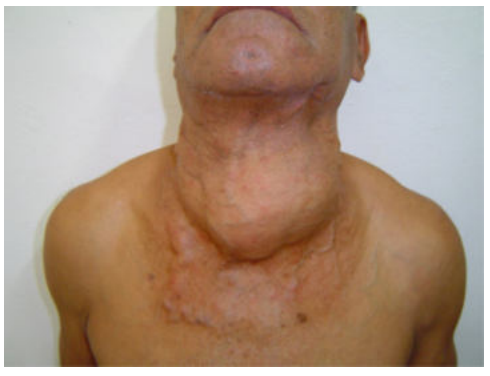
Thyroid Neoplasms



Dept. of Surgery

Introduction

- Six deaths per 1 million people occur annually.
- Occurs in about 40 per 1 million people per year
- The most common endocrine malignancy
- Accounts for 95% of all endocrine cancers
- Female to Male Ratio 2.5:1

Thyroid Neoplasms

Primary Tumours

- Epithelial
- Malignant Lymphomas
- Mesenchymal tumours

Metastatic Tumours

Epithelial Thyroid Neoplasms

- Tumours of follicular cells
  - Benign (adenomas)
    - Follicular adenoma
  - Malignant (carcinomas)
    - Follicular carcinoma (10-20%)
    - Papillary carcinoma (75-85%)
    - Undifferentiated (anaplastic) carcinoma (<5%)
- Tumours of C-cells
  - Medullary thyroid carcinoma (MTC - 5%)

Risk Factors for Thyroid Cancer

The only well-established risk factor for differentiated thyroid cancer is head and neck Radiation,especially during infancy

Papillary thyroid carcinoma may occur in several rare inherited syndromes, including familial adenomatous polyposis, Gardner's syndrome, and Cowden's disease

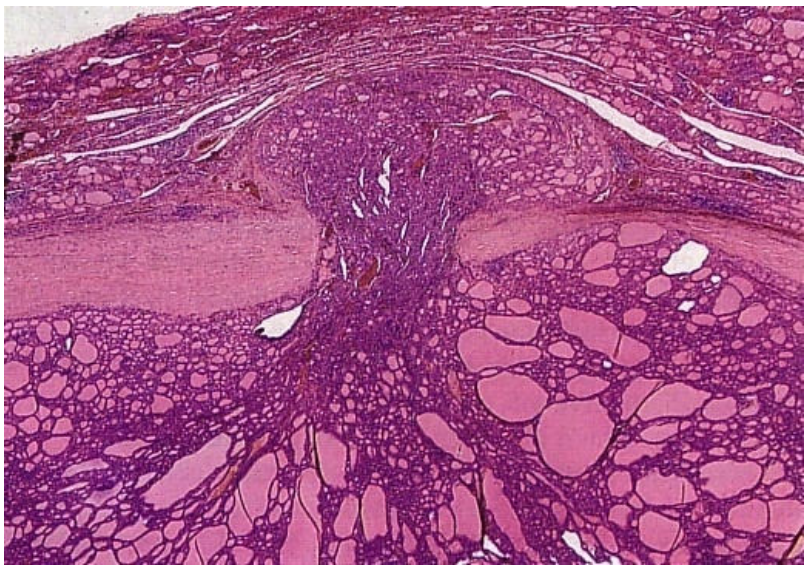
Patient's Age and Gender

- Malignancy more common in children and adults >60
- Men

Follicular Carcinoma

- Second most common form, 10-20%
- Females > Males, average age = 45 - 55 yr
- Rare in children
- Solitary nodule, painless, cold on isotopic scan
- 50% 10 yr survival Vs 90%10 yr survival
- Haematogenous route is preferred mode of spread

