

THYROID MALIGNANCIES

S3 UNIT

INTRODUCTION

- Commonest endocrine malignancy
- 1% of all malignancies
- Annual incidence - 3.7 per 1,00,000 population
- Sex ratio 3:1 (Female : Male)

TOPICS

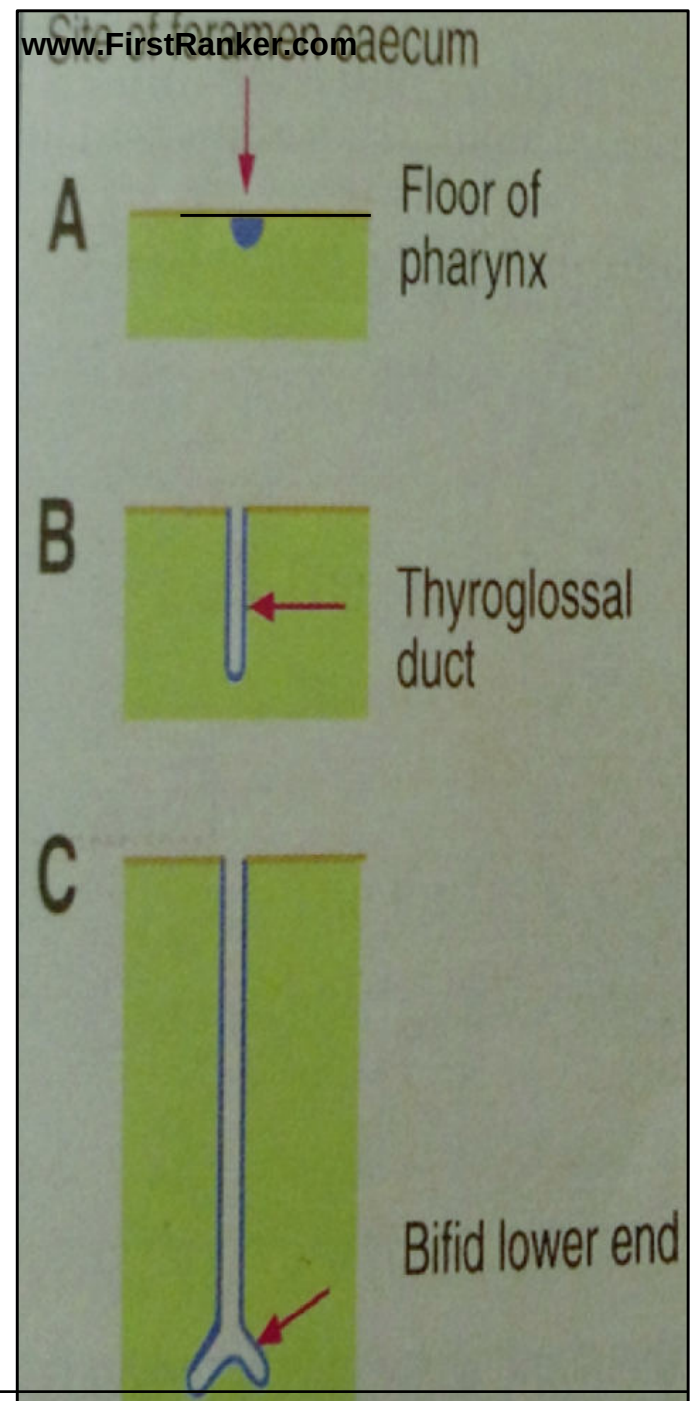
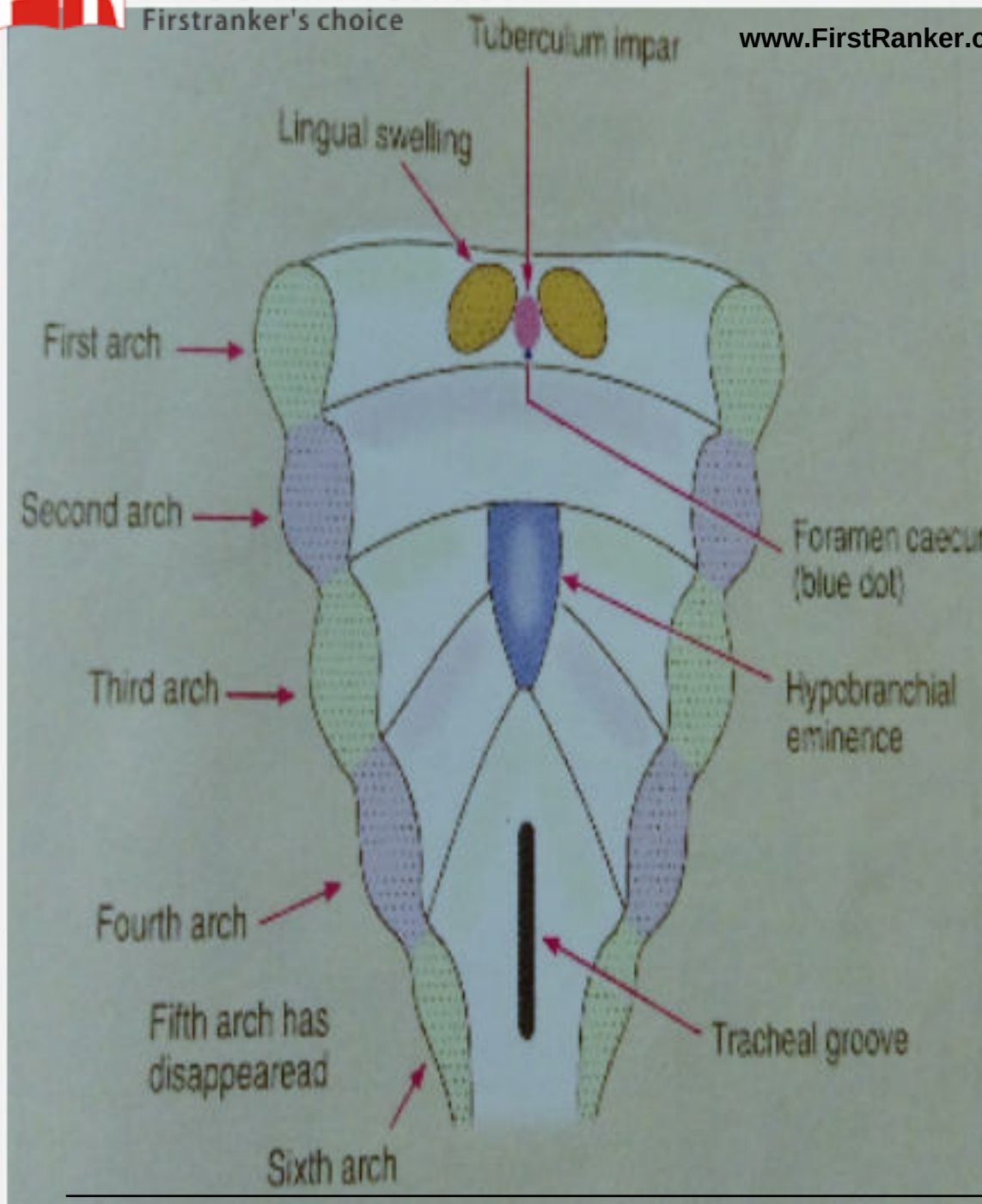
- Anatomy -Alphy Theres Teji
- Physiology and clinical evaluation -Ameena Muhammed
- Aetiopathogenesis & classification -Amruthavarshini B.V
- Investigation - Anagha K Karun
- Differentiated thyroid Carcinoma -Anakha M
- Anaplastic carcinoma, Medullary carcinoma, Thyroid lymphoma -Anamika S
- Surgery & complications -Anandhu J B
- Prognosis & postop follow - Andrews Paul

THYROID ANATOMY

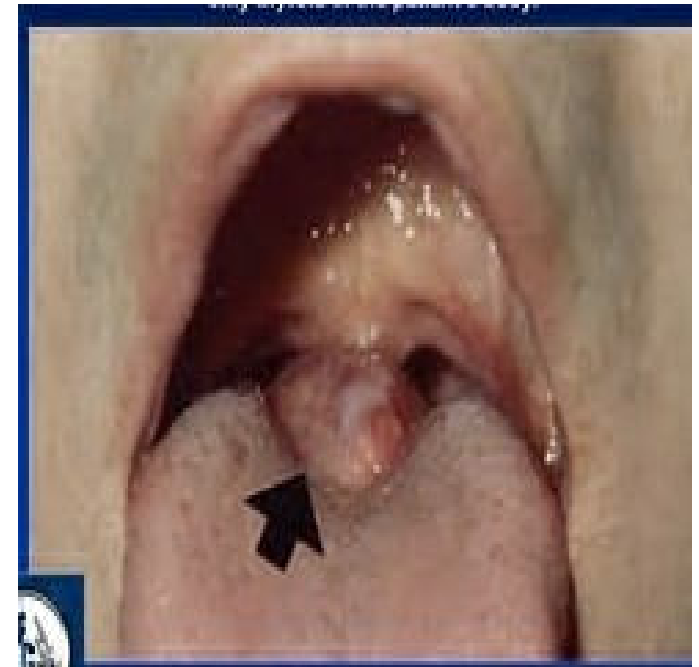
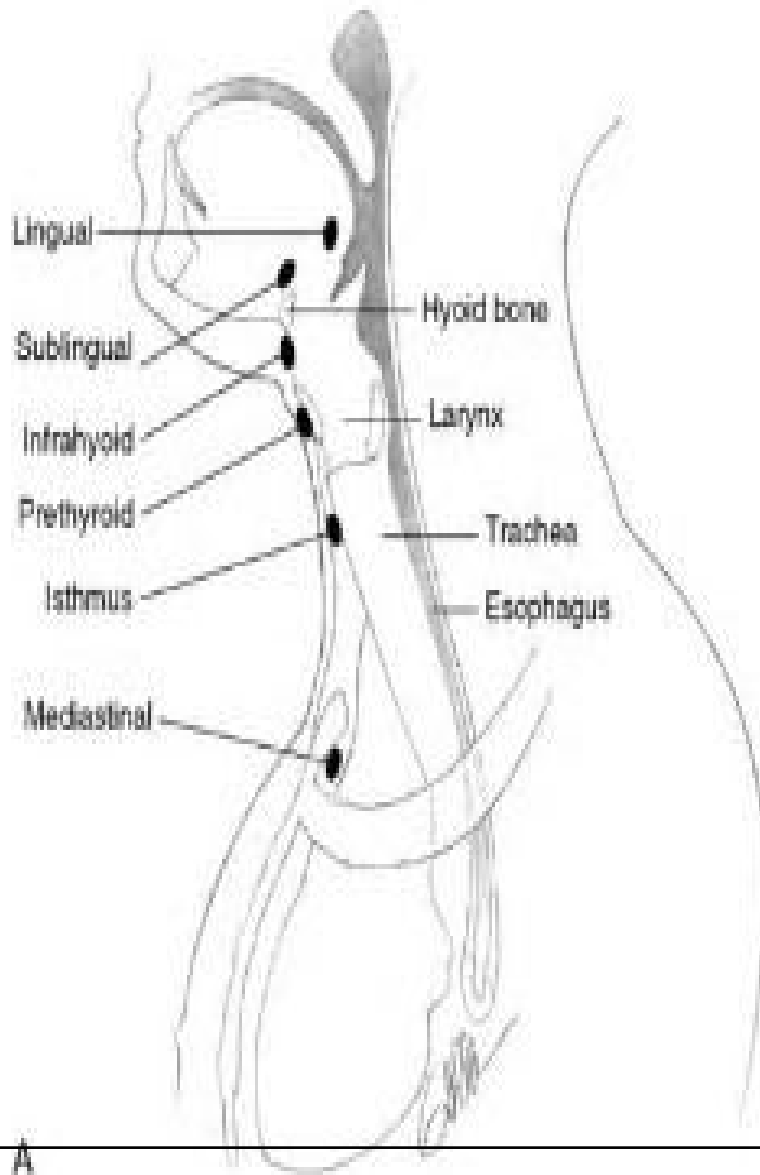
ALPHY THERES

EMBRYOLOGY OF THYROID

- Thyroid gland- endodermal cells of floor of pharynx
- Parafollicular cells- neural crest



ANOMALIES OF POSITION



**LINGUAL
THYROID**

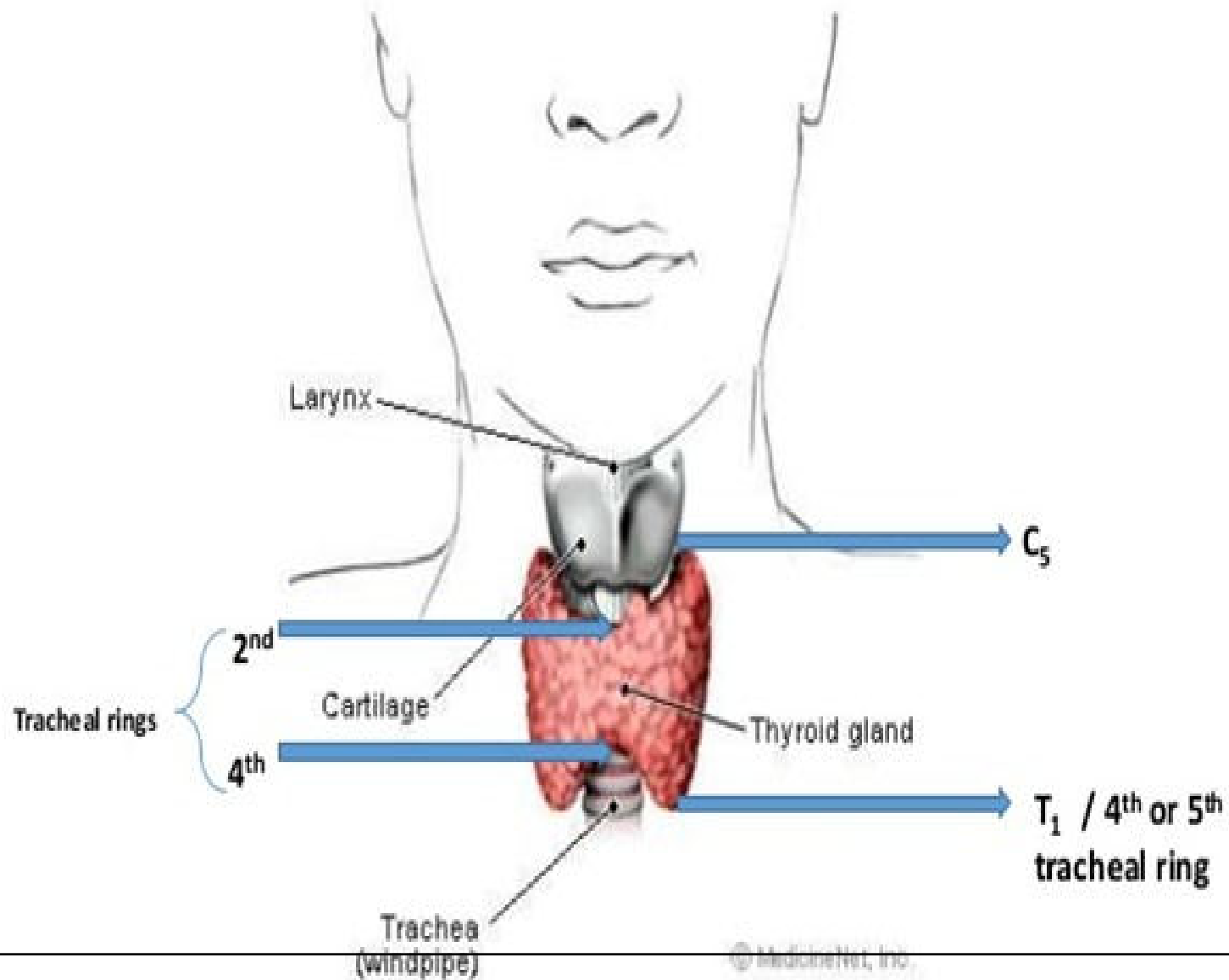
WEIGHT & DIMENSIONS

- Normal gland weighs : **20-25gm**
- Each lobe : **5cm** in length

 3cm in breadth

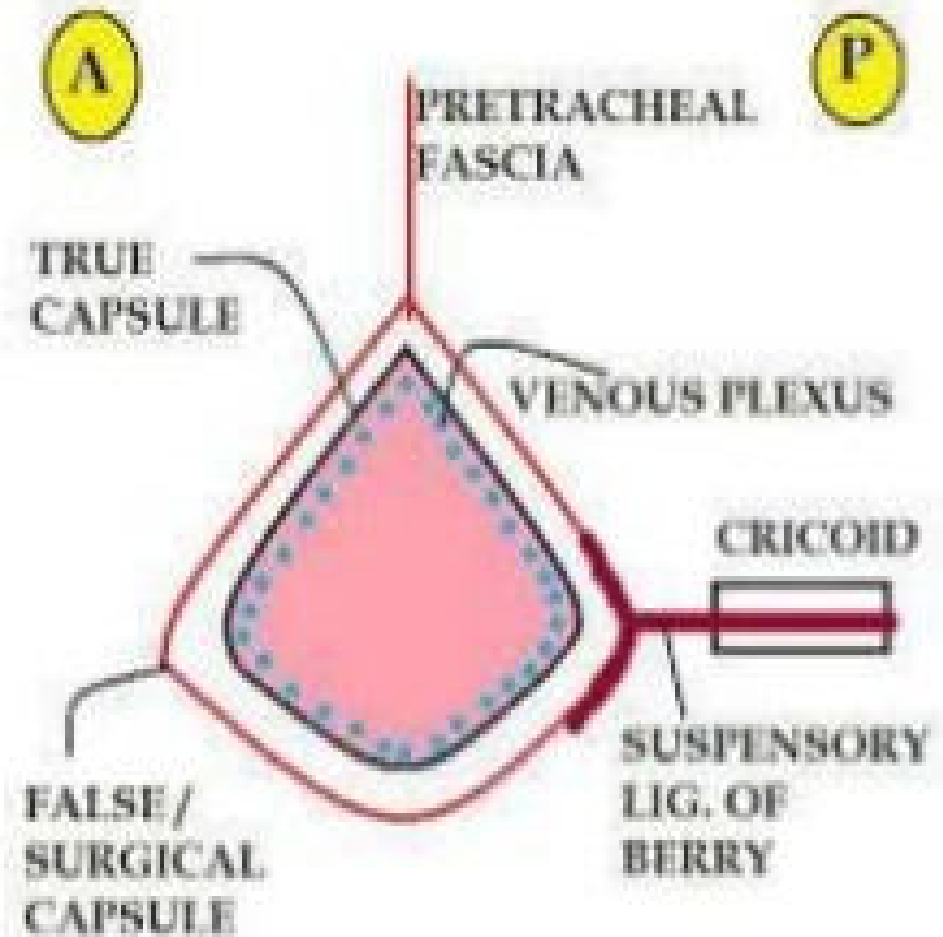
 2cm in thickness
- Isthmus : **1.2 cm** in length & **1.2cm** in breadth

