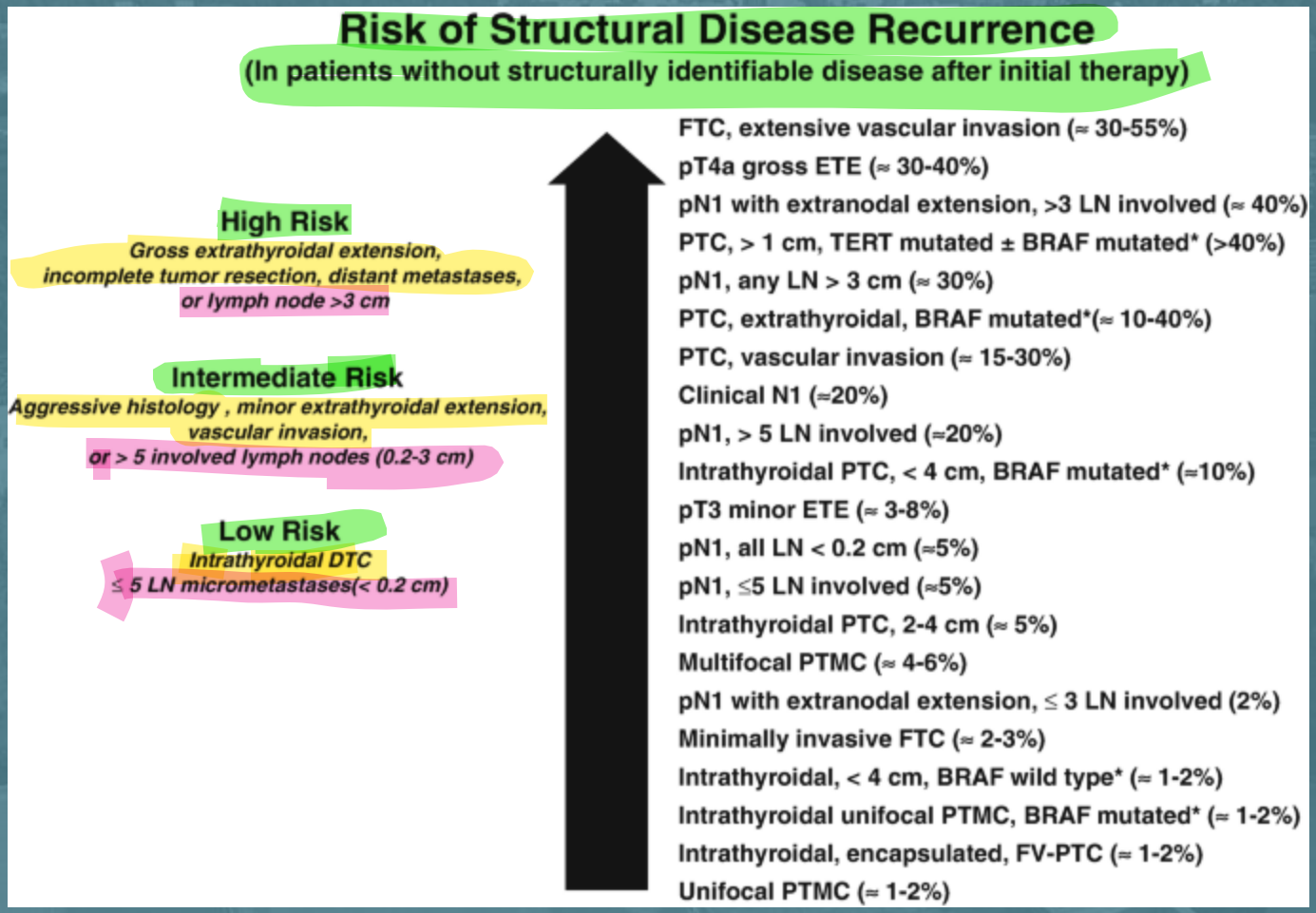
- Total Thyroidectomy
  - Removal of all grossly visible thyroid tissue
- Near Total Thyroidectomy
  - Removal of all grossly visible thyroid tissue, leaving only a small amount [<1g] of tissue adjacent to the recurrent laryngeal nerve near the ligament of Berry
- Subtotal Thyroidectomy
  - leaving >1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



if we remove one lobe --> hemithyrodictomy
if we remove lobe + pyramidal lobe + isthmus --> extended hemithyrodictomy