Follicular Carcinoma

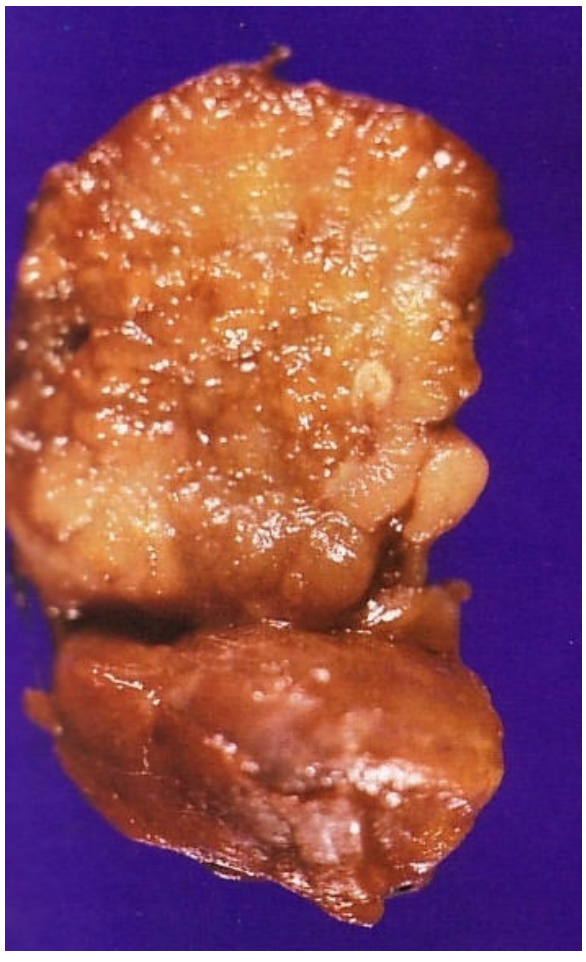


- Solitary round or oval nodule
- Thick capsule
- Composed of follicles
- Capsular invasion or vascular invasion within or outside capsular wall

Papillary Carcinoma

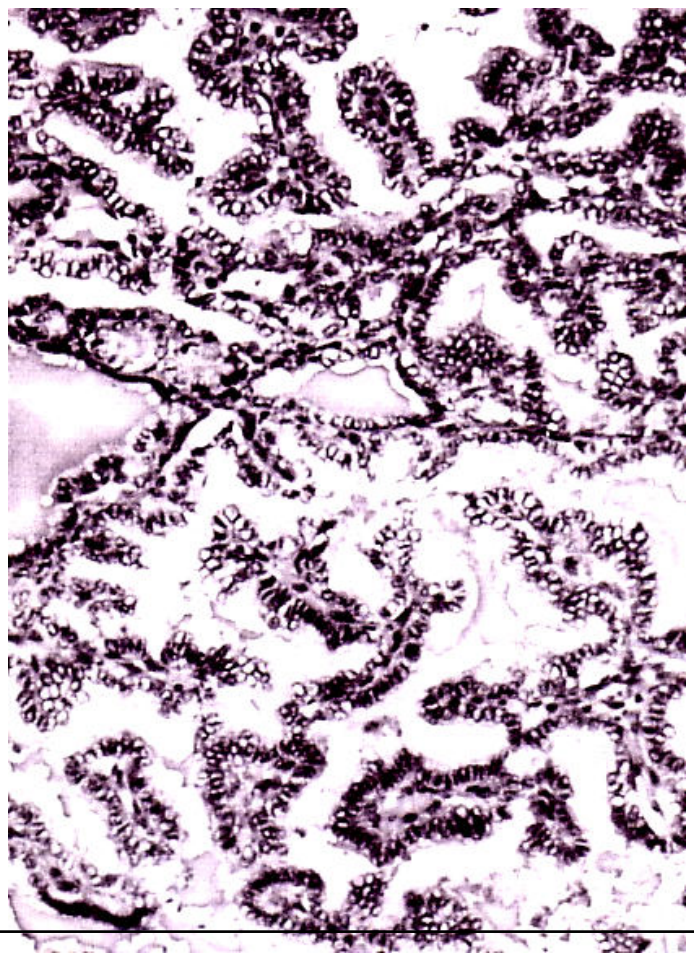
- Commonest thyroid malignancy, 75-85%
- Female:Male = 2.5:1
- Mean age at onset = 20 - 40 yr
- May affect children
- Prior head & neck radiation exposure
- Indolent, slow-growing painless mass cold on isotopic scan
- Cervical lymphadenopathy may be presenting feature

Papillary Carcinoma



- Variable size (microscopic to several cm)
- Solid or cystic
- Infiltrative or encapsulated
- Solitary or multicentric (20%)

Papillary Carcinoma



Nuclear Features

- Optically clear (ground glass, Orphan Annie) nuclei
- Nuclear pseudoinclusions or nuclear grooves

Papillary Carcinoma Prognosis

Excellent but following factors play important role:

- Age and sex
- Size
- Multicentricity
- Extra-thyroid extension
- Distant metastasis
- Total encapsulation, pushing margin of growth & cystic change

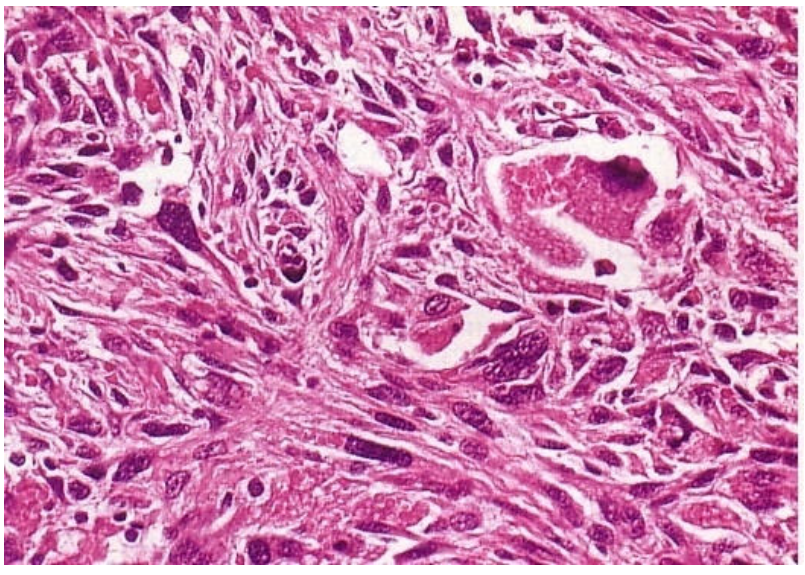
Anaplastic Carcinoma

- Rare; < 5% of thyroid carcinomas
- Highly malignant and generally fatal < 1yr.
- Elderly 65 yrs; females slightly > males
- Rapidly enlarging bulky neck mass
- Dysphagia, dyspnoea, hoarseness

Anaplastic Carcinoma

- Large, firm, necrotic mass
- Frequently replaces entire thyroid gland
- Extends into adjacent soft tissue, trachea and oesophagus
- Highly anaplastic cell on histology with:
  - Giant, spindle,small or mix cell population
- Foci of papillary or follicular differentiation

Anaplastic Carcinoma



- Cellular pleomorphism
- +/- multinucleated giant cells
- High mitotic activity
- Necrosis

Medullary Thyroid Carcinoma (MTC)

- Malignant tumour of thyroid C cells producing Calcitonin
- 5 % of all thyroid malignancies
- Sporadic (80%)
- Rest in the setting of MEN IIA or B or as familial without associated MEN syndrome

Medullary Thyroid Carcinoma (MTC)

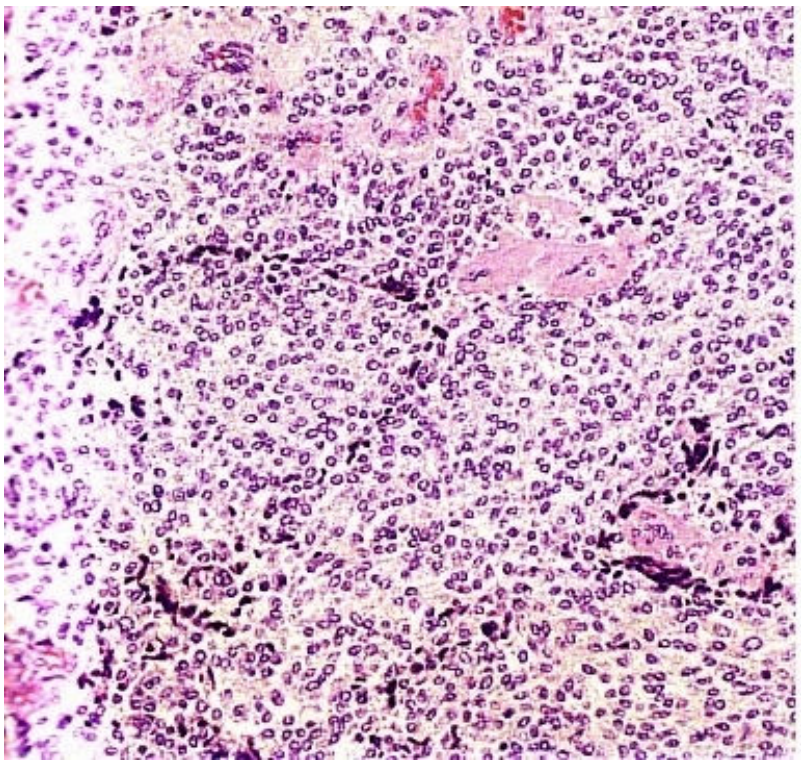
Sporadic MTC

- Middle-aged adults
- Female:male = 1.3:1
- Unilateral involvement of gland
- +/- cervical lymph node metastases
- Indolent course with 60-70% 5-yr survival after thyroidectomy

Multiple Endocrine Neoplasia Types IIA & IIB

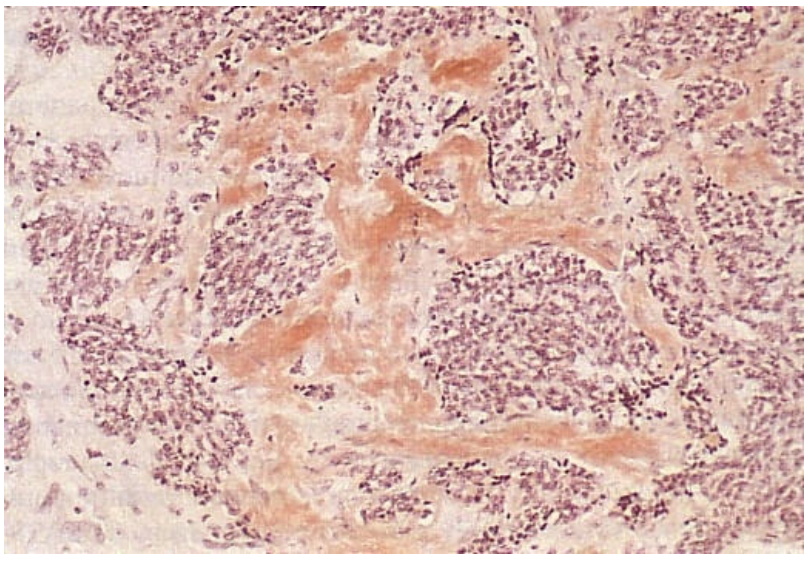
- ***Germ-line mutation in Ret*** protooncogene on chromosome 10q11.2
- MEN IIA: MTC, phaeochromocytoma, parathyroid adenoma or hyperplasia
- MEN IIB: MTC, phaeochromocytoma, mucosal ganglioneuromas, Marfanoid habitus, other skeletal abnormalities

Medullary Thyroid Carcinoma (MTC)



- Histology same for sporadic & familial
- Solid, lobular or insular growth patterns
- Tumour cells round, polygonal or spindle-shaped
- Amyloid deposits in many cases

Medullary Thyroid Carcinoma (MTC)



- Amyloid deposits stain orange-red with Congo Red stain

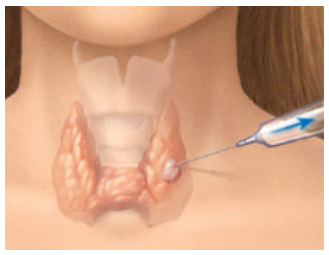
Clinical Manifestation

- Most patients are euthyroid and present with a thyroid nodule
- Symptoms such as dysphagia, dyspnea and hoarseness usually indicate advanced disease
- Ipsilateral Cervical lymph glands may also be present.

