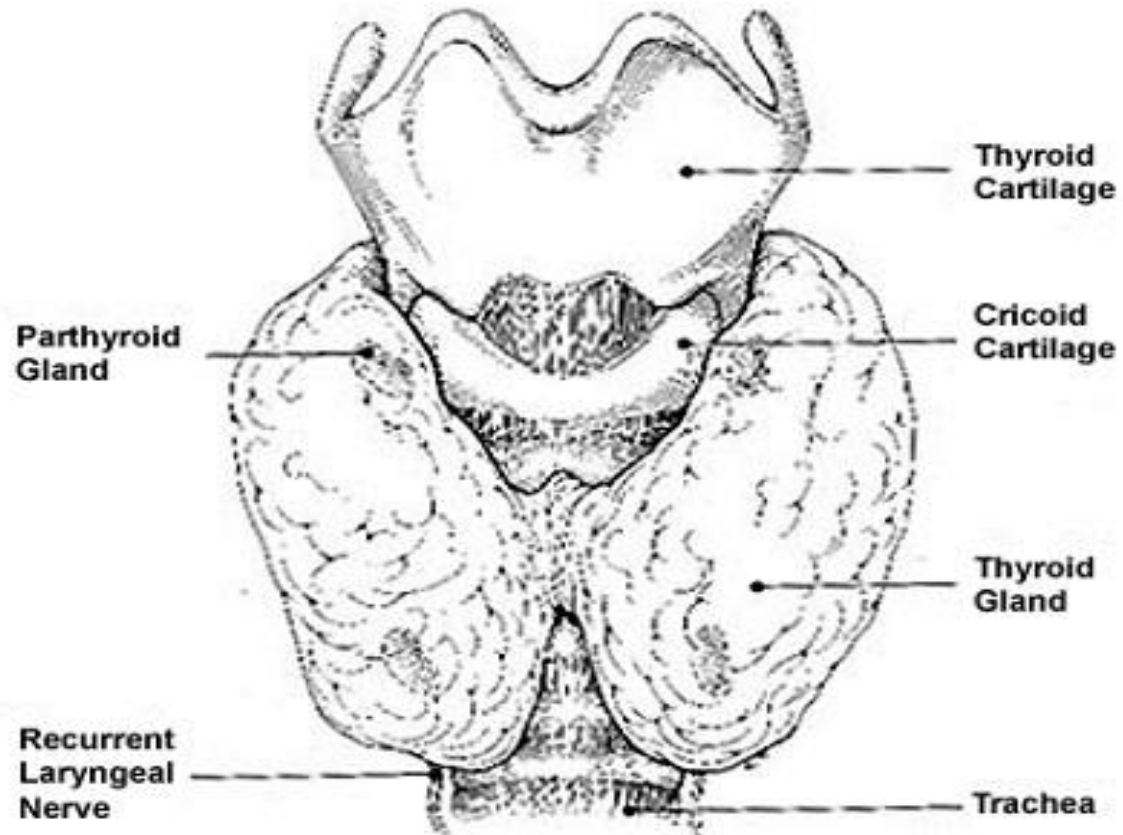


# *Approach to a thyroid nodule*

Ayman Mismar



# Anatomy of the Thyroid Gland



# Thyroid Hormones

- Thyroid pro-hormone is stored as thyroglobulin as an extracellular colloid
- T3 and T4 can cross lipid membranes readily (secretion and uptake)
- T3 and T4 are small, hydrophobic and circulate bound to Thyroxine-binding globulin (TBG)

# Approach

- Clinical.
- Biochemical.
- Radiological.
- Histopathological.

# Clinical

- History taking.
- Physical examination.

# History

- Profile.
- Mass in ant. neck (onset, duration, pain, course, trauma....)
- Assessment of function( Symptoms of thyrotoxicosis or hypothyroidism)
- Risk factors for malignancy.
- Review of Systems, medical hx., past hx, drug hx, social hx.

# Symptoms of thyrotoxicosis

- nervousness, tremors, sweating, heat intolerance, palpitations, wt loss despite normal or increased appetite, amenorrhea, weakness.

# Hypothyroidism

- Lethargy, hoarseness, hearing loss, thick and dry skin, constipation, cold intolerance, stiff gait, weight gain.



# Risk factors for malignancy

Age

sex

occupation

family hx

Painless

Hoarseness

Hx of irradiation

hard,

LN enlargement

residency,.....etc.

# Physical Exam

- Swelling in the anatomical site of thyroid.
- Moves with swallowing

# Goitre

- Diffuse
- Nodular

-Solitary nodule

-Multinodular goitre

- Anatomical dx includes

retrosternal extension

extension below sternocleidomastoid

# Solitary Nodule

- Neoplastic
- Non neoplastic

# Non Neoplastic

- Cyst: degenerative, Hemorrhagic, Hydatid...  
Surgery is indicated after second recurrence.
- Solid : Part of Multinodular Goiter.

# Neoplastic

- Benign: Follicular adenoma
- Malignant: Wide spectrum of behaviour

# Papillary Ca

- Most common, Best prognosis
- 10 year survival around 85 %
- At younger age group.
- Spreads by lymphatics.
- Can be multifocal.
- Can be familial.
- Usually sensitive to RAI



# Follicular Ca

- 10 y survival around 60 %.
- Associated with iodine deficiency.
- Usually monofocal.
- Haematogenous spread.
- Diagnosed by capsular and vascular infiltration.
- Sensitive to RAI.

# Medullary Ca

- From Parafollicular cells.
- 10 year survival 25-30%
- Can be Familial or Sporadic.
- Can be part of MEN 2.
- Does not uptake RAI.

# Anaplastic

- Around 1 %
- Very aggressive tumor.
- The worst prognosis
- Survival is usually less than 6 months

# Fibrolymphovasclar tumors

- Haemangioma, Lymphoma, Fibroma,.....
- Secondary Metastases.

# Biochemical

- Thyroid function tests: T3, T4, TSH.
- Antithyroid Antibodies: antithyroglobulin, antimicrosomal antibodies.

# Imaging Assessment

- Ultrasound.
- Computerized tomographic scan.
- Magnetic resonance scan.
- Radioactive Iodine scan.

# Pathological Dx

- Fine Needle Aspiration.
- Surgery for definitive biopsy.

# Ultrasound

- One nodule or more
- Cystic or solid
- Presence or absence of features of malignancy
- Cervical LN enlargement



# Features of malignancy in U/S

- Microcalcification.
- Hypoechoic nodules.
- Increased vascularity.
- Interrupted halo sign

# U/S guided FNA

- Preferred if
  - > 50 % cystic lesion.
  - located posteriorly.

# Serum Thyroglobulin

- Increases in most thyroid pathologies.
- Not specific as a diagnostic tool.
- For follow up only.

# Serum Calcitonin

- Controversy about its importance as a diagnostic tool.
- if  $>100$  pg/ml can suggest medullary Ca.

# Benign FNA

- Risk of false neg. Up to 5%.  
papable >U/S guided(0.6%).
- Repeat examination or U/S 6-18 m interval
- Growth>20%,or more than 2mm in two dimensions→repeat FNA preferably U/S guided.

# Medical Treatment

- No data to suggest that TSH suppression will cause a change in thyroid nodule size in iodine sufficient area.
- Not recommended.

# Children

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- Should be evaluated as adults.

# Pregnancy

- Thyroid scan should be delayed till delivery.
- If operation is to be done 12-24wks GA.
- After that → should be postponed till delivery.
- (studies:delay less than one year will not affect the eventual prognosis)



# Treatment

- Goals:
  - 1-to remove the primary tumour and its local extension.
  - 2-to minimize treatment related morbidity.
  - 3-to permit accurate staging.
  - 4-facilitate postop. Radioactive Iodine ttt.
  - 5-facilitate long term postop. Surveillance
  - 6-minimize disease recurrence and mets.

# Thyroidectomy – Types

- **Hemi-thyroidectomy:** Removal of half of thyroid gland (Lobe + Isthmus+ Pyramidal)
- **Lobectomy:** Removal of either right or left lobe of thyroid gland

Both these are done in solitary goitre

- **Total thyroidectomy:** Removal of whole thyroid gland

This is done in cases of malignancy

# Thyroidectomy types

- **Subtotal thyroidectomy:** Removal of a little less than total; done in multi-nodular goitre
- **Near-total thyroidectomy:** Almost same as total, but a little thyroid tissue around one parathyroid gland is preserved
- **Isthmusectomy:** Dividing the isthmus

# Total Thyroidectomy

- 1- FNA → papillary, medullary.
- 2- nodule > 4cm and atypia.
- 3- hx. Of irradiation or positive family hx.
- 4- bilateral nodules.
- 5- regional LN or distant metastases.
- 6- patient preference for one stage.
- 7- relative indication → age >45

# Lobectomy

- Solitary nodule+indetermined pathology  
FNA+ patient preference.

# Central LN Dissection

- CLN are most common site of recurrence.
- Routine CLN dissection is indicated in medullary Ca., no consensus in papillary Ca.

# Lateral Neck Dissection

Levels II,III,IV and V

Done only with biopsy proven metastases after clinical or sonographic suspicion

# Completion Thyroidectomy

- To allow resection of multicentric disease.
- Allow radioactive Iodine diagnostic scan and treatment.
- Studies:same surgical risk as one stage surgery.
- (small tumours<1cm,intrathyroid,node neg.,low risk group) can be managed without completion.




# Complications of thyroidectomy

- Intraoperative
  - Bleeding
    - Damage to arteries/veins of neck
- Postoperative presentation
  - Injury to recurrent laryngeal nerve
    - Unilateral: hoarseness
    - Bilateral: respiratory distress
  - Bleeding
    - Expanding hematoma – causes compression, shortness of breath
  - Hypocalcemia
    - Removal or injury to parathyroid glands or their blood supply
  - Scar

If patient develops expanding neck hematoma postoperatively, treatment involves immediate opening of sutures to evacuate clot and return to OR to explore and stop bleed

# Postoperative Radioactive Iodine Ablation

- Prepared with L-thyroxin withdrawal for 4 wks, or replace it with T3 for 2-4 wks then withdraw it for 2 wks.
- TSH > 30, to increase avidity.
- The minimal activity should be used 30-100 mci.
- Higher dose 100-200, in residual disease or aggressive pathology (tall cell, columnar, insular)

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- Recombinant human thyrotropin(rhTSH) can be used in patients who cannot tolerate stopping thyroxin.
  - Needs stopping thyroxin for one day only.
  - Approved in Europe but still not in USA.

# Whole body scan

- Usually done one week after ablation therapy.
- 10-26% metastatic foci.

# External Beam Radiotherapy

- Indications

- age > 45 and extrathyroid extension and high likelihood of microscopic residual tumour.

- gross residual and further surgery or radioactive iodine treatment is ineffective.

# Chemotherapy

- NO role for chemotherapy in differentiated thyroid Ca.
- Some studies: Adriamycin can act as a radiation sensitizer for external beam radiotherapy.

# TSH Suppression Therapy

- Differentiated thyroid Ca have TSH receptors on cellular membrane.
- High risk patients < 0.1 mu/l
- Low risk patients 0.1 - 0.5 mu/l

# Prognosis

**Table 1.**

Prognostic factors in thyroid cancer: AMES (age, distant metastases, extent, size)

| Low risk  | High risk   | Survival by AMES risk groups (20 years) |
|---|---|---|
| Younger patients (men = 40, women = 50) with no metastases                              | All patients with distant metastases                              | Low risk = 99%                          |
| Older patients (intrathyroid papillary, minor capsular invasion for follicular lesions) | Extra-thyroid papillary, major capsular invasion follicular       | High risk = 61%                         |
| Primary cancers <5.0 cm   | Primary cancers = 5.0 cm in older patients (men > 40, women > 50) |   |
| No distant metastases   |   |   |

Based on Lahey Clinic data.

**Table 2.**

Prognostic factors in thyroid cancer: AGES (age, grade, extent, size)

| Prognostic score = $0.05 \times \text{age}$ | Survival by AGES score (20 years) |
|---|-----------------------------------|
| +1 (if grade 2)                             | <3.99 = 99%                       |
| +3 (if grade 3 or 4)                        | 4–4.99 = 80%                      |
| +1 (if extra-thyroid)                       | 5–5.99 = 67%                      |
| +3 (if distant spread)                      | >6.00 = 13%                       |
| +0.2 × tumor size (cm maximum diameter)     |                                   |

Based on Mayo Clinic data.

**Table 3.**

Prognostic factors in thyroid cancer: MACIS (metastasis, age, completeness of resection, invasion, and size)

| Score = 3.1 (if age <40 years) or $0.08 \times \text{age}$ [if age = 40 years] | Survival by MACIS score (20 years) |
|--|------------------------------------|
| +0.3 × tumor size (cm maximum diameter)  | <6 = 99%                           |
| +1 (if incompletely resected)  | 6–6.99 = 89%                       |
| +1 (if locally invasive)   | 7–7.99 = 56%                       |
| +3 (if distant spread)   | >8.00 = 24%                        |

Based on Mayo Clinic data.



# Follow Up

- Every 6-12 months.
- Physical examination and cervical U/S
- Thyroglobulin and calcitonin.
- In borderline Tgn → stimulation by withdrawing thyroxin or rhTSH.
- If positive → whole body scan