Surgical management of thyroid nodules

Risk stratification



TSH suppression

High Risk

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

RAI
radioactive iodine

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

Intermediate Risk

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

- surgery — total or near total
- TSH suppression
- RAI — radio active iodine but not all patient just for the patient in the last intermediate risk group

Low Risk 70-80% (most common)
<50 years old male or female

Intrathyroidal DTC
≤ 5 LN micrometastases(< 0.2 cm)

→ Surgery

Total thyroidectomy
Hemithyroidectomy

no need for radioactive iodine or TSH suppression

Strong recommendation, high-quality evidence, R35-B, ATA 2015

Surgical management of thyroid nodules

Submetacentric lesions

like low risk

Thyroid cancer thyroid cancer <1 cm

no need for radioactive iodine or TSH suppression

- without extra thyroidal extension and cN0
- initial surgical procedure thyroid lobectomy

Strong recommendation, high-quality evidence, R35-C, ATA 2015

Surgical management of thyroid nodules

RAI therapy

High risk disease

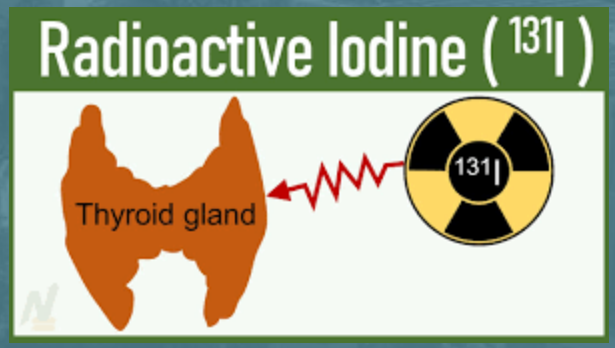
RAI indicated

Intermediate risk disease

RAI indicated in some patients

Low risk disease

RAI is not indicated



Surgical management of thyroid nodules

TSH suppression therapy

TSH in follow up

- High-risk thyroid cancer patients: <0.1 mU/L.
- Intermediate-risk: 0.1– 0.5 mU/L.
- Low-risk:

1. Lobectomy (no ablation): 0.5-2 mU/L
2. Remnant ablation and undetectable Tg: 0.5– 2 mU/L
3. Remnant ablation and low-level Tg: 0.1-0.5 mU/L

2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid 2016; 26:1.

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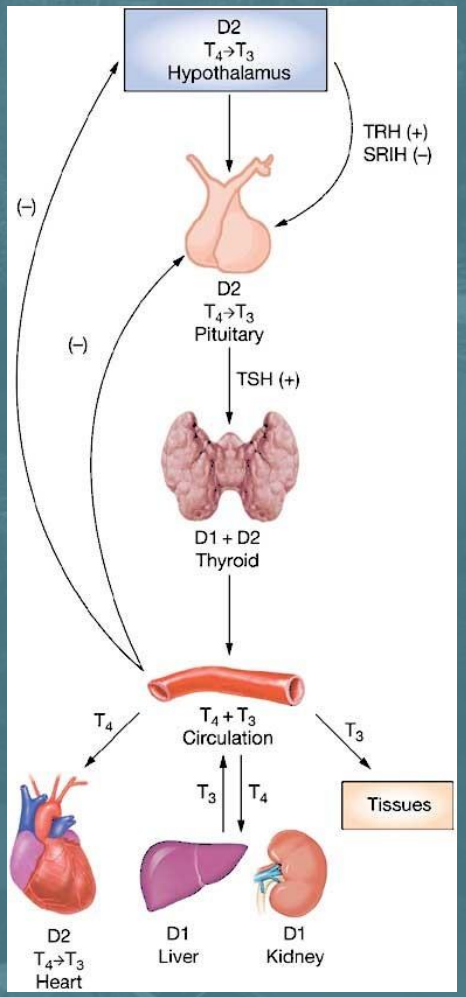

Surgical management of thyroid nodules

Complications of thyroid surgery

Immediate complications

within 24-72 hours

- HEMORRHAGE
- INFECTION
- RECURRENT LARYNGEAL NERVE PALSY
- THYROID CRISES OR STORM
- RESPIRATORY OBSTRUCTION
- PARATHYROID INSUFFICIENCY OR TETANY due to injury of parathyroid gland

Late complications

- THYROID INSUFFIENCY
- RECURRENT THYROTOXICOSIS
- PROGRESSIVE EXOPHTHALMOS
- HYPERTROPHIC SCAR OR KELOID.