SITUATION AND EXTENT



CAPSULES OF THYROID

- **True capsule:** Peripheral condensation of the connective tissue of gland
- **False capsule:** Pretracheal layer of deep cervical fascia

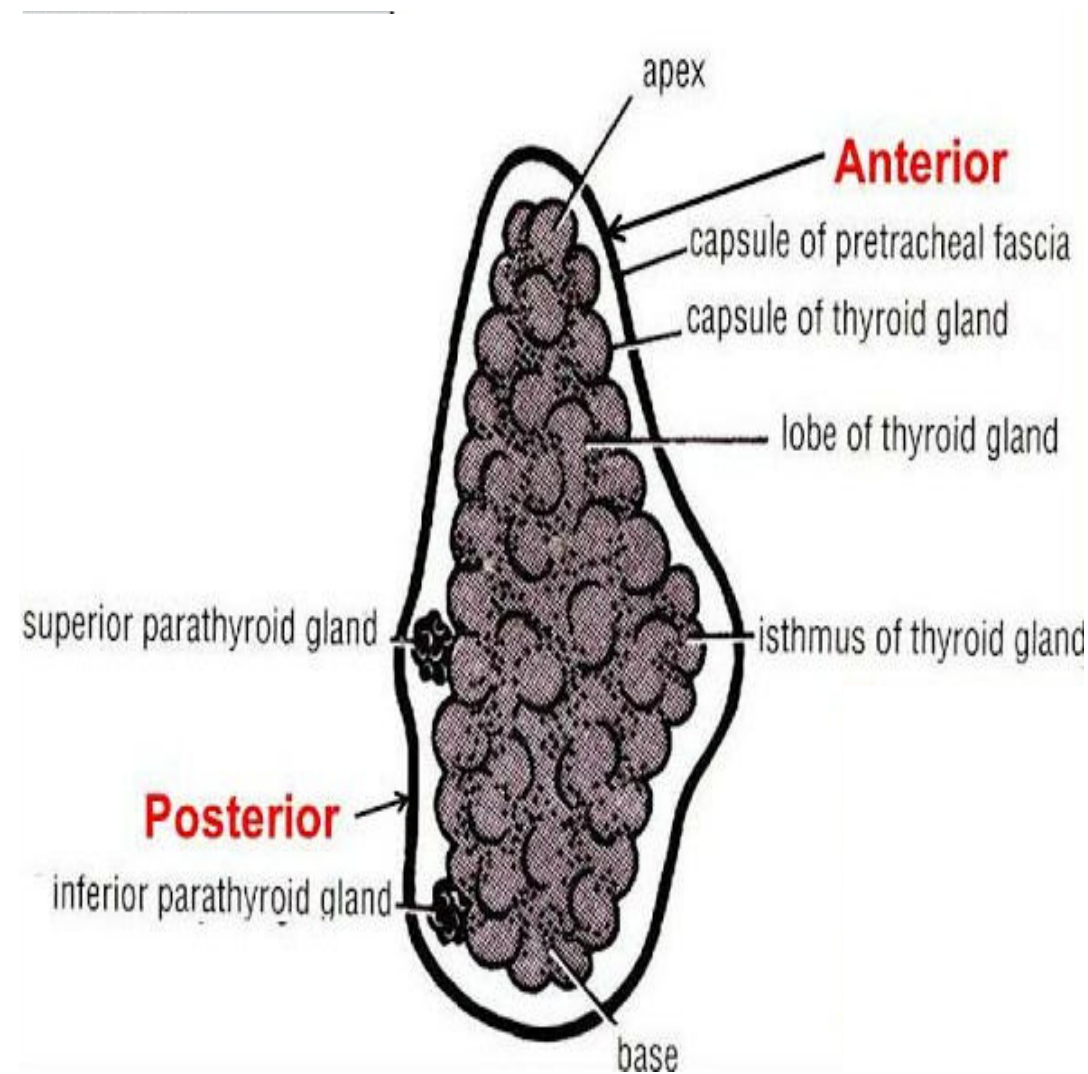


RELATIONS OF THE LOBES

Lobes are conical in shape

having:

- **An apex**
- **A base**
- **Three surfaces:**
lateral, medial and posterolateral
- **Two borders:** anterior
and posterior



✓ **Apex**

Superior thyroid artery

External laryngeal nerve

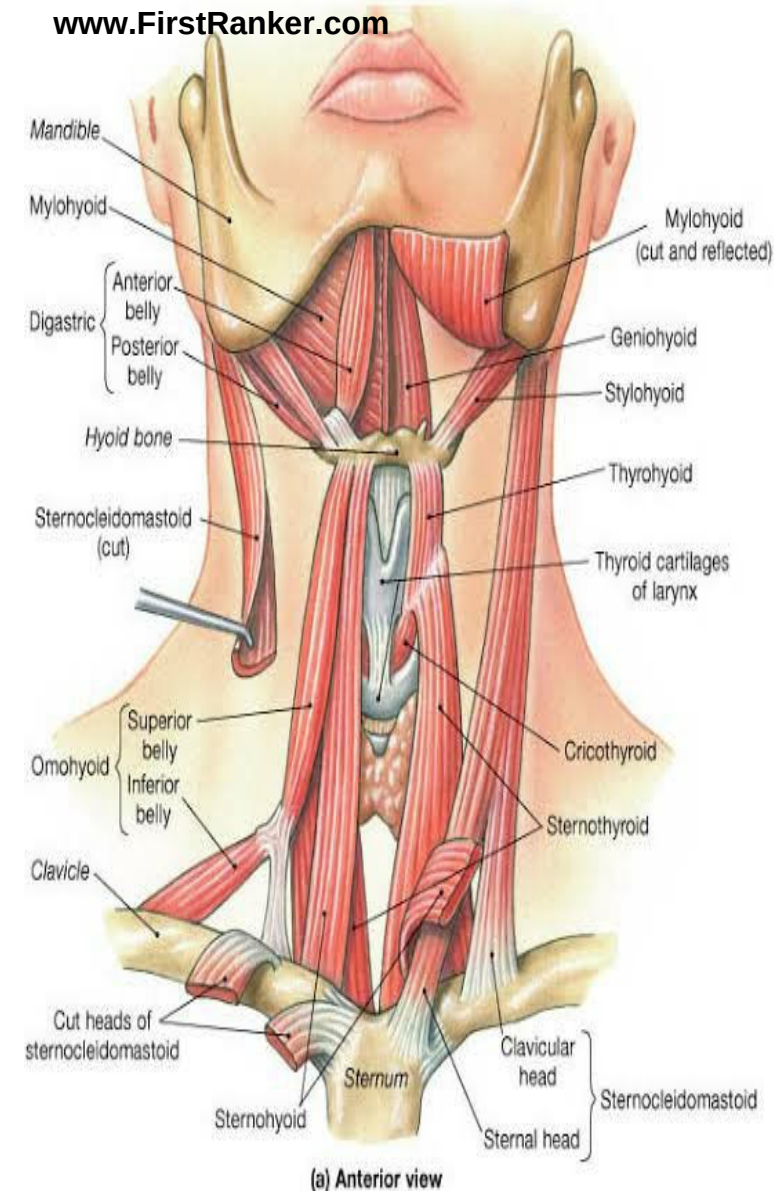
✓ **Base**

Inferior thyroid artery

Recurrent laryngeal nerve

✓ Lateral surface:

- Sternohyoid
- Superior belly of omohyoid
- Sternothyroid
- Anterior border of sternocleidomastoid



✓ **Medial
surface**

2 tubes- trachea
oesophagus

2 muscles

inferior

constrictor
cricothyroid

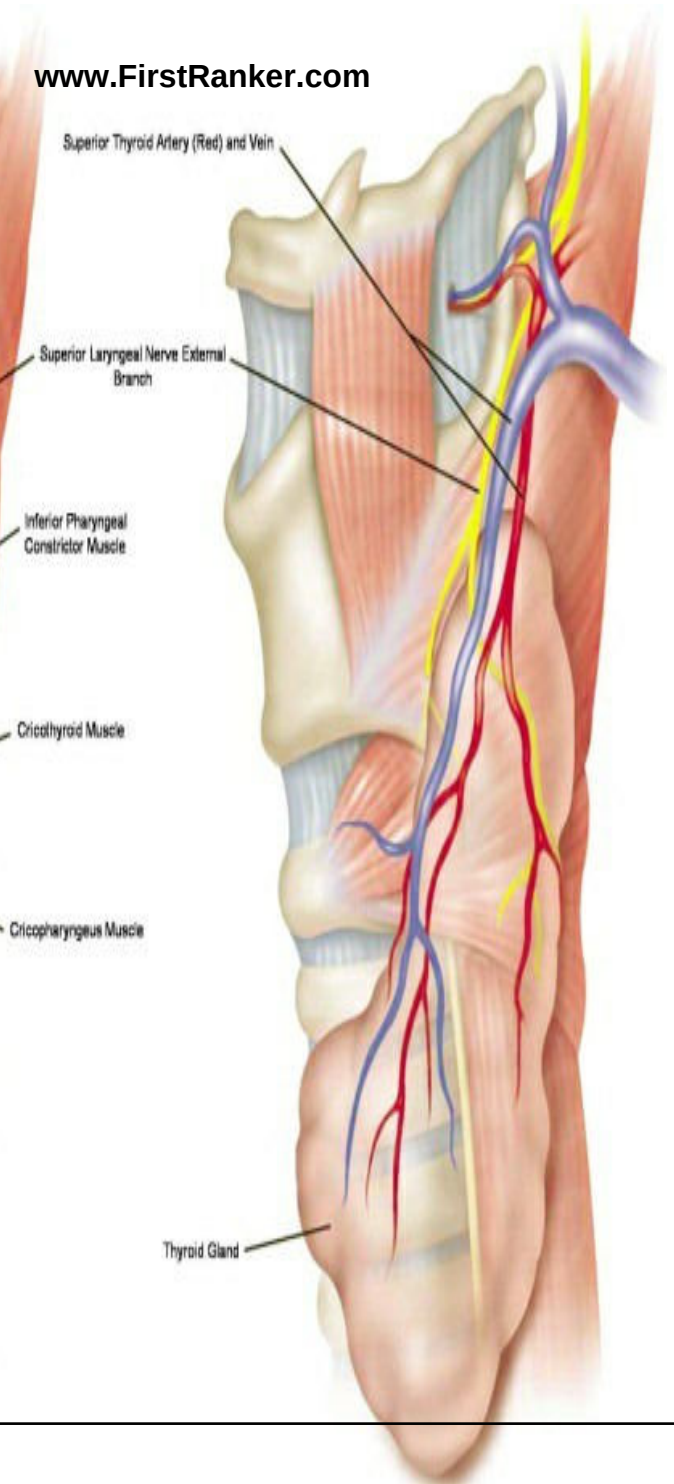
2 nerves

ext. laryngeal
recurrent
laryngeal

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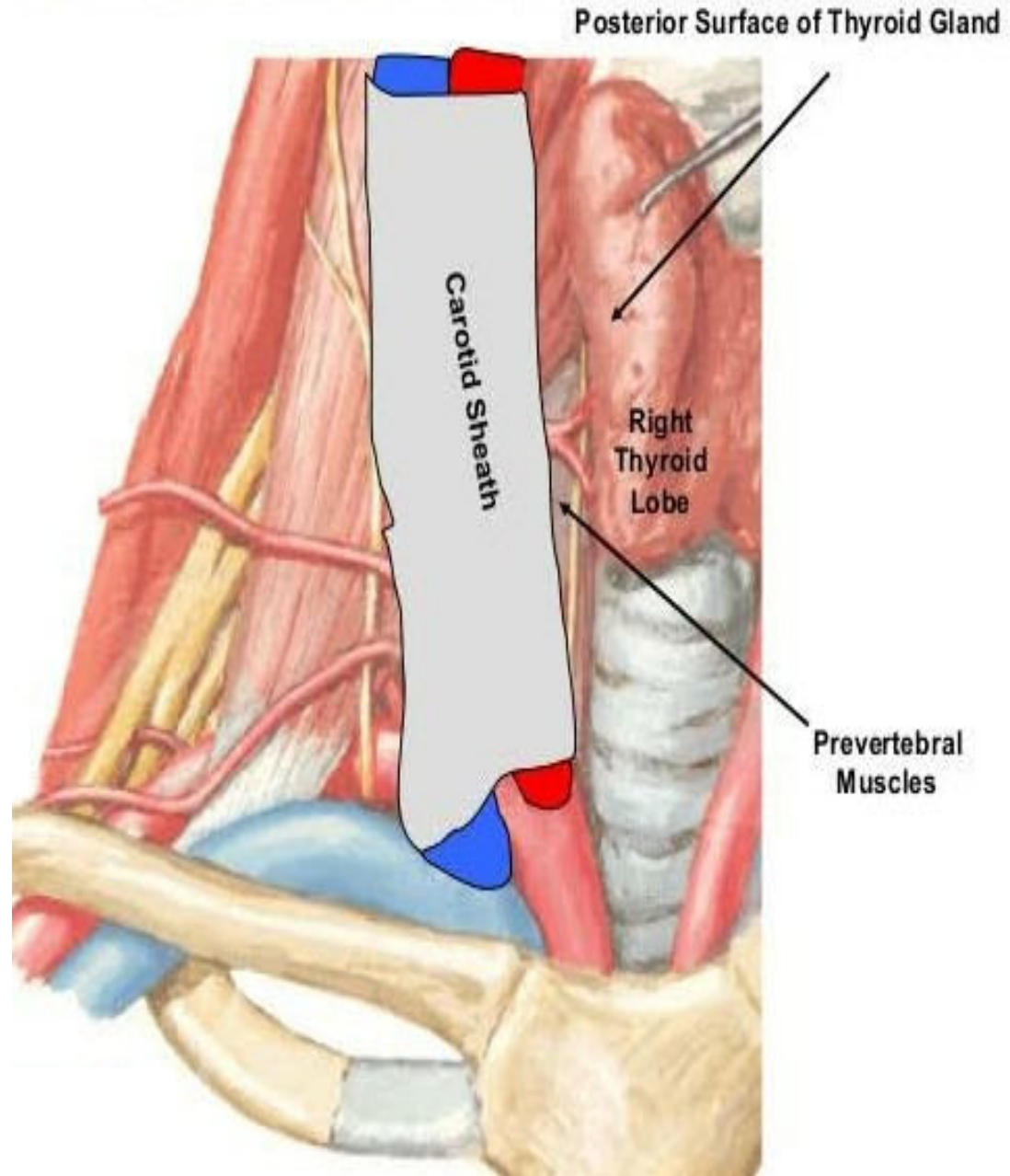


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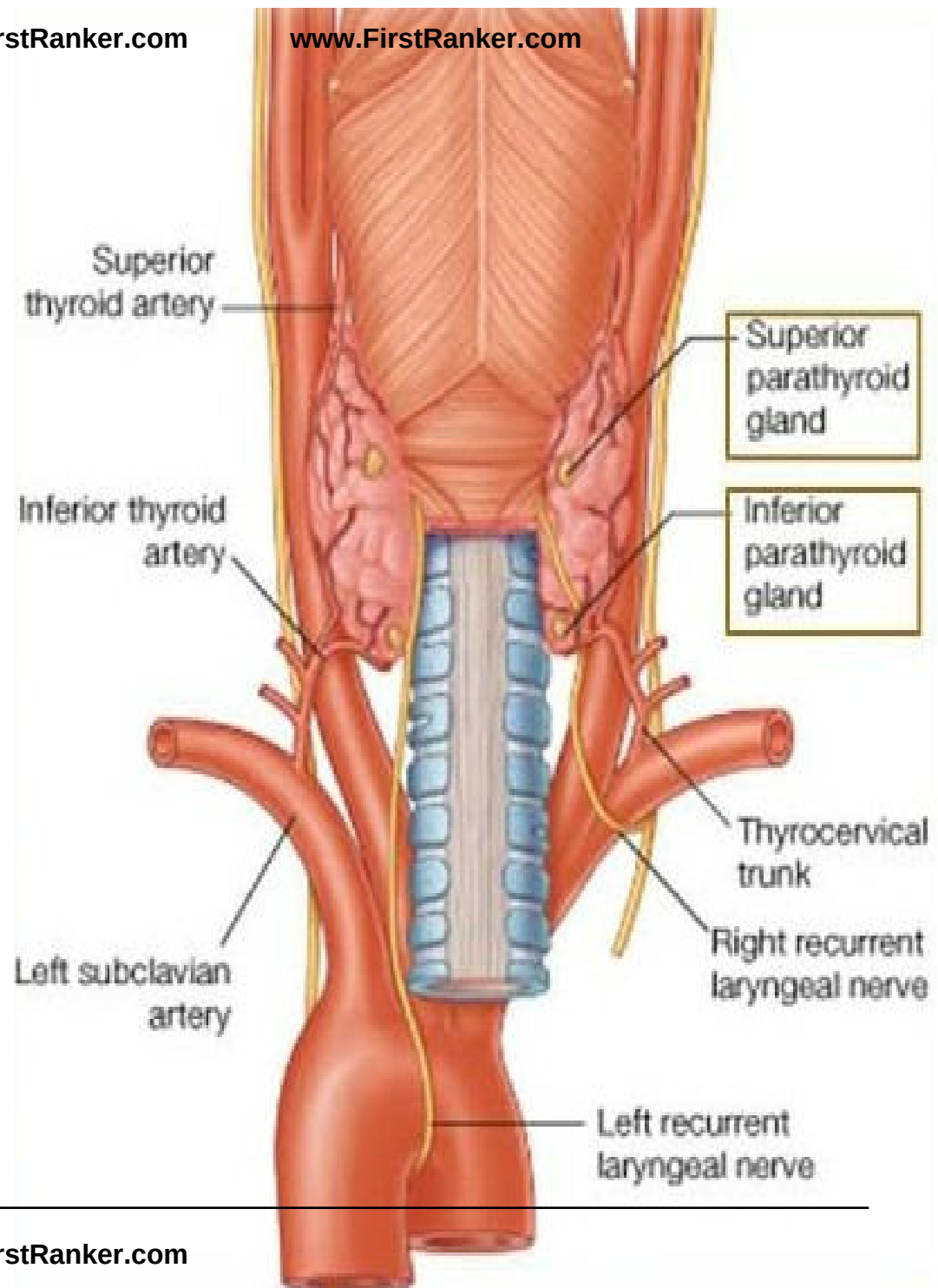


✓ **Posterolateral surface:** carotid sheath, ansa cervicalis & cervical sympathetic chain

✓ **Anterior border:** anterior branch of superior thyroid artery



- Inferior thyroid artery
- Anastomosis between superior and inferior thyroid arteries
- Parathyroid gland
- Thoracic duct on left side



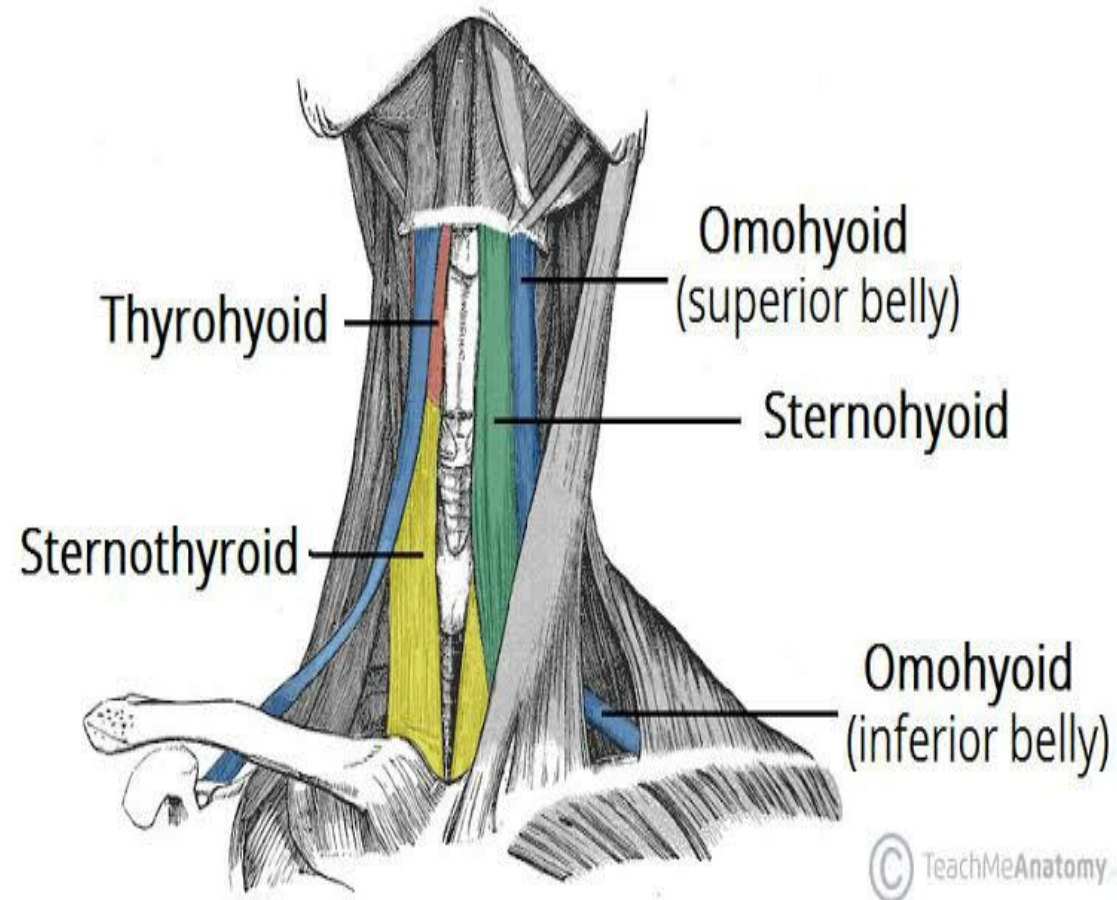
RELATIONS OF ISTHMUS

- **Two surfaces:**

Anterior and posterior

- **Two borders:**

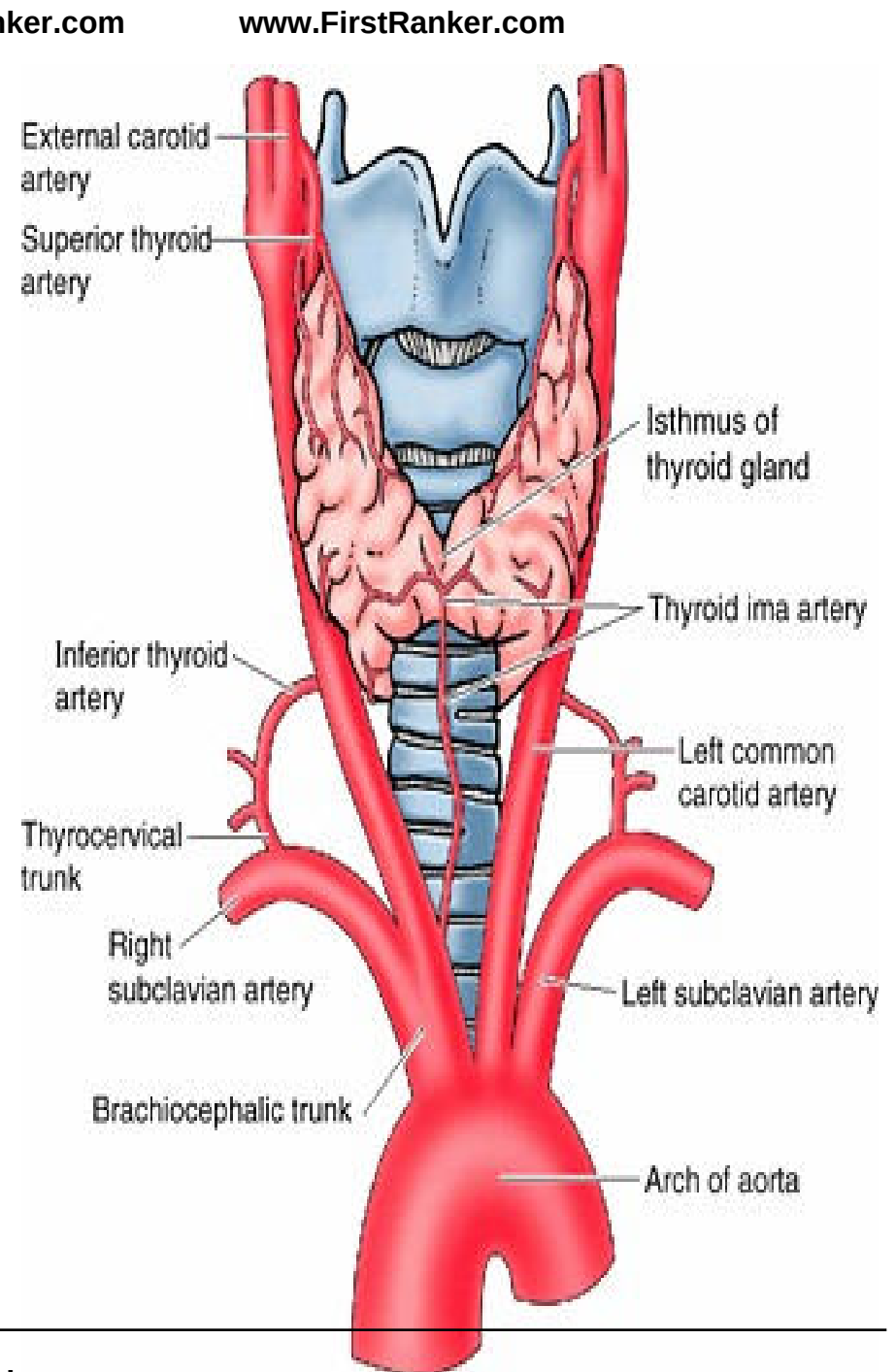
superior and inferior



BLOOD SUPPLY OF THYROID

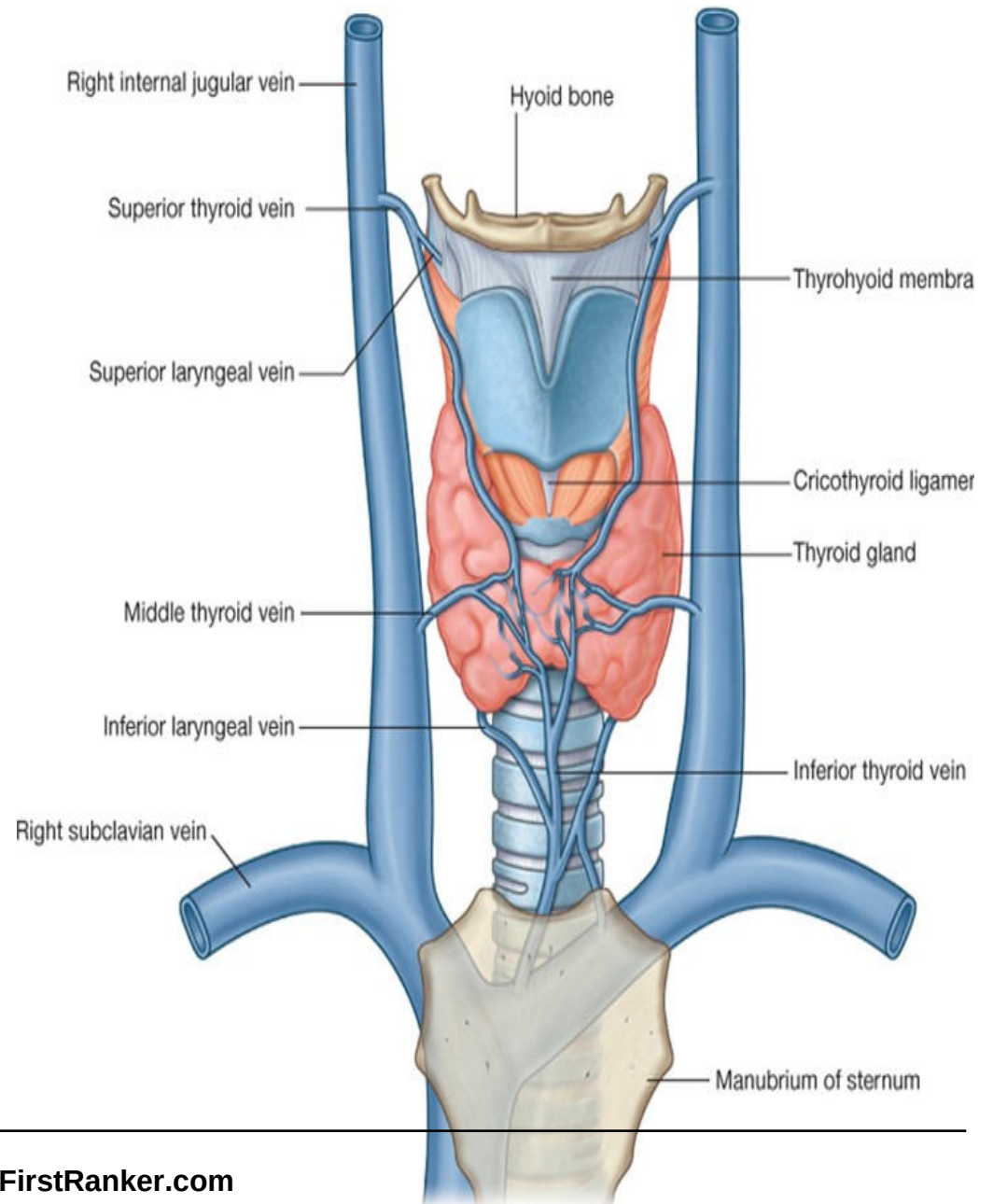
ARTERIAL SUPPLY

- Superior thyroid artery
- Inferior thyroid artery
- Thyroidea ima arteries

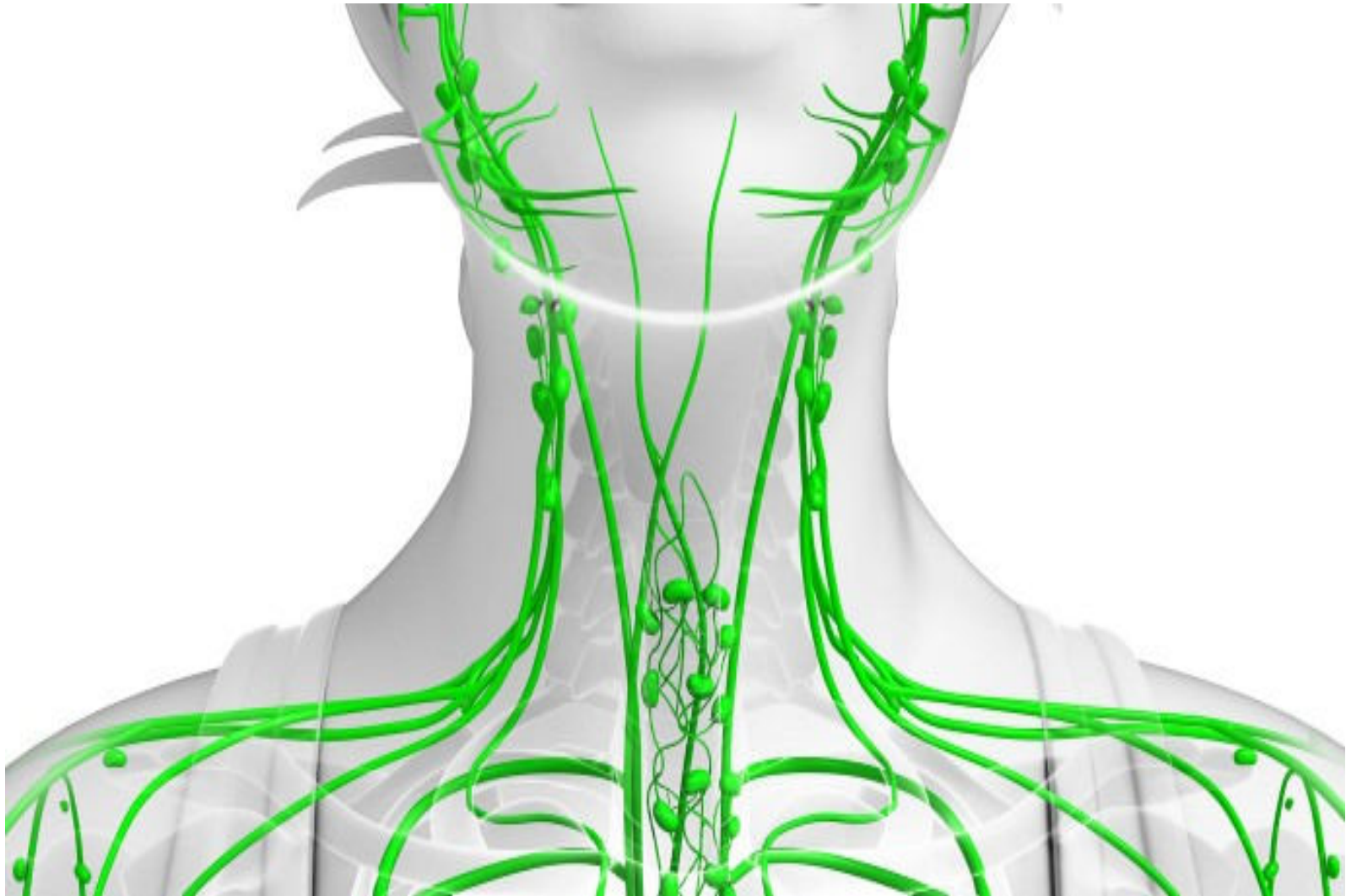


VENOUS DRAINAGE

- Superior thyroid vein
- Middle thyroid vein
- Inferior thyroid vein
- Kochers vein



LYMPHATIC DRAINAGE

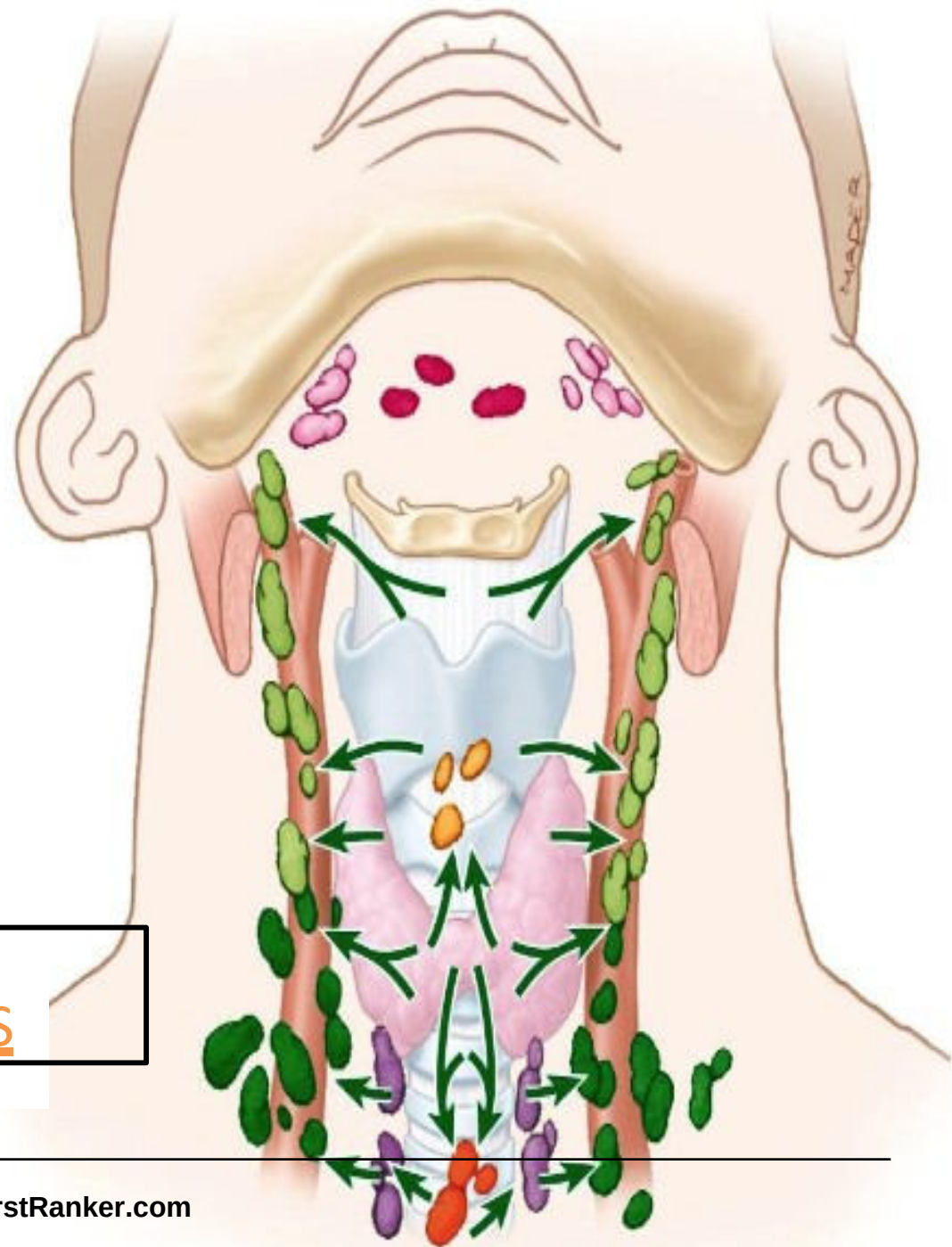


•Lymph drains to

- **prelaryngeal nodes**
- **pretracheal nodes**
- **paratracheal nodes**

•Then to

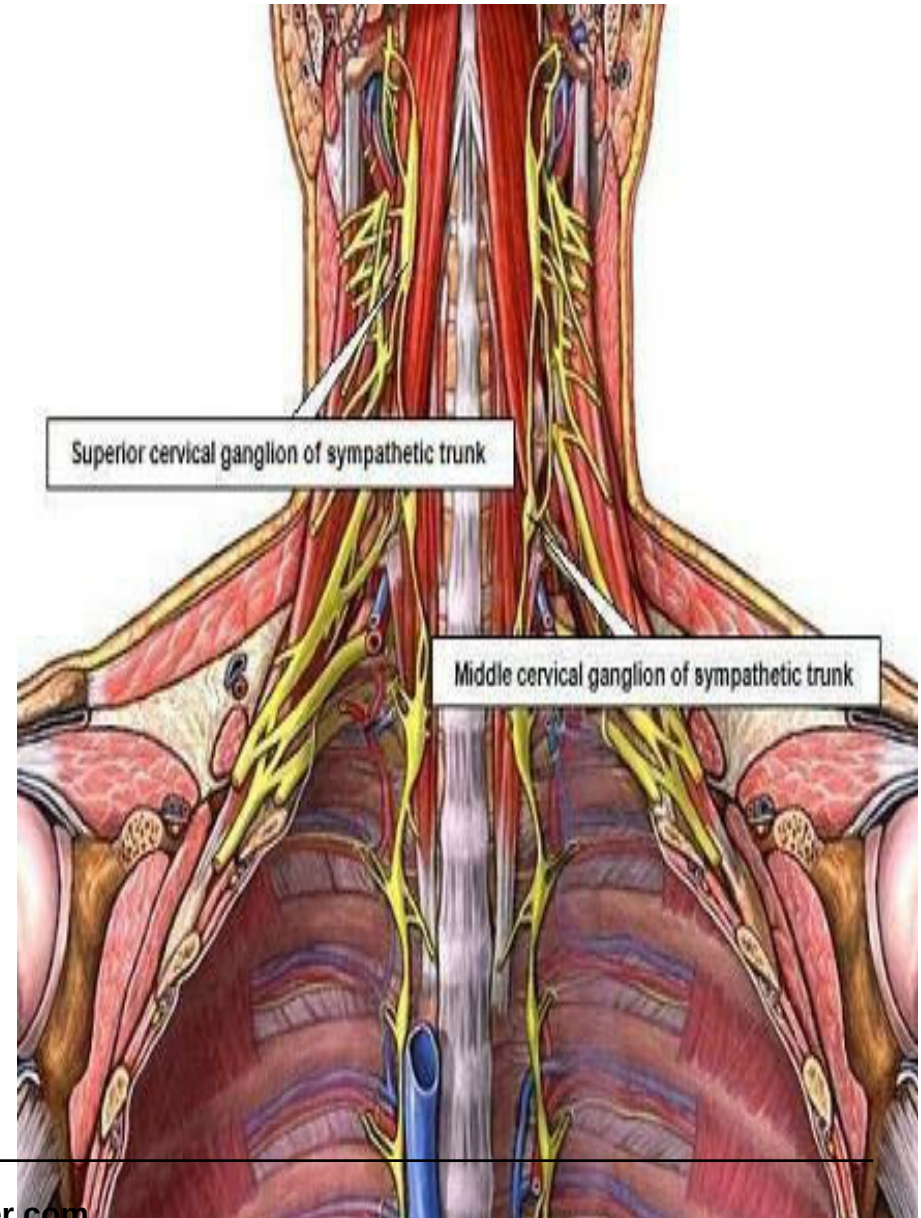
JUGULAR LYMPH NODES



- periglandular » prelaryngeal (Delphian) » pretracheal
» paratracheal (along RLN) » sup mediastinum » deep cervical » thoracic duct
- Upper part via prelaryngeal LN to upper deep CLN
- Lower part via pretracheal and paratracheal LN to lower deep CLN

NERVE SUPPLY

- Mainly from middle cervical ganglion
- Partly from superior and inferior cervical ganglion

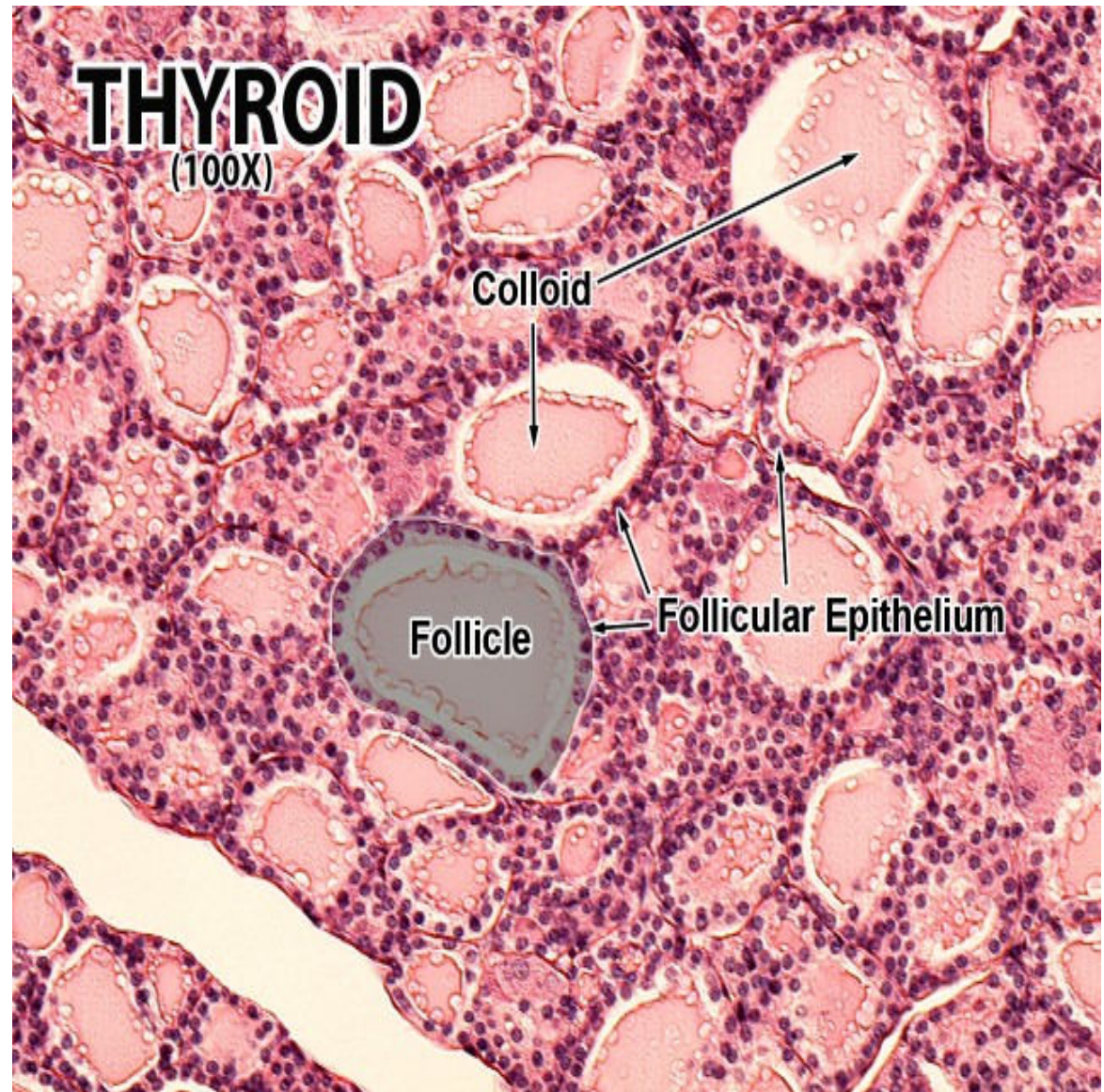


HISTOLOGY

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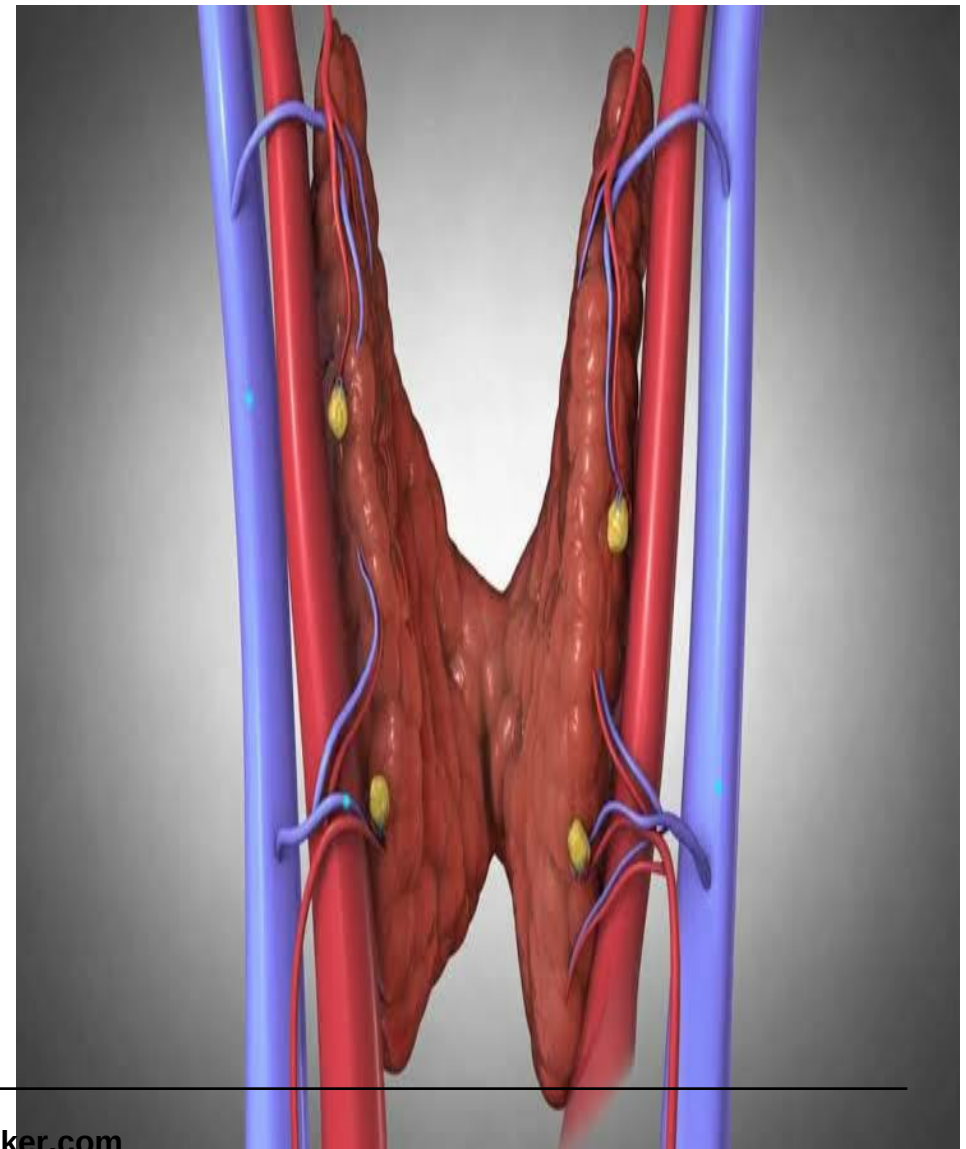
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- Follicles- structural unit
- Secretory cells- follicular and parafollicular

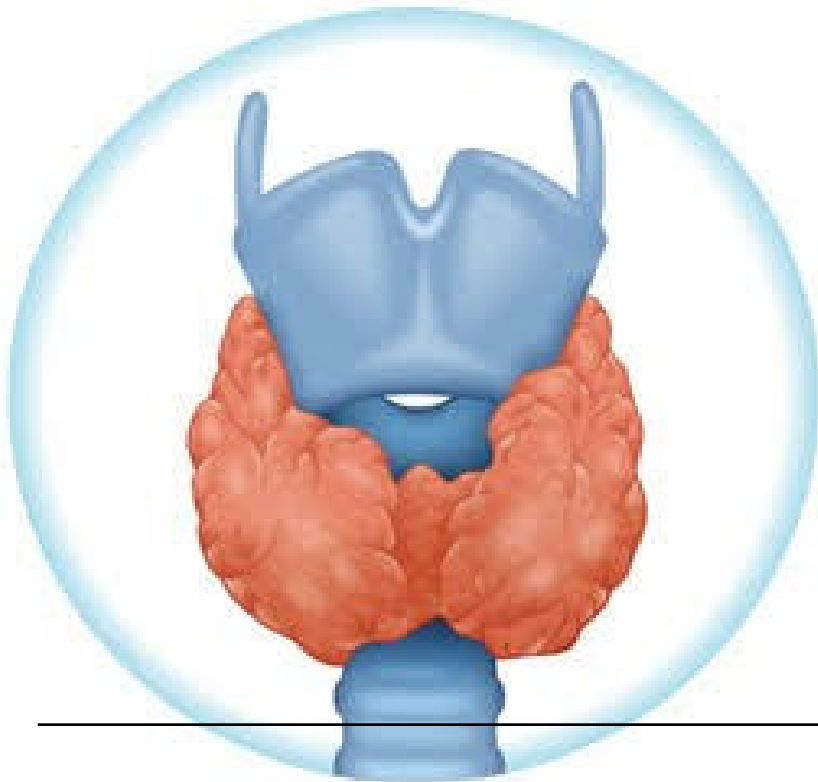


PARATHYROID GLANDS

- Two pairs-superior and inferior
- Lie on the posterior border of thyroid
- Secrete parathormone
- blood supply from inferior thyroid arteries

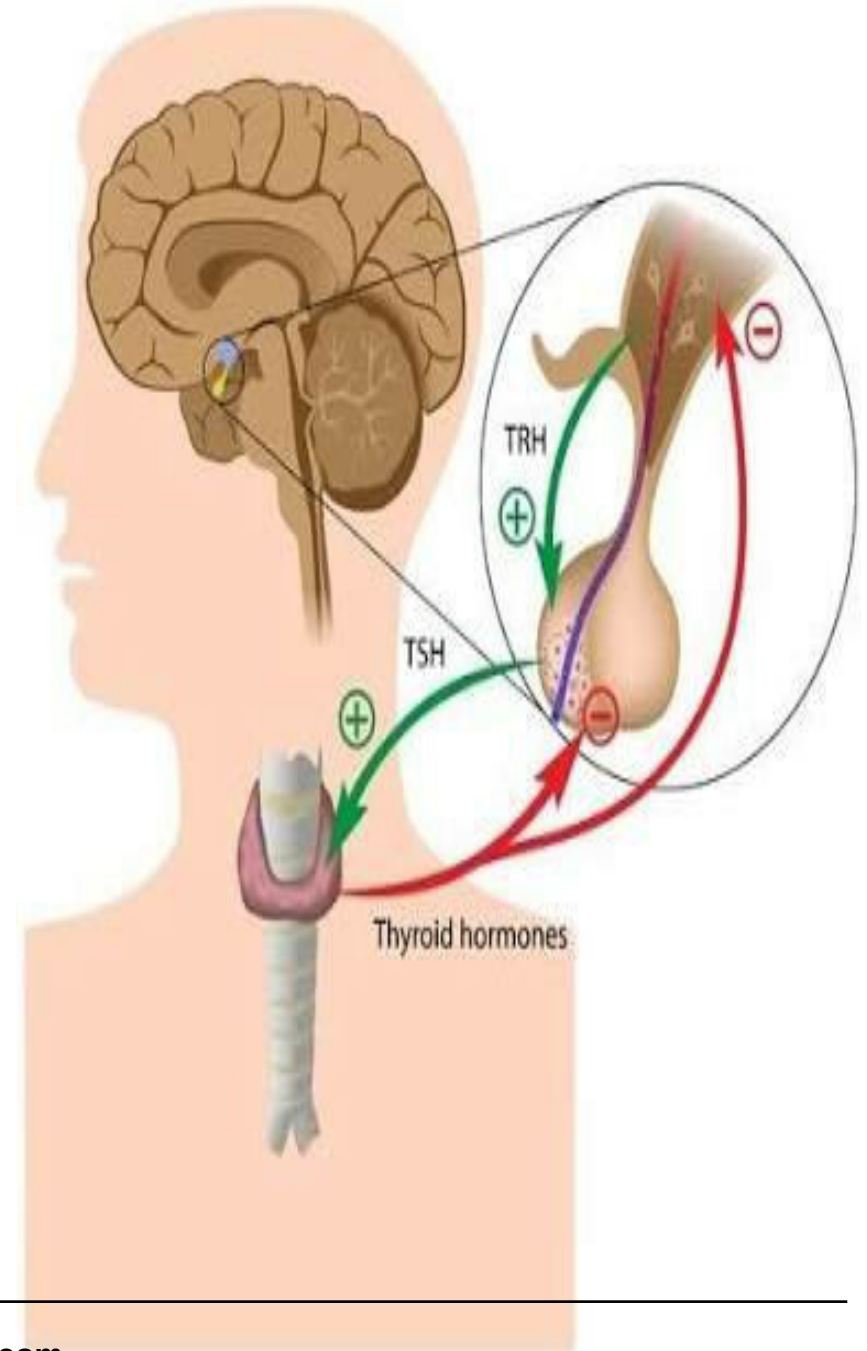


PHYSIOLOGY AND CLINICAL EVALUATION



**Ameena
Muhammed**

PHYSIOLOGY OF THYROID GLAND



THYROID HORMONES

Follicular cells- Thyroxine[T4] 93%,
Triiodothyronine[T3] 7%

Parafollicular cells- Calcitonin

IODINE HEMOSTASIS

- Iodine- essential for hormone synthesis
- Daily requirement - 150 mcg
- Absorbed by intestine

Excretory routes

Urine - 80%

Stool- 15%

Rest through bile

THYROID HORMONE SYNTHESIS

1. Iodide trapping

- Transport of iodide ions into colloid
- Na^+ - I^- symporter

2. OXIDATION

Iodide ion is oxidised to iodine by
peroxidase

3. BINDING

Iodine+ tyrosine residues of thyroglobulin =
MIT & DIT

4. COUPLING REACTION

$$\text{MIT} + \text{DIT} = \text{T3}$$

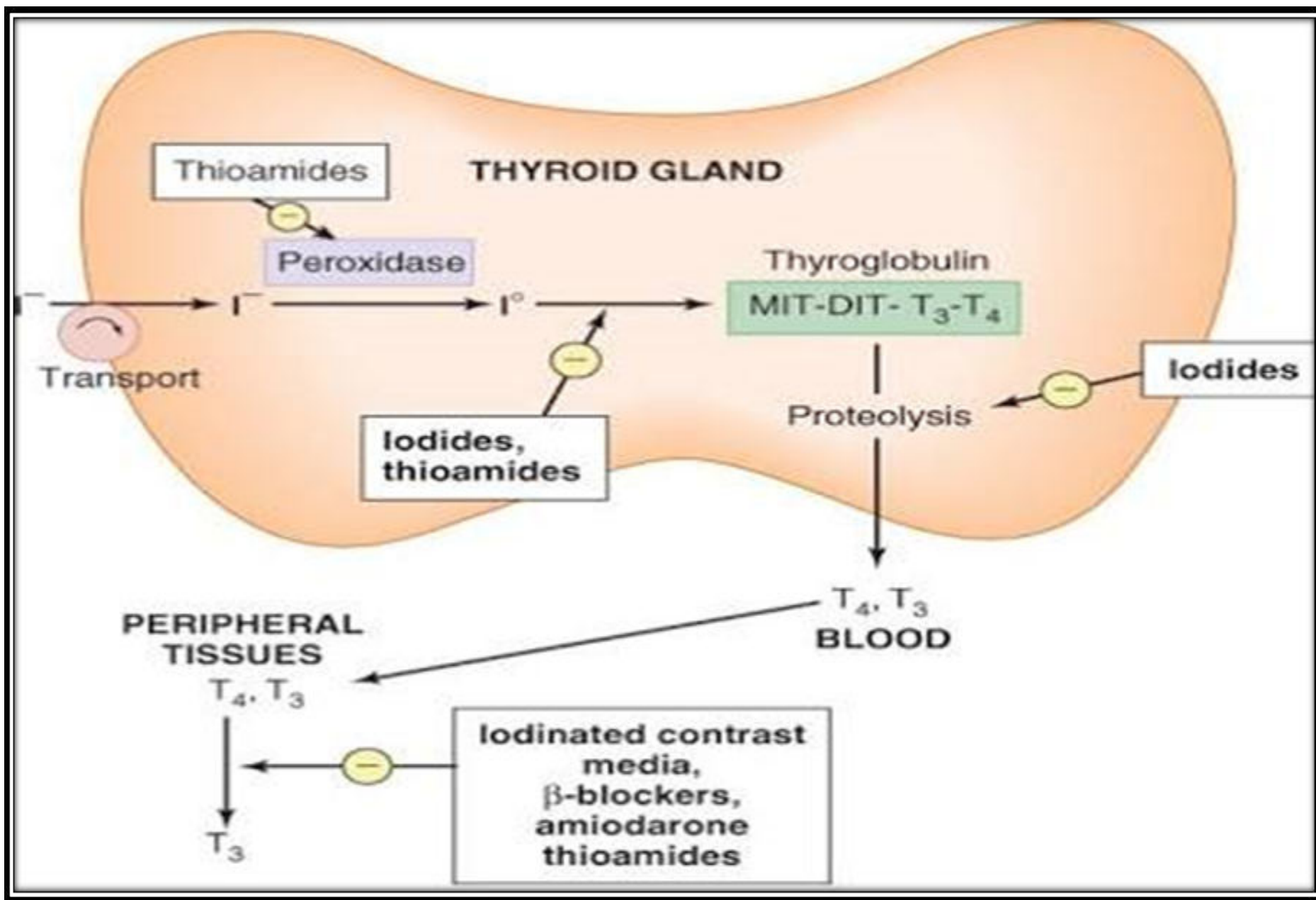
$$\text{DIT} + \text{DIT} = \text{T4}$$

5. HORMONE RELEASE

- When hormones are needed, Endocytosis and Proteolysis of iodinated thyroglobulin
- Release of T3 ,T4 into circulation
- In blood, bound to albumin, thyroxine binding globulin (TBG), thyroxine binding pre albumin(TBPA)
- **Unbound T3 & T4 is functional**

6. PERIPHERAL CONVERSION

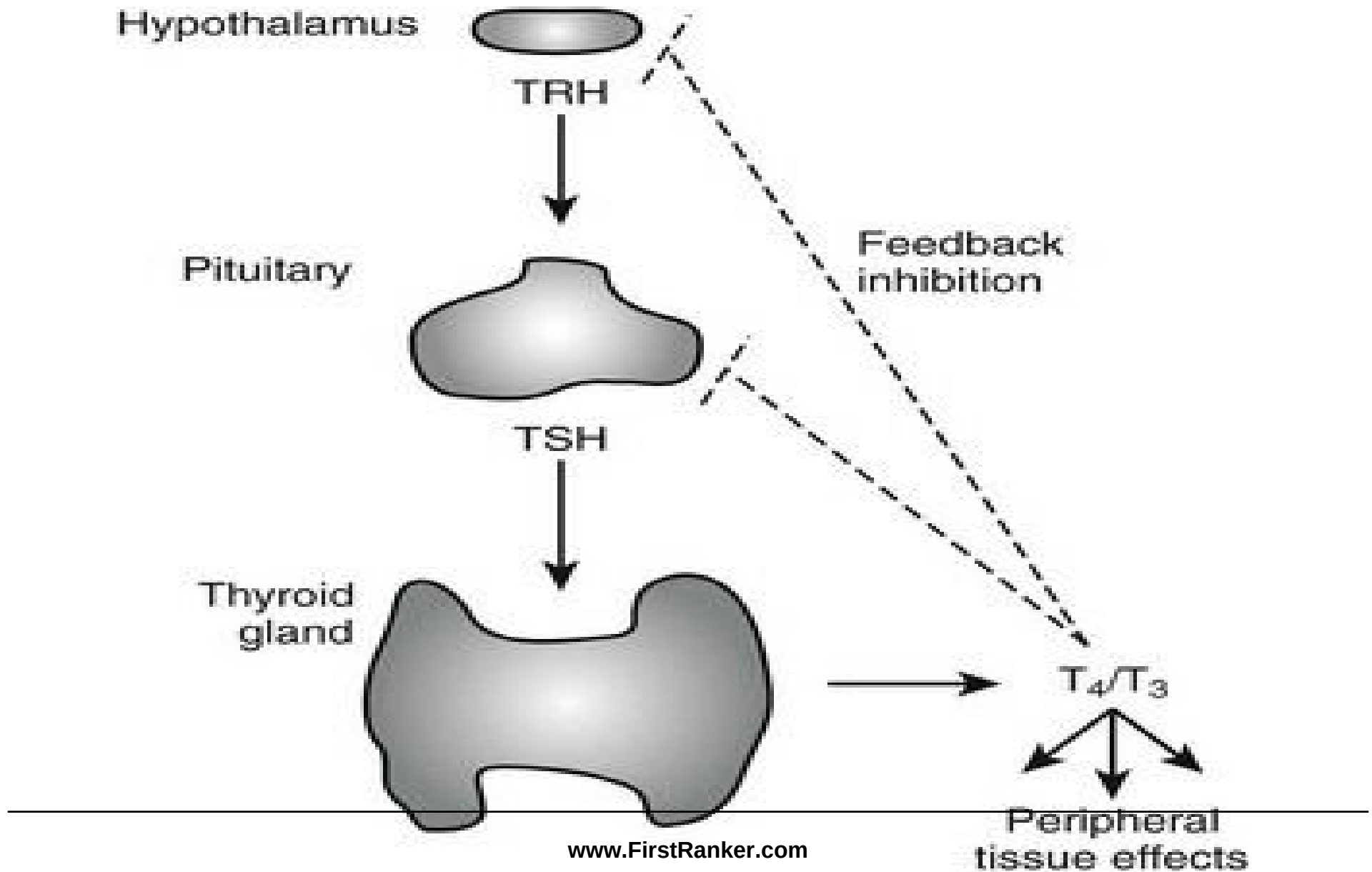
- Major product secreted is T₄
- About 35% secreted T₄ is converted into T₃ by 5'-deiodinase
- T₃ is four times potent than T₄ & causes the peripheral actions.



TSH enhances the hormone production by increasing:

- Iodination of tyrosine
- Proteolysis of thyroglobulin
- Number, size & secretory activity of cells

REGULATION OF SYNTHESIS



ACTIONS OF THYROID HORMONES

1. EFFECT ON BASAL METABOLISM

- ❑ Increases the basal rate of metabolism
- ❑ Increases heat production (**Calorigenic action**)
- ❑ BMR increased to about 80% in hyperthyroidism

2. CARDIOVASCULAR SYSTEM

- ❑ Increase heart rate
- ❑ Increases myocardial contraction
- ❑ Increases systolic blood pressure
- ❑ Decreases diastolic blood pressure
- ❑ Enhances erythropoiesis.

3. EFFECT ON GROWTH & DEVELOPMENT

- ☐ Facilitate the effect of GH on tissues
- ☐ Promote linear growth of bones
- ☐ Enhance the activity of chondrocyte in Cartilage
- ☐ Increases the osteoid activity and Bone remodelling
- ☐ Eruption and development of Teeth

4. EFFECT ON NERVOUS TISSUE

- ❑ Differentiation and maturation of brain cells
- ❑ Growth of cerebral and cerebellar cortices and basal ganglia
- ❑ Development of synaptic connection

5. GI TRACT

- ☐ Enhance motility
- ☐ Increases production of digestive juices.
- ☐ Increases appetite and food intake

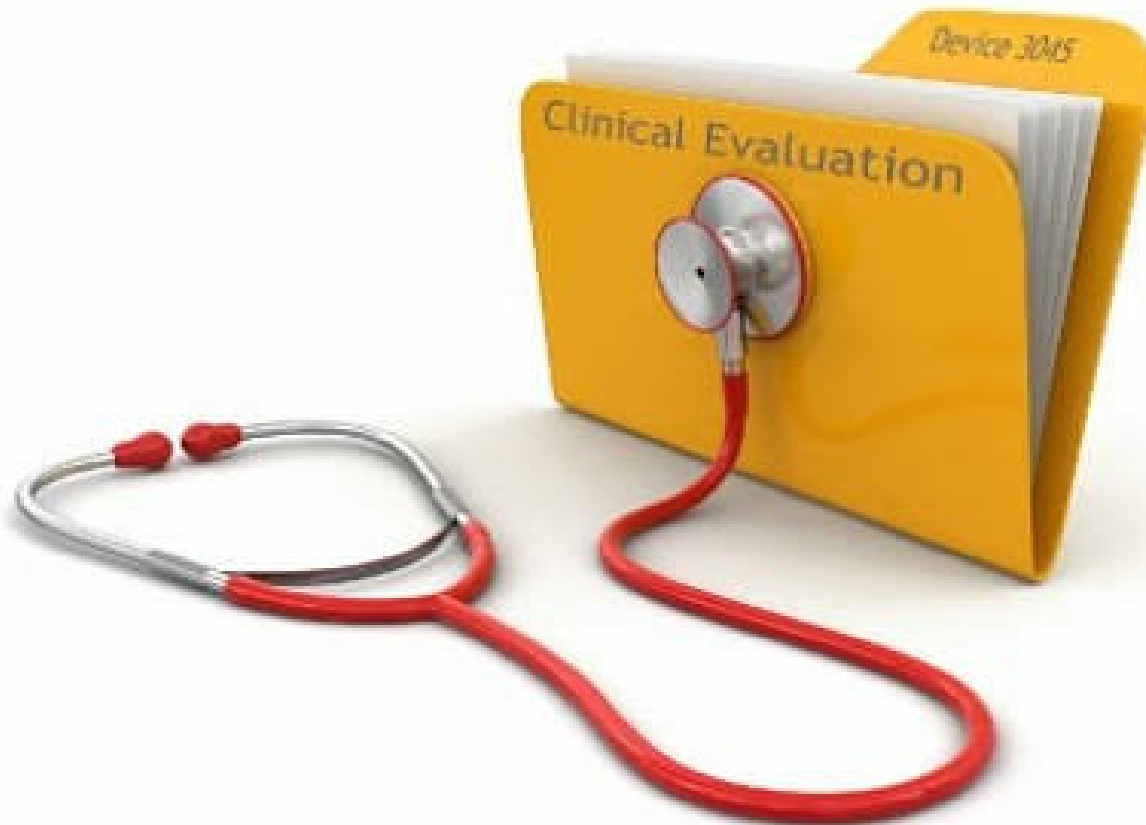
6. EFFECTS ON REPRODUCTIVE SYSTEM

- ❑ Follicular maturation and ovulation
- ❑ Promote spermatogenesis

7. EFFECT ON KIDNEY

- ❑ Increases renal outflow and GFR

CLINICAL EVALUATION



- ❑ HISTORY TAKING
- ❑ EXAMINATION

HISTORY TAKING

❑ AGE

Papillary ca: young

Follicular ca: middle aged

Anaplastic ca, Lymphoma : old age

❑ SEX

Females: male= 3:1

❑ SWELLING

Papillary & follicular - slow growth

Anaplastic - fast growth

❑ PAIN

Painless to start

❑ PRESSURE EFFECT

Hoarseness, dysphagia, dyspnoea

❑ PAST HISTORY

Radiation exposure

❑ FAMILY HISTORY

MEN 2A, 2B

Cowden syndrome

Gardner syndrome

EXAMINATION

SIGNS OF MALIGNANCY

Stony hard swelling

Restriction of lateral mobility

infiltration of surrounding tissues.

Lymphadenopathy in neck

Berry's Sign

Horner Syndrome

Features of infiltration

Laryngotracheal complex- stridor & hemoptysis

Recurrent laryngeal nerve - hoarseness

Esophagus - dysphagia/ odynophagia

Carotid sheath - Berry's sign

Cervical sympathetic chain - Horner's syndrome

Evidence of Metastasis -

Pulsatile bony swelling in scalp or any pathological fracture.

Abdominal distension & jaundice

Hemoptysis, dyspnoea & chest pain

ETIOPATHOGENESIS AND CLASSIFICATION

AMRUTHAVARSHINI B V

AETIOLOGICAL FACTORS

1. IONIZING RADIATION

- Most imp risk factor
radiation - external/radioiodine - under 5 yrs
- Commonest **papillary carcinoma thyroid**
- To treat benign condition in the first two decade of life
(tonsillitis, adenoiditis. . .etc)
- Adolescent - radiotherapy for Hodgkins lymphoma

****Chernobyl nuclear disaster in Ukraine, 1986**

2.GENETIC MUTATION

Genes implicated in thyroid tumorigenesis

Cancer	Oncogenes	Tumour suppressor genes
➤ Papillary thyroid Carcinoma	RET, MET, TRK1, RAS, BRAF	p53
➤ Medullary thyroid carcinoma	RET	
➤ Follicular carcinoma	Ras, PAX8/PPAR	P53, PTEN
➤ Anaplastic	BRAF	p53.
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3.FAMILIAL

MEN 2A

MEN 2B

FAMILIAL MTC

COWDEN SYNDROME

GARDNER SYNDROME

MEN 2A

- Autosomal dominant inheritance
- Mutation of RET protooncogenes
- Characterized by :

Pheochromocytoma

Hyperparathyroidism

Medullary carcinoma of thyroid

- RET mutation
- Characterized by:

Medullary carcinoma thyroid

Pheochromocytoma

**Mucosal neuromas of
lip, tongue, inner eyelid**

Marfanoid habitus

Familial Medullary Thyroid Carcinoma

- RET proto-oncogene mutation
- only Medullary thyroid cancer
- 20% of total cases of MCT

COWDEN SYNDROME

- AD inheritance - Mutation of PTEN gene on chr 10
- Characterized by;
 - Differentiated thyroidcarcinoma**
 - Carcinoma breast**
 - Multiple hamartomas of skin**
 - Neuroendocrine tumor**
 - Endometrial cancer**

GARDNER SYNDROME

- Autosomal dominant inheritance
- Mutation of APC gene in chromosome 5
- Familial adenomatous polyposis
- Multiple polyp in colon which predisposes to colon cancer

➤ Characterized by:

Papillary carcinoma of thyroid

Colorectal cancer

Cancer of ampulla of vater

Hepatoblastoma

Osteomas of the jaw

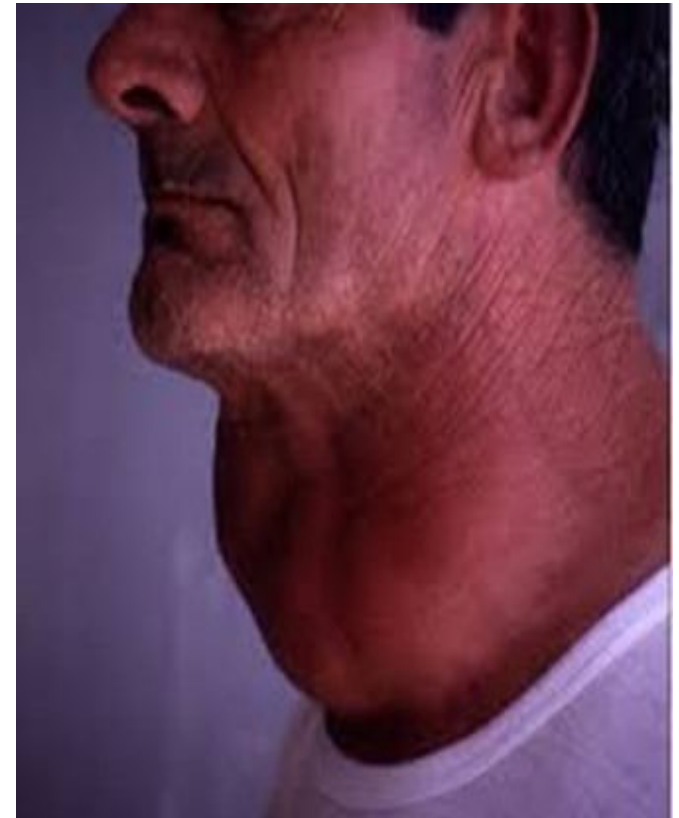
CHRPE

Primary brain tumors

4. PRE EXISTING MNG

Follicular thyroid carcinoma

Dominant or rapidly growing
nodules in long standing
goiters



5. ENDEMIC AREAS

➤ Low iodine areas

➤ Follicular carcinoma - Increased TSH
secretion

6. HASHIMOTO'S THYROIDITIS

- Also called diffuse non goitrous thyroiditis
- Hyperplasia - fibrosis - infiltration with plasma cells and lymphocytes
- Non Hodgkins Lymphoma
- Half of the primary thyroid LYMPHOMA

CLASSIFICATION OF THYROID NEOPLASMS

BENIGN

follicular
adenoma

MALIGNANT

primary

follicular cells
differentiated

Follicular
(10%)
Papillary
(80%)

follicular cells
undifferentiated

Anaplastic
(5%)

parafollicular
cells

Medullary
(2.5%)

lymphoid cells

Lymphoma
(2.5%)

MALIGNANT secondary

metastatic

colon,breast
melanoma,
kidney

local
infiltration

INVESTIGATIONS OF THYROID MALIGNACIES



ANAGHA K KARUN

□ THYROID FUNCTION TEST **[TFT]**

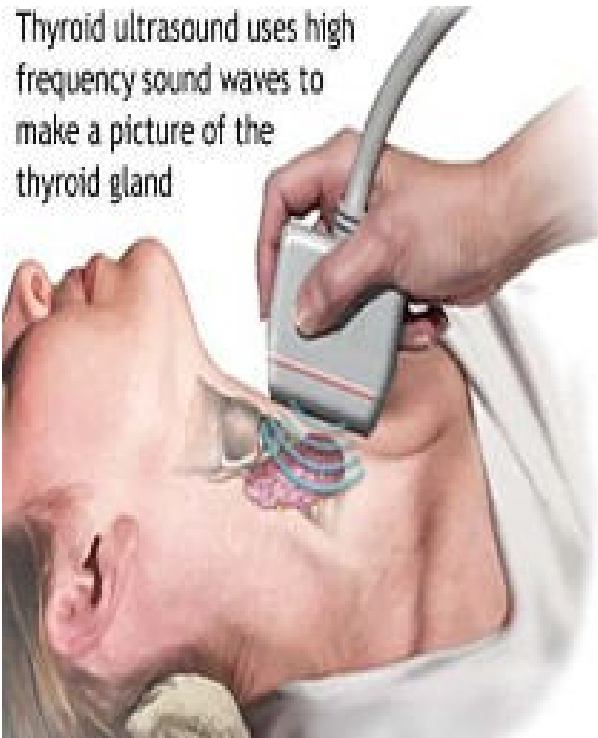
□ THYROID IMAGING {USG,**CT,MRI,PET scan,X-RAY**}

□ FINE NEEDLE ASPIRATION CYTOLOGY
[FNAC]

□ RADIOISOTOPE SCANNING **{Tc 99m,I 123}**

- Immunochemiluminometric assay.
- Measures TSH, free T3 and free T4.
- Total T3 and T4 depend on TBG.
- Free T3 and T4 are important.

Thyroid ultrasound uses high frequency sound waves to make a picture of the thyroid gland



- Gold standard investigation
- Use high frequency probe in the range 7.5-16 MHz
- Number, size, shape, margin, vascularity, microcalcification

- To differentiate cystic & solid swellings
- Non palpable , deep nodules
- Features of malignancy
- Lymph node assessment for metastasis
- USG guided FNAC

FEATURES OF MALIGNANCY

- **Hypo echoic**
- **Increased vascularity**
- **Micro calcifications**
- **No peripheral halo**
- **Poorly defined borders**
- **Taller than wide**
- **LN involvement**



- To conclude pathological diagnosis
- 95% accuracy, 83% sensitivity, 92% specificity
- USG guided aspiration
- **Advantages :**
 - patient compliant
 - simple & quick to perform
 - repeated readily
- **C/I : Toxic nodule**

1. 10cc syringe & 23G needle inserted
 2. Multiple passes are made(Minimum 6 aspirations)
 3. capillary & suction technique
 4. Papanicolaou stain
- **Adequate smear:** 6 aspiration with 6 cluster of cells each containing 20 cells

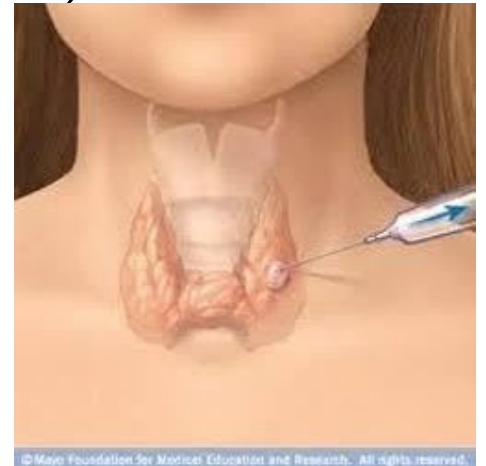


TABLE 36-3 Bethesda Criteria for Reporting Thyroid Cytopathology

BETHESDA CATEGORY	IMPLIED MALIGNANCY RATE ACCORDING TO BETHESDA SYSTEM (%) ⁵⁵	META-ANALYSIS REPORTED MALIGNANCY RATE IN EXCISED LESIONS (%) (MEDIAN) ⁵⁶	PERCENT OF FNA SPECIMENS IN META-ANALYSIS (% [RANGE]) ⁵⁶	USUAL MANAGEMENT ⁵⁵
1—Nondiagnostic or unsatisfactory	1-4	17	13 (2-24)	Repeat FNA with image guidance
2—Benign	0-3	4	59 (39-74)	Clinical follow-up
3—AUS/FLUS	5-15	16	10 (1-27)	Repeat FNA or lobectomy
4—FN or SFN (specify if Hürthle cell type)	15-30	26	10 (1-25)	Lobectomy
5—Suspicious for malignancy (specify type)	60-75	75	3 (1-6)	Lobectomy or total thyroidectomy
6—Malignant (specify type)	97-99	99	5 (2-16)	Total thyroidectomy

AUS/FLUS, atypia of undetermined significance/follicular lesion of undetermined significance; *FN*, follicular neoplasm; *FNA*, fine-needle aspiration; *SFN*, suspicious for follicular neoplasm.

Disadvantages

- Not possible to differentiate follicular adenoma and carcinoma.
- Sampling error (False neg. rate: 1-6%) in non guided FNAC.

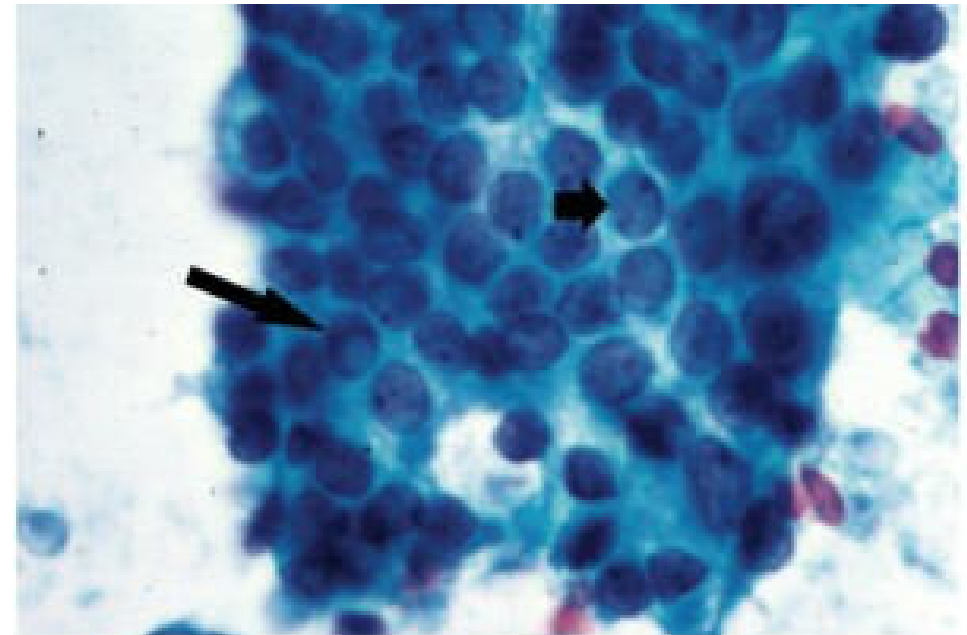
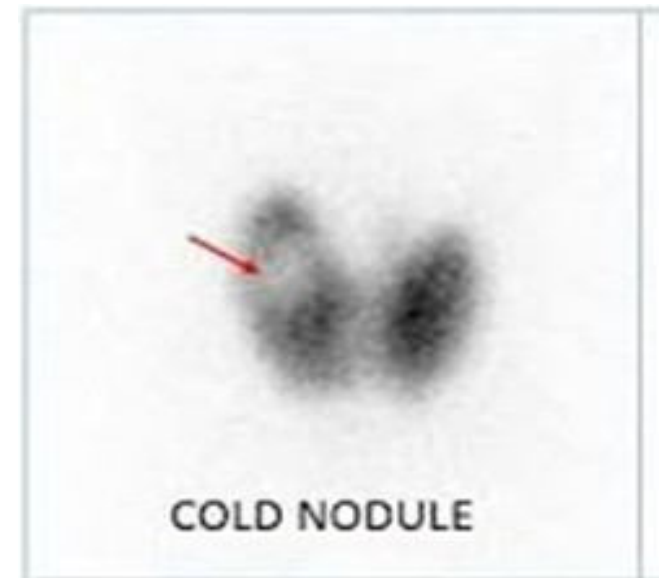
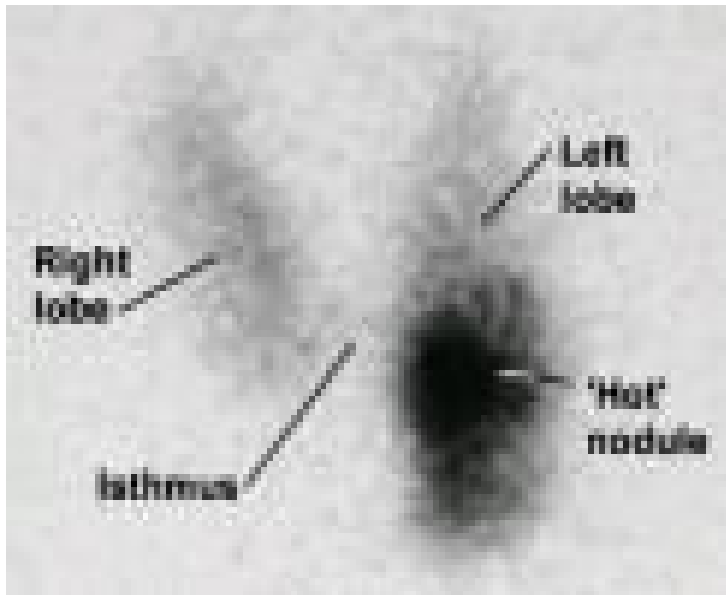


FIGURE 36-12 Fine-needle aspiration of a thyroid mass allows determination of individual cellular morphology. Cells in this aspirate demonstrate intranuclear grooving (*short arrow*) and ground-glass cytoplasmic inclusions (*long arrow*) (so-called Orphan Annie eyes). These cellular features confirm the diagnosis of papillary carcinoma of the thyroid.

RADIO ISOTOPE SCANNING

- I123 or Tc 99m
- INDICATION
- Solitary thyroid nodule - toxic

- **HOT** : 5% malignant
- **COLD** : 20% malignant



X RAY

- Preoperatively, tracheal deviation or compression
- Retrosternal extension

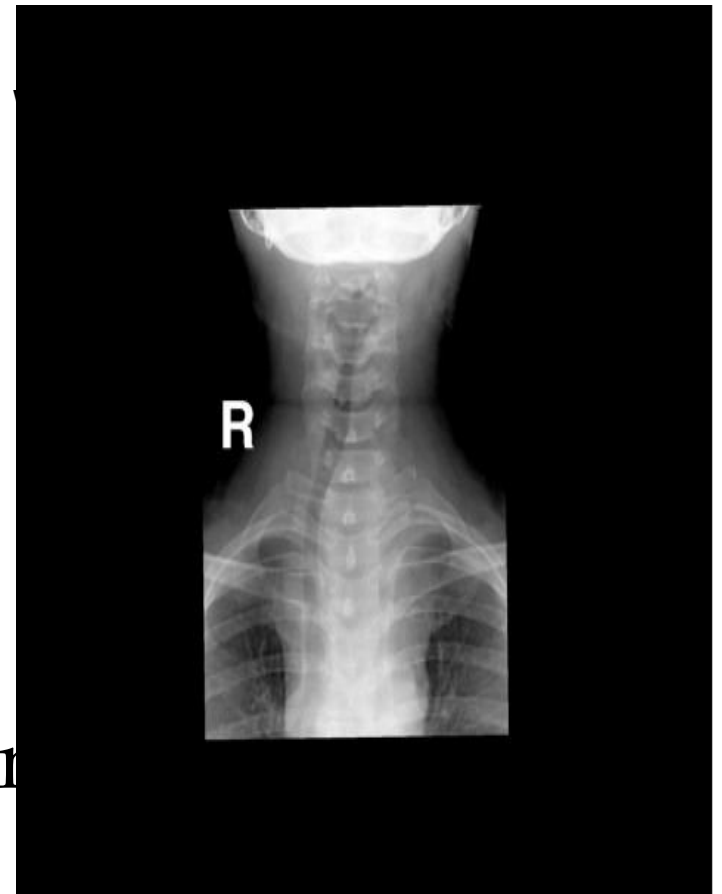


Figure 1: Thoracic inlet with right deviation and indentation of the trachea

TOMOGRAPHY

INDICATIONS

- Retrosternal goitre
- Malignancy (T&N Staging)
- Giant goitre with tracheal compression and displacement
- Berry sign +ve

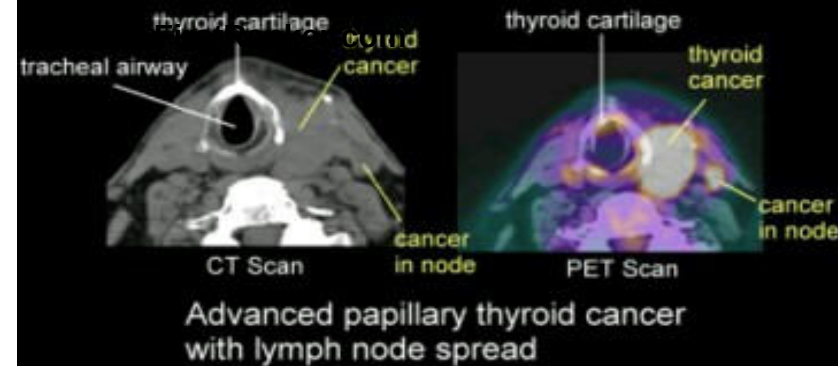
➤ Iodine used with iv contrast, so not used in malignancies.



MRI

- MR Angiography : vessel wall involvement
- Advantage over CT:
 - no iodine contrast
 - no radiation exposure

POSITRON EMISSION TOMOGRAPHY[PET]

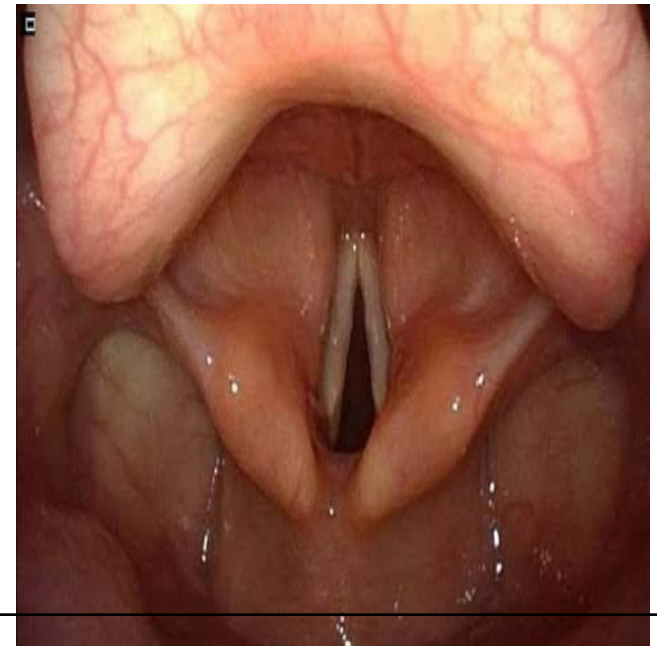


- Recurrence and metastasis

- Preoperatively
- Mobility of VC
- Flexible Laryngoscopy

USES

- ✓ Medico legal use



S.THYROGLOBULIN:

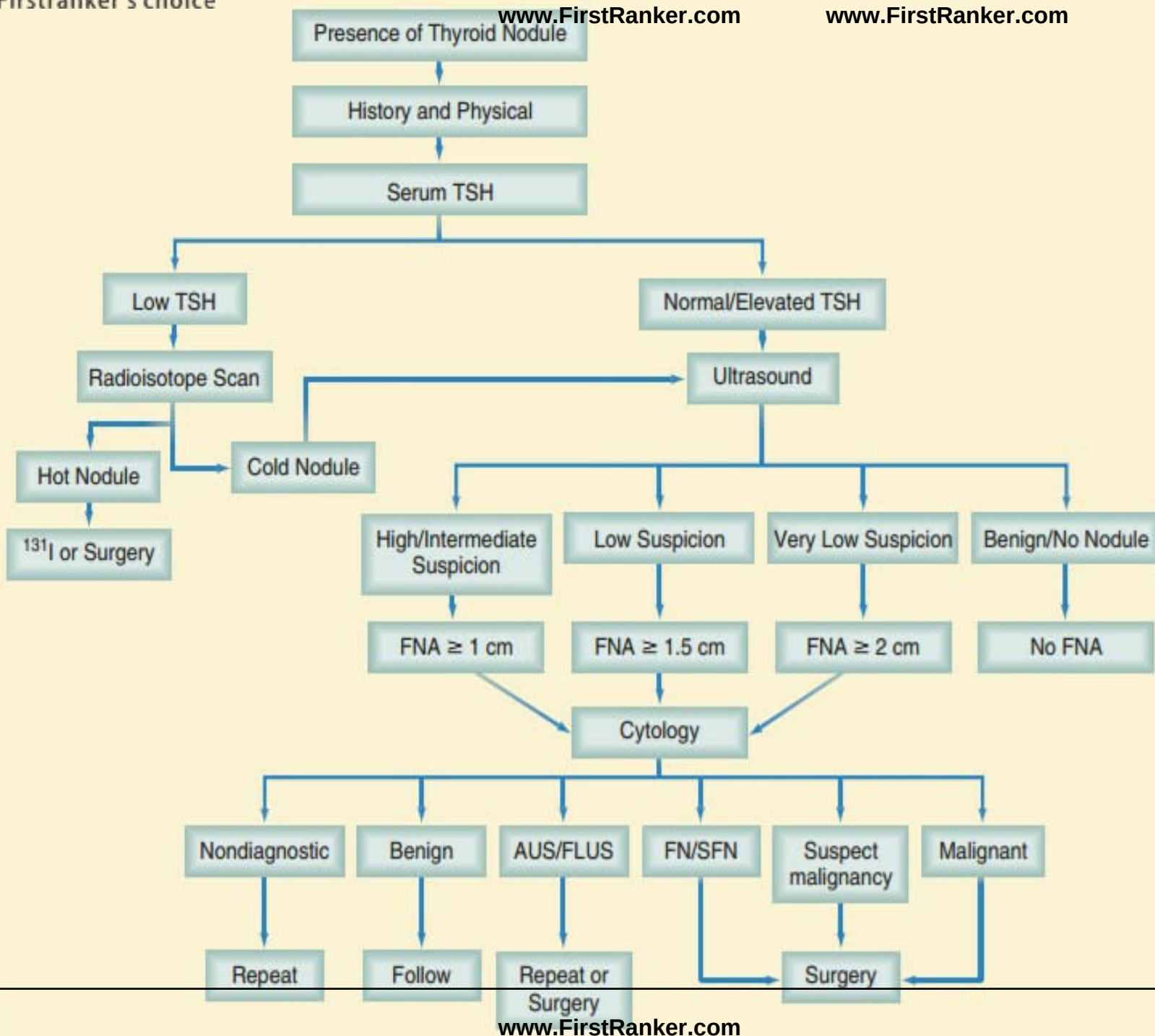
- ❖ No significance in initial evaluation
- ❖ in follow-up
- ❖ pre operative evaluation

Normal value 3–40ng/ mL

INTRAOPERATIVE FROZEN SECTION

- Confirm nodal involvement in PTC.
- Can avoid 2nd procedure





DIFFERENTIATED THYROID CARCINOMAS

ANAKHA M

- Differentiated thyroid carcinomas are;
Papillary thyroid carcinoma
Follicular thyroid carcinoma
Hurthle cell carcinoma

PAPILLARY THYROID CARCINOMA

- Most common malignancy -80%
- Excellent prognosis
- Important risk factor- radiation exposure in childhood
- More common in females 2.5:1 ratio
- Peak incidence less than 40 years of age

- Micropapillary carcinoma
- Diffuse sclerosing variant
- Encapsulated variant
- Tall cell variant
- Columnar cell variant

CLINICAL FEATURES

- Palpable nodule ;incidental imaging finding; painless lateral mass
- Lymphadenopathy is usually present
- Compression features less common

- Slowly progressive and less aggressive tumour
- Spread via lymphatics
- Multicentricity can be anticipated in 70% of patients

- GROSS FEATURES
 - It can be hard or of varying consistency
 - It can be solitary or multinodular
- MICROSCOPY
 - orphan annie eye nucleus
 - papillary projections with psammomma bodies ,cystic spaces



**PSAMMOMA
BODIES**

PAPILLARY

ORPHAN ANNIE NUCLEI



FOLLICULAR THYROID CARCINOMA

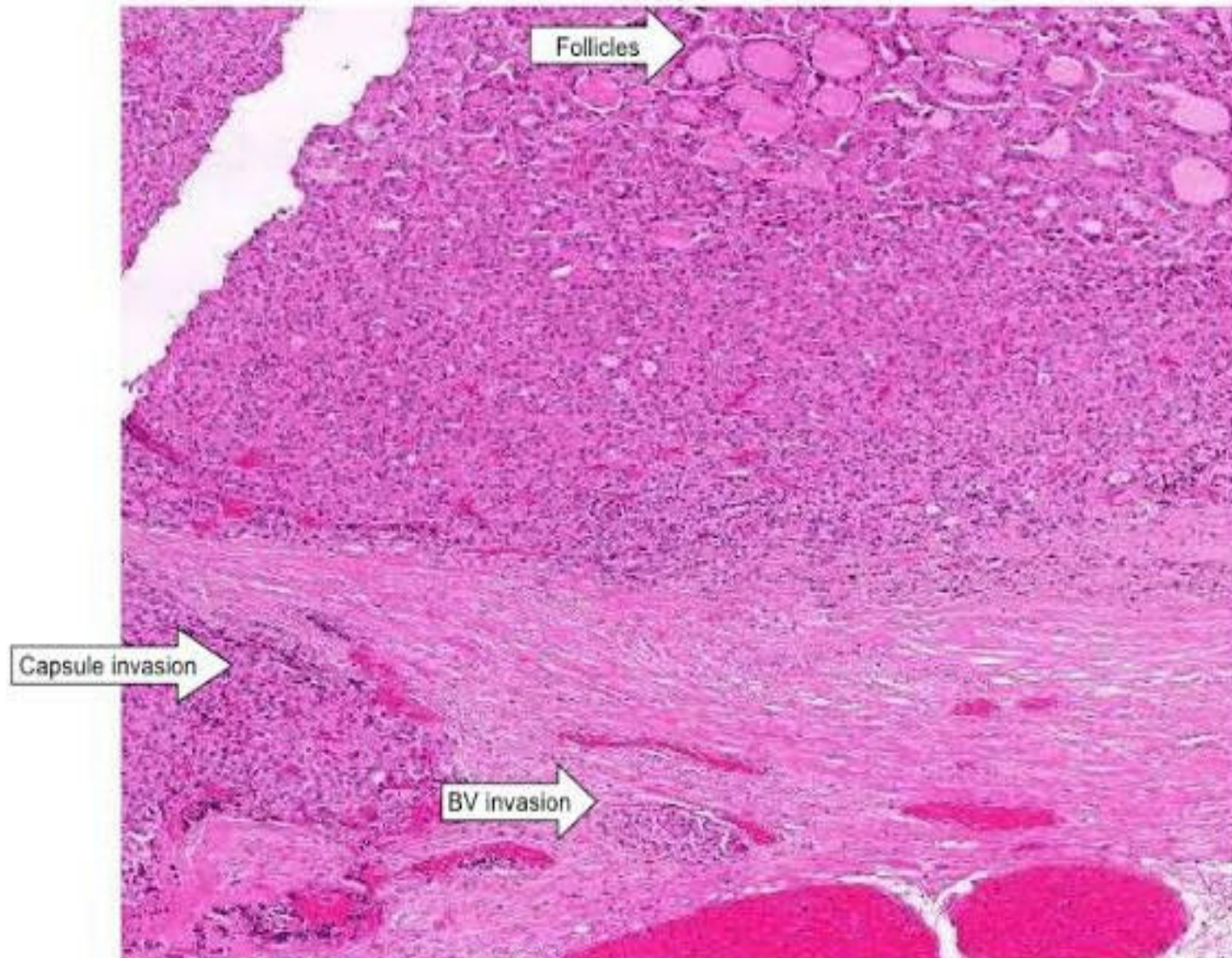
- 10% of all thyroid malignancies
- More commonly seen in female 3:1
- 40 to 60 yrs of age
- Either de novo or pre existing MNG

- Capsular invasion and angio invasion
- More aggressive, mortality twice than papillary carcinoma
- Lymph node involvement is less common
- Less favourable prognosis
- Blood born metastases common

CLINICAL FEATURES

- Presents as painless thyroid mass
- May coexist with MNG 5-10% CASES
- In advanced disease
 - hoarseness of voice
 - stridor
 - berry's sign
 - pathologic fractures
 - pulsatile bony swelling in the scalp

Follicular Carcinoma

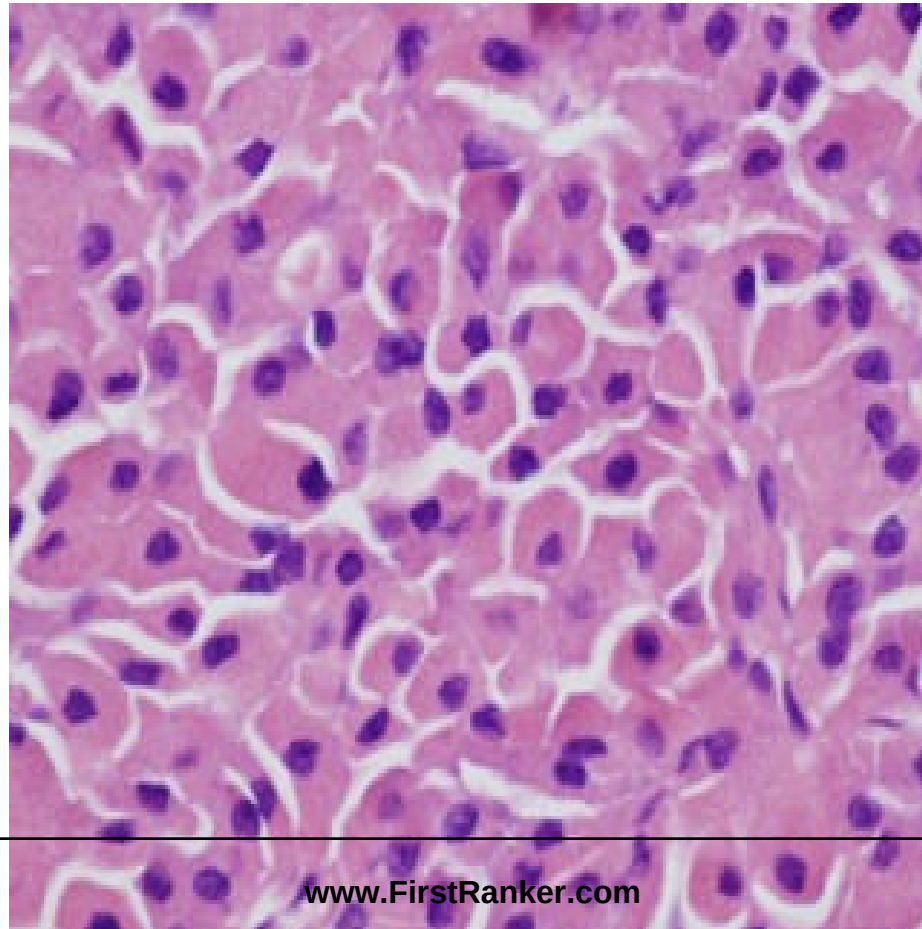


HURTHLE CELL CARCINOMA

- Subtype of follicular thyroid carcinoma
- Consists of oxyphilic cells
- Increased no of mitochondria ,enlarged granular eosinophilic cytoplasm
- 60-70 years of age
- More aggressive behaviour

- Secrete thyroglobulin
- 30% multicentric
- More chances of lymphatic spread

- Cells with abundant granular eosinophilic cytoplasm



INVESTIGATIONS

- TSH levels
- FNAC of thyroid nodule and lymph node
- Ultrasound scan neck, CT scan neck

TNM STAGING

TUMOUR

- Tx –Primary cannot be assessed
- T0-No evidence of primary
- T1-Tumour - $\leq 2\text{cm}$
 - T1a – $\leq 1\text{ cm}$
 - T1b- $> 1 \leq 2\text{cm}$
- T2-limited to thyroid $>2\text{cm}$ but $\leq 4\text{cm}$
- T3 –Limited to thyroid $>4\text{ cm}$ or any tumour with minimal extrathyroid extension
- T4 – Any size with extensive extra thyroid extension
 - T4a :moderately advanced
 - T4b :very advanced

NODES

- Nx- Cannot be assessed
- N0- No regional node metastases
- N1-Regional node metastases

N1a-level 6

N1b-any/all other levels

METASTASES

- Mx-Cannot be assessed
- M0-No metastases
- M1-Metastases present

AJCC STAGING OF DTC

- STAGE <45 yrs

Stage 1- any T any N M0

Stage 2 – any T any N M1

- STAGE >45 yrs

Stage 1 –T1a,T1b,T2N0M0

Stage 2 –T3N0M0

- T1,T2,T3N1M0

Stage 3-T4a any N M0

Stage 4A- T4bAny N M0

Stage 4b-Any T any N M1

TREATMENT

- Papillary thyroid carcinoma
 - Total thyroidectomy + CCND
- Follicular thyroid carcinoma
 - Total thyroidectomy +CCND

If lymph node seen in USG and proven in FNAC— lateral lymph node dissection

MEDULLARY CARCINOMA THYROID

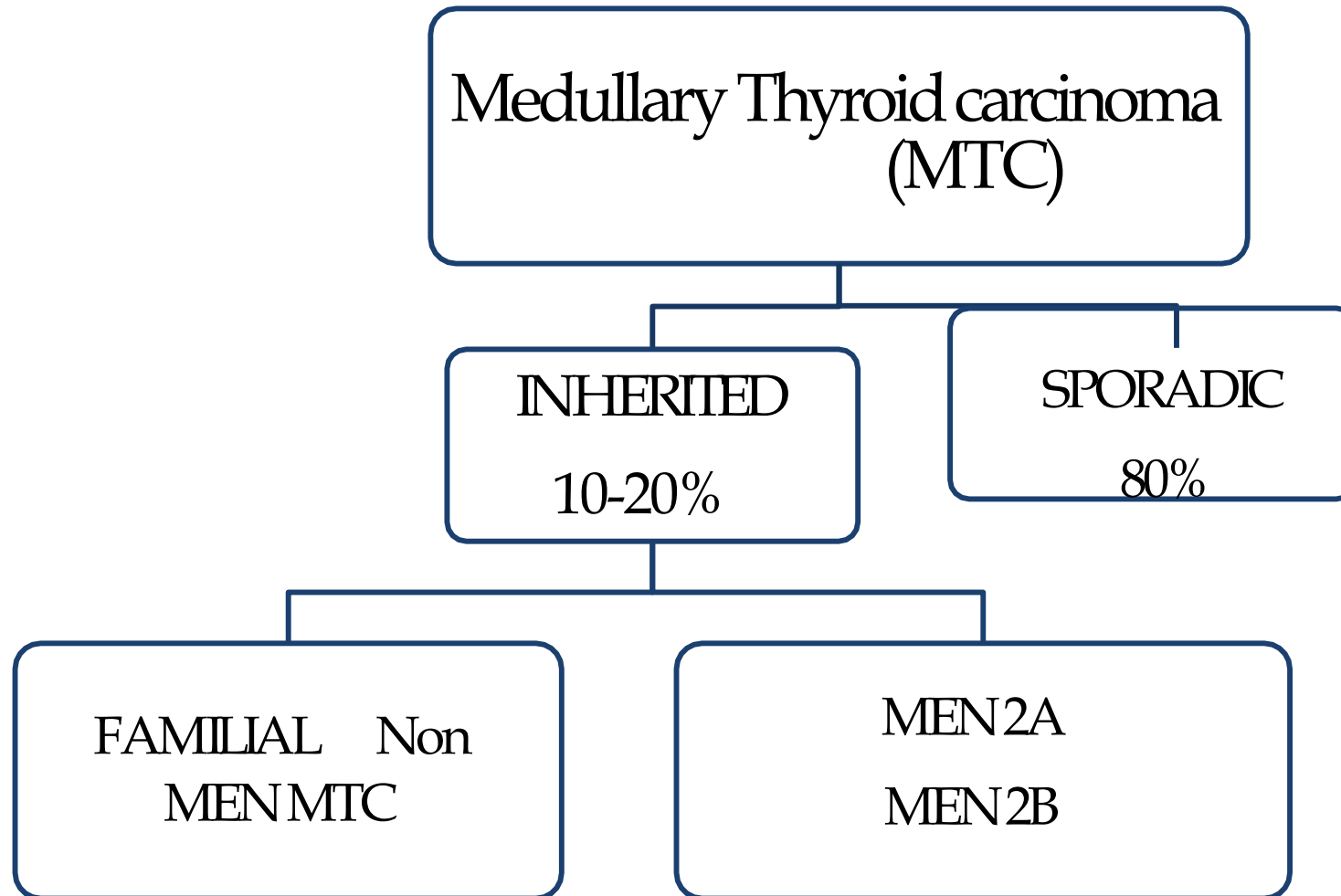
ANAMIKA S

INTRODUCTION

- 2.5% of thyroid carcinoma
- Tumours of parafollicular C cells

FORMS

1. Sporadic form (80%)
2. Familial form (10 to 20%)



FAMILIAL

BILATERAL AND
MULTICENTRICITY

YOUNGER AGE GROUP

ASSOCIATED WITH C CELL
HYPERPLASIA

SPORADIC

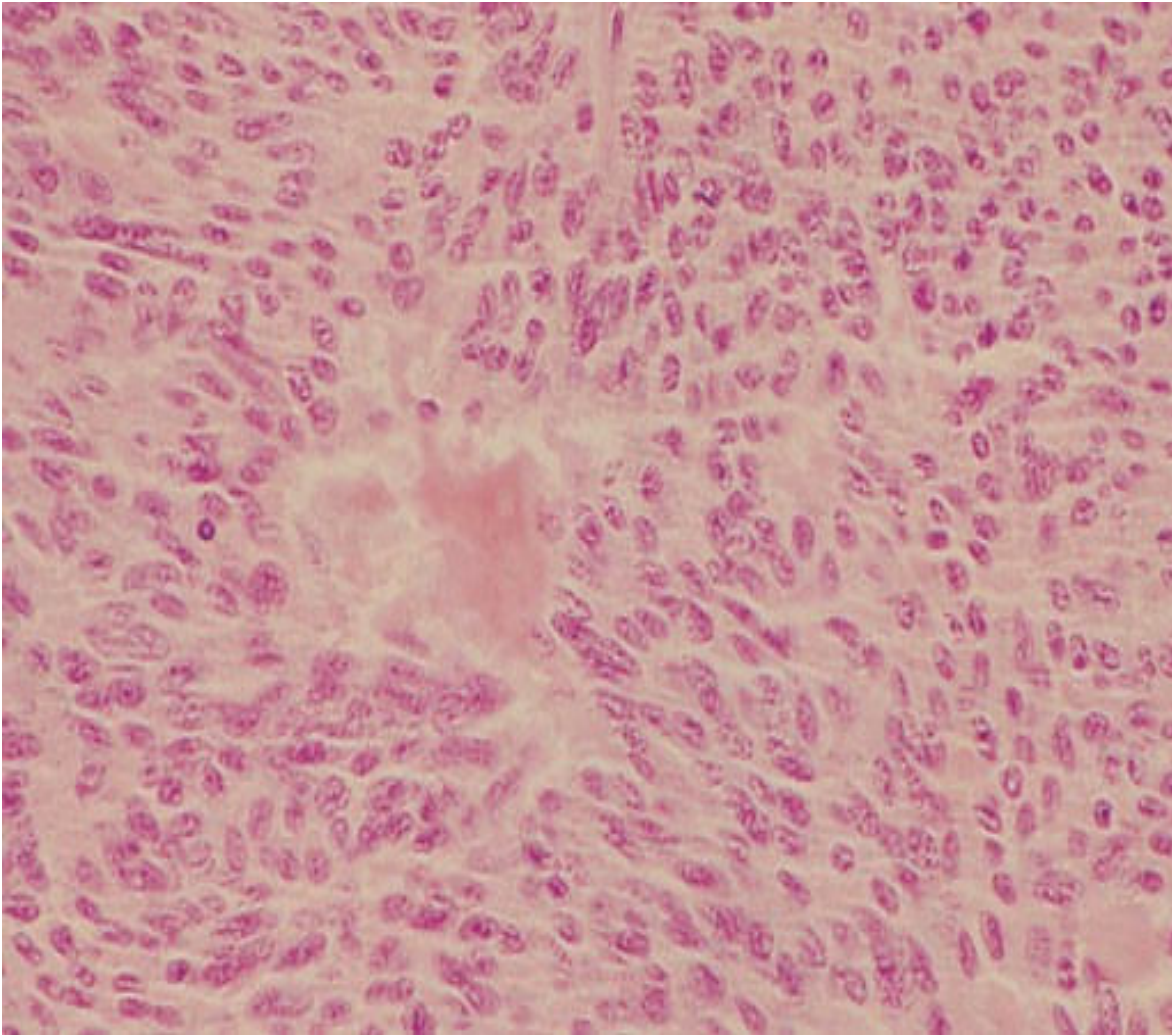
ORIGINATE IN ONE LOBE

ANY AGE

KEY FEATURES

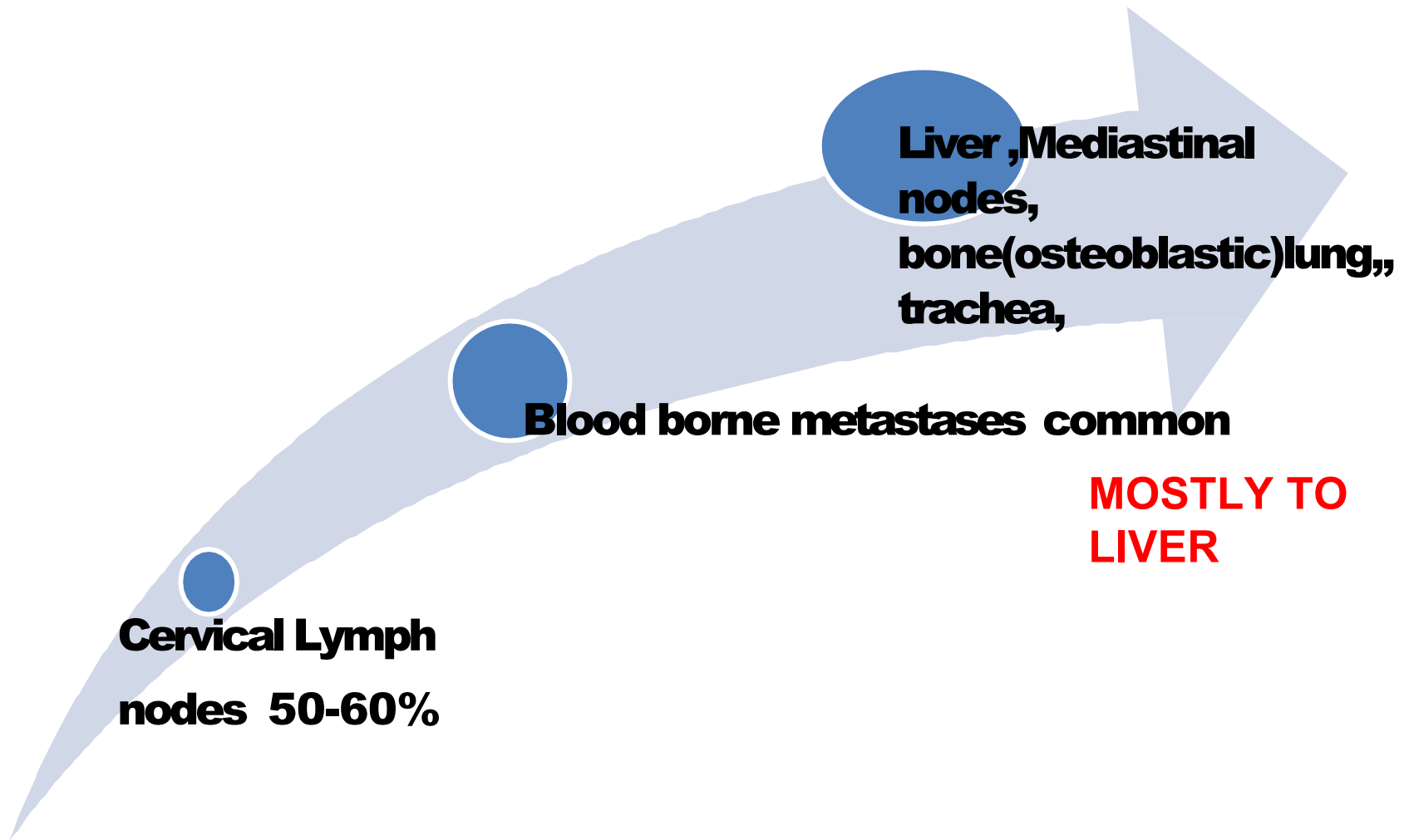
1. More aggressive
2. RET gene point mutation.
3. High levels of CEA and serum CALCITONIN.
4. Not TSH dependent
5. Do not take up radioactive IODINE.
6. Diarrhoea is a feature of 30% of cases.

MEDULLARY CARCINOMA



Cell balls and Amyloid stroma

METASTASES



CLINICAL FEATURES

1. Thyroid swelling-neck lymph nodes
2. HTN , Pheochromocytoma ,mucosal neuroma-MEN 2
3. Paraneoplastic symptoms like cushings and carcinoids

INVESTIGATIONS

1.FNAC

2.SERUM CALCITONIN AND CEA

**3.GENETIC TESTING FOR GERMLINE RET
MUTATION**

4.THYROID AND NECK USG

- All patients should be screened for RET gene point mutation ,pheochromocytoma and hyperparathyroidism.
- Pheochromocytoma-to prevent hypertensive crisis

- 1. Serum Ca-to rule out hyperparathyroidism.**
- 2. 24 hr urine VMA and serum metanephrin,USG abdomen- to rule out pheochromocytoma**
- 3. If it is + ve – CECT of abdomen**
- 4. CECT or MRI chest and mediastinum – if N1disease or calcitonin greater than 400pg/ml**
- 4. PET scan – recurrence, Metastasis as they do not take up radioiodine**

TREATMENT

- 1. Surgery is the treatment of choice.**
- 2. Tumour size more than 1cm, chance of spread to regional nodes is 75%**
- 3. Total thyroidectomy with elective central neck dissection.**
- 4. When central node (level 6) involved – Ipsilateral modified radical neck dissection.**

- Hypercalcemia and PTH at time of surgery-Only obviously enlarged parathyroid removed
- If vascular pedicle of parathyroid is unable to maintain –auto transplantation of $\frac{1}{2}$ the gland in sternocleidomastoid or brachioradialis of non-dominant forearm.
- Somatostatin analogue (octreotide ,
lanreotide)for cushings syndrome , flushing

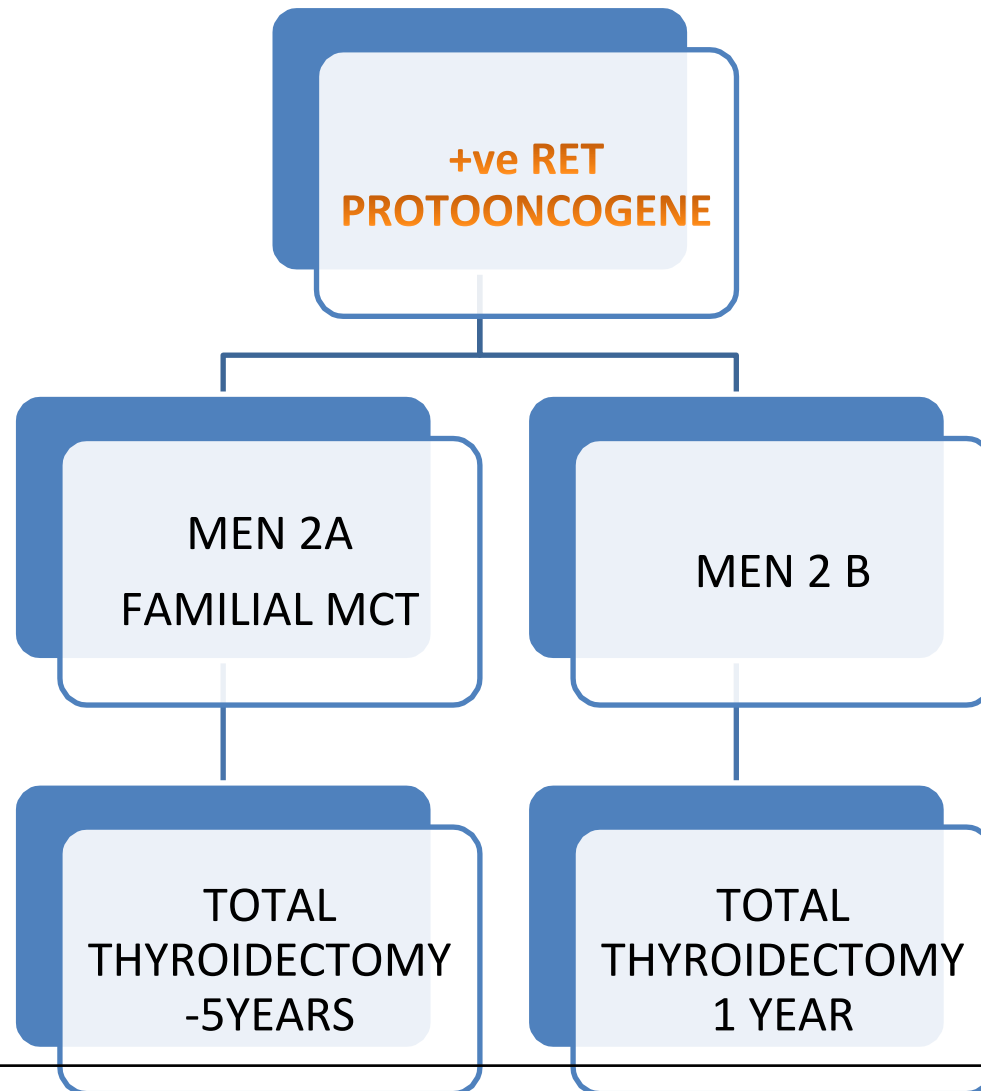
EXTERNAL BEAM RADIOOTHERAPY

1. Resected T4 disease.
2. Unresected residual or recurrent tumour
3. Symptomatic bony metastasis.

POST OPERATIVELY

- Stimulated calcitonin assay to assess the adequacy of resection
- Levothyroxine is indicated in all patients .
- TSH-normal range

GENETIC SCREENING



- Prognosis is variable and depends on the stage at diagnosis
- FMTC (best) > MEN-2A > Sporadic > MEN-2B (worst)
- Chance of recurrence 50% & also high mortality

FOLLOW-UP

- **Basal calcitonin-Fall after resection**
Rise in recurrence, residual tumour and metastasis.
- **PET scan**
- **CEA**
- **USG (central and lateral neck compartments)**

ANAPLASTIC THYROID CARCINOMA

INTRODUCTION

- Undifferentiated carcinoma
- 5% of all thyroid malignancy
- Most aggressive
- Disease specific mortality 100%
- Occurs mainly in elderly women

TYPICAL MANIFESTATION

Older patient with

1. Dysphagia
2. Cervical tenderness
3. Painful, rapidly enlarging neck mass
4. Frequently have history of DTC and upto 50% goitre

- May also Include superior venacava syndrome
- Deteriorates into tracheal obstruction
- Rapid local invasion of surrounding structures

SPREAD

- Rapid local invasion
- Blood as well as lymph spread present.
- Sites of Mets : lung , brain, bone, liver, kidney, skin, pancreas, adrenal.

STAGING

Table 1 Staging of anaplastic thyroid cancer

Classification	Tumor	Lymph nodes	Metastases
Stage IVa	T4a [†]	Any N	M0
Stage IVb	T4b [‡]	Any N	M0
Stage IVc	Any T	Any N	M1

[†]T4a, tumor does not extend beyond the thyroid capsule;

[‡]T4b, tumor extends beyond the thyroid capsule (<http://www.cancer.org/cancer/thyroidcancer/detailedguide/thyroid-cancer-staging>).

MANAGEMENT

- Treatment of ATC is usually palliative
- Treatment of choice -RADIOTHERAPY