Diagnosis

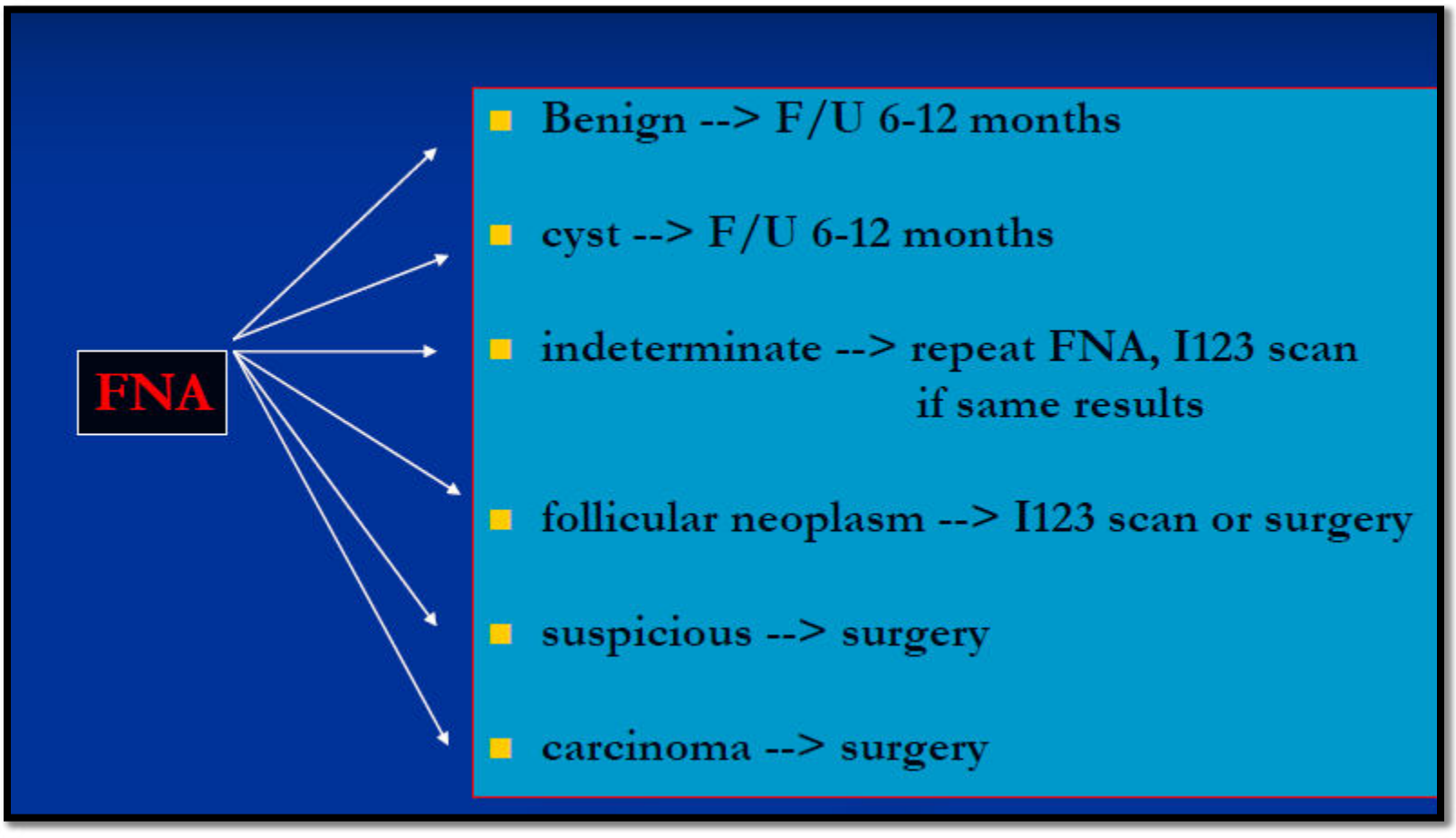
- Serum TSH
- Fine Needle Aspiration Cytology (FNA)
- High Resolution Thyroid US- helpful in detecting non palpable nodule and solid versus cystic lesion
- Thyroid Isotope Scanning- to assess functional activity of a nodule

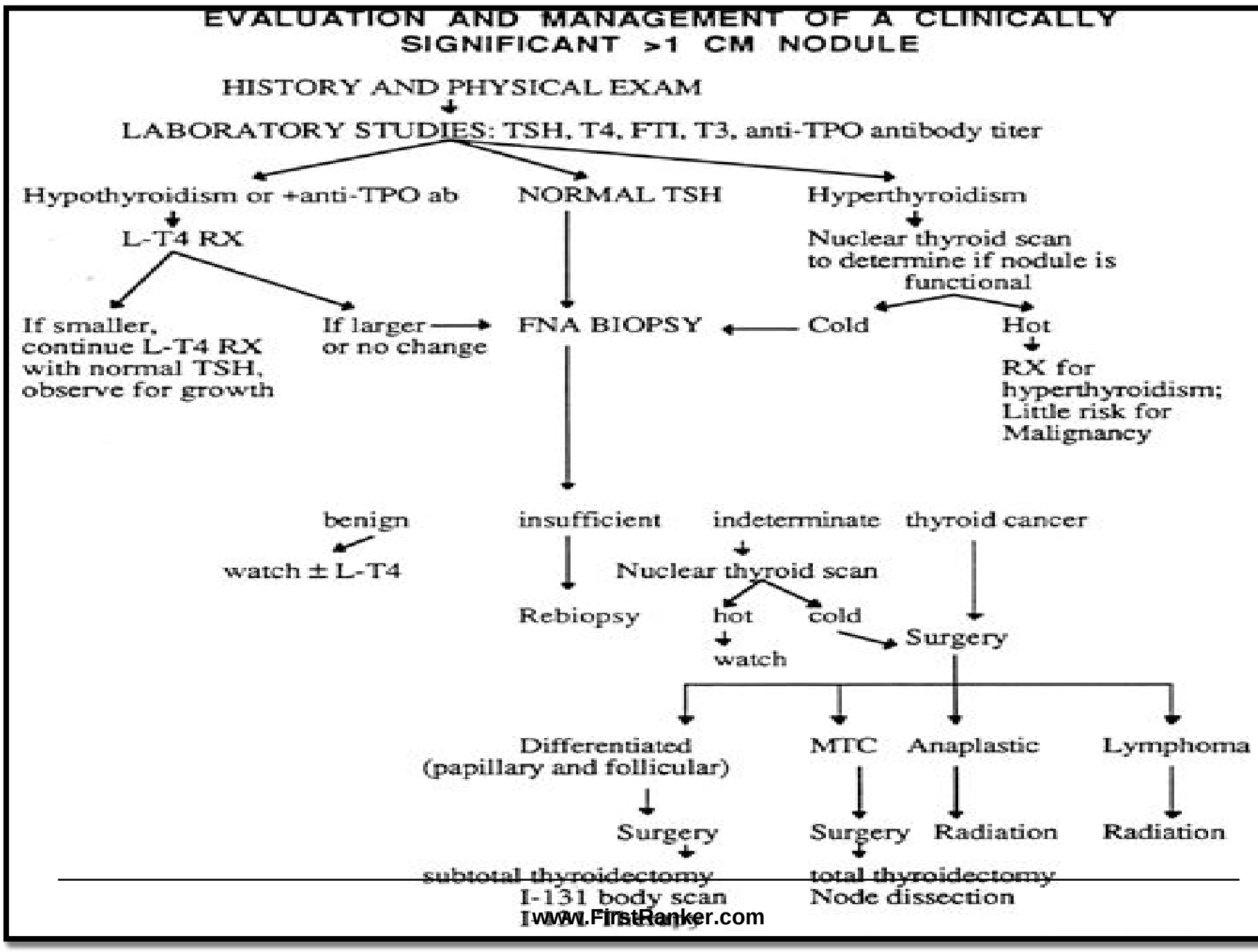
Fine Needle Aspiration



- Procedure of Choice – Fast, minimally invasive and few risk
- Incidence of False positive: 1%
- Incidence of False negative: 5%
- FNA is not a tissue diagnosis
- Limitation of FNA: cannot distinguish a benign follicular from a malignant lesion.

FNA Results of Thyroid Nodule





Staging For Differentiated Thyroid Cancer

In differentiated thyroid carcinoma, several classification and staging systems have been introduced. However, no clear consensus has emerged favoring any one method over another

- **AMES system/AGES System/GAMES system**
- **TNM system**
- **MACIS system**
- **National Thyroid Cancer Treatment Cooperative Study (NTCTCS)**

Prognosis

- **GAMES scoring (Papillary & Follicular Cancer)**
  - G Grade
  - A Age of patient when tumor discovered
  - M Metastases of the tumor (other than Neck LN)
  - E Extent of primary tumor
  - S Size of tumor (>5 cm)

The patient is then placed into a high or low risk Category

Age for poor prognosis has been raised from 45 to 55 years (AJCC 8th Edition)

(GAMES)

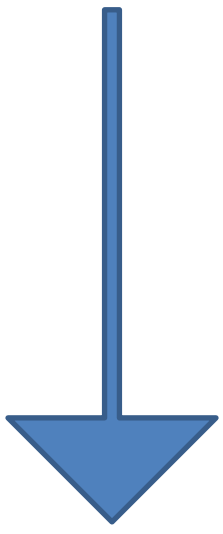
	Low Risk	High Risk
Age	<40	>40
Sex	Female	Male
Extent	No local extension, intrathyroidal, no capsular invasion	Capsular invasion, extrathyroidal extension
Mets	None	Regional or Distant
Grade	Well Differentiated	Poorly Differentiated

Prognosis of Thyroid Carcinomas

Papillary — Best prognosis

Follicular

Medullary



Anaplastic — Worst prognosis

Hürthle Cell Neoplasms

- More aggressive than other differentiated thyroid carcinomas (higher mets/lower survival rates)
- Decreased affinity for I^{131}
- Need to differentiate from benign/malignant
- 65% of tumors > 4cm are malignant
- If malignant, needs total thyroidectomy and I^{131} with thyroglobulin assays
- Mets may be more sensitive to I^{131} than primary

Secondary Tumours

Direct extensions from: larynx, pharynx, oesophagus

Metastasis from: renal cell carcinoma, large bowel carcinoma, malignant melanoma, lung carcinoma, breast carcinoma

Treatment

The main treatment of papillary carcinoma of the thyroid is surgical resection.

For lesions <1 cm, there is general agreement in the literature that lobectomy plus isthmectomy is the appropriate treatment.

For adults with lesions larger than 2 cm, a total thyroidectomy is favored by most surgeons.

Patients with history of exposure to ionizing radiation of the head and neck should have total thyroidectomy

Controversies in Treatment

Total Vs Lobectomy

- Controversy exists about the use of total thyroidectomy versus lobectomy and isthmectomy in adults with a 1- to 2-cm lesions

- Role of Lymph node dissection also debated

Central Lymph Node Dissection

Central compartment =the region bounded by the jugular veins, the hyoid bone, and the sternal notch

All central nodes removed at time or procedure

Removal of Central Nodes important in medullary and Hurthle Cell Ca

- Microscopic spread is high
- Do not take up I^{131} and cannot be ablated

Lateral Lymph Node Dissection

Diseased nodes lateral to the jugular vein =modified radical neck dissection

Removal of LN's anterior and posterolateral to the IJV from the mastoid to the subclavian vessels inferiorly and laterally to spinal accessory nerve (Level 2-5)

Sparing the internal jugular vein, spinal accessory nerve, and sternocleidomastoid muscle

Treatment

- **Papillary cancer**
  - < 1 cm — Lobectomy & isthmusectomy
  - >2cm — Total thyroidectomy
- **Follicular cancer** — Total thyroidectomy
- **Hurthle** — Total thyroidectomy
- **Medullary** — Total thyroidectomy & central neck dissection

Complications of Surgery

Hypocalcemia -devascularization of parathyroid

about 5%, which resolves in 80% of these cases in about 12 months

Recurrent Laryngeal Nerve Injury-either traction induced or division.

less than 3%

Bleeding

wound hematomas

Postoperative management for thyroid cancer

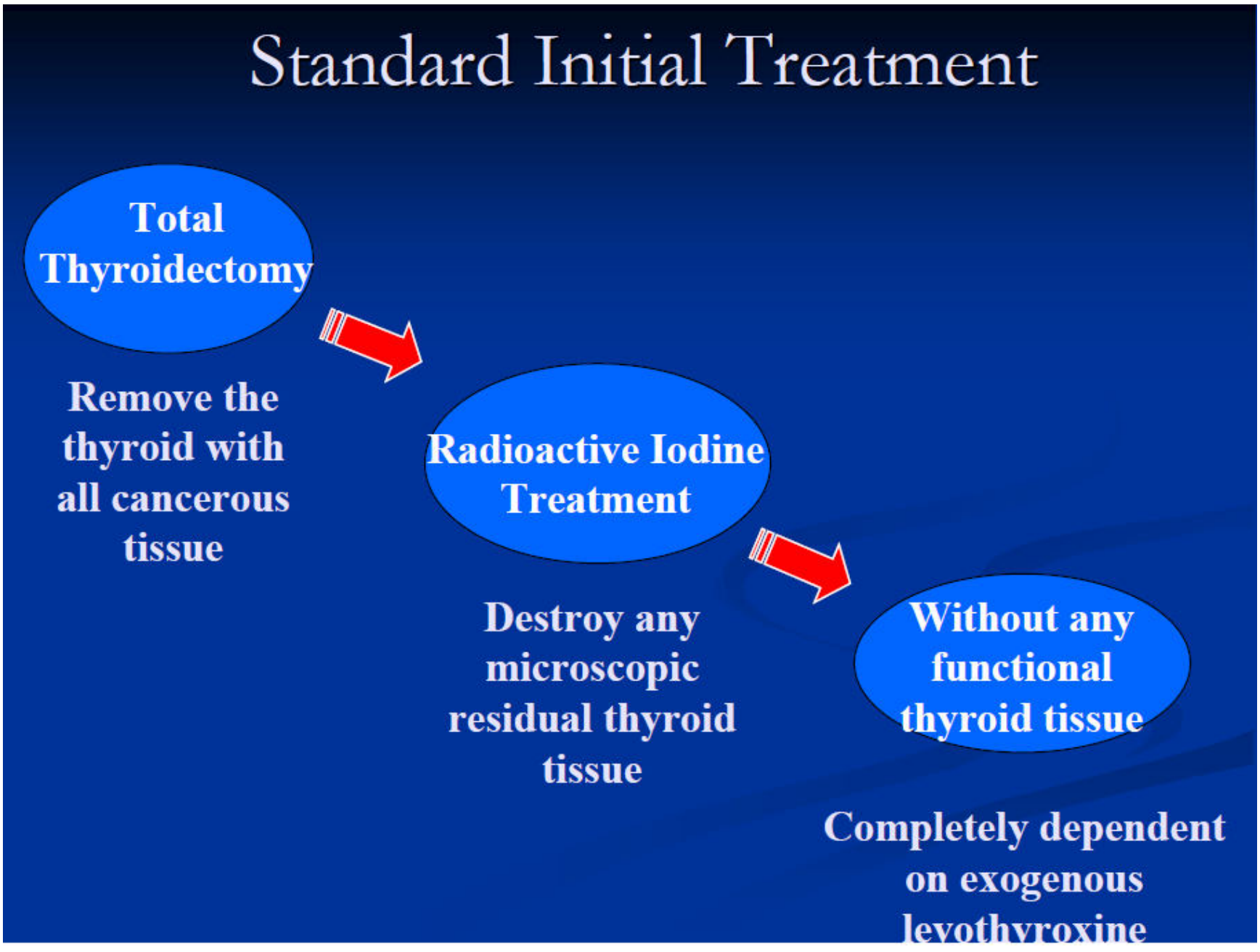
Two principles:

- Radioiodine remnant ablation
- Adminstration of Thyroid Hormone
  - To suppress TSH and growth of any residual thyroid
  - To maintain patient euthyroid
    - Maintain TSH level 0.1uU/ml in low risk pts
    - Maintain TSH Level < 0.1uU/ml in high risk pts

Postoperative RAI

Recommendations:

- Postoperative remnant ablation for all patients with differentiated thyroid carcinoma 45 years of age or older
- Those with primary tumor 1.5 cm in diameter or more
- Extrathyroidal disease, whether manifested by direct invasion through the capsule of the gland or local or regional metastases.



Radioiodine therapy

The nonsurgical treatment for papillary thyroid carcinoma is radioiodine (131-I).

Radioiodine has three uses in the postoperative treatment of patients with thyroid cancer:

- ablation of residual thyroid tissue
- imaging for possible recurrent disease
- treatment of residual or recurrent thyroid cancer

External Beam Radiotherapy and Chemotherapy

External Radiation required to control unresectable cancer.

Chemotherapy may occasionally be beneficial in patients with progressive symptomatic thyroid carcinoma that is unresponsive or not amenable to surgery, radioiodine therapy, or external radiotherapy