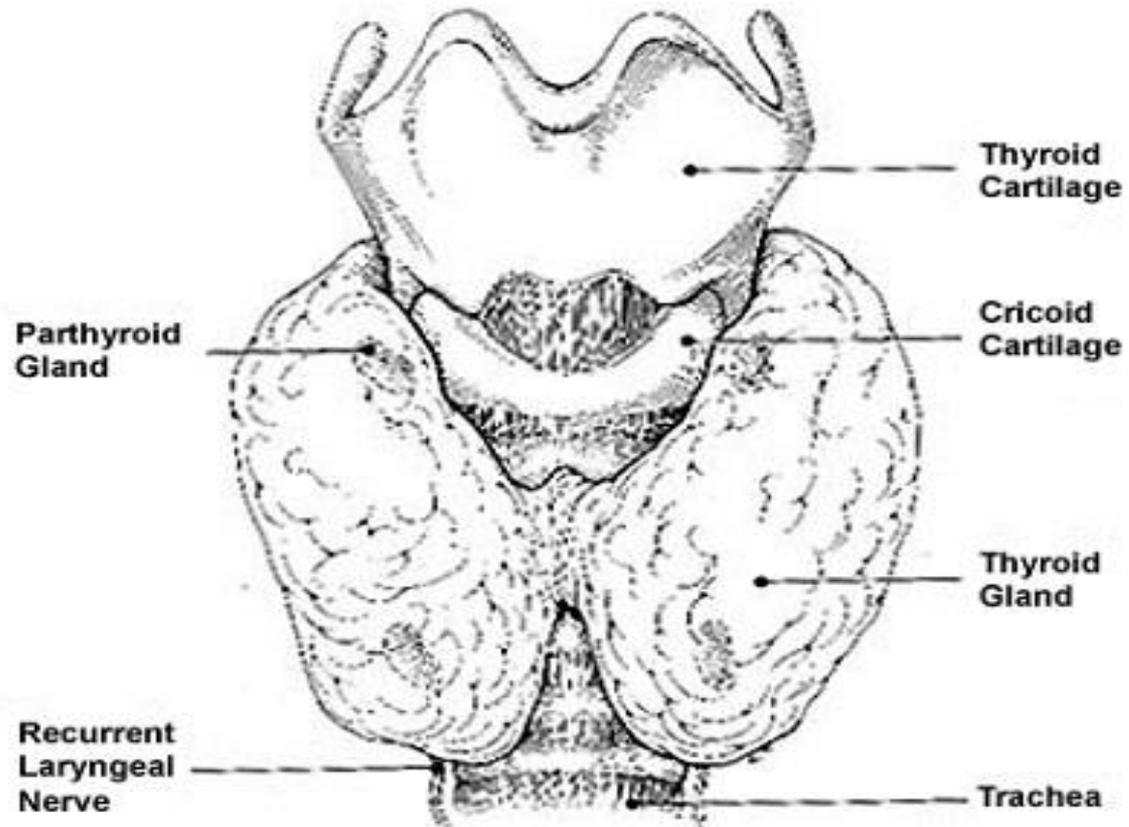


Approach to a thyroid nodule

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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

- 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)

- 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 \times 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 \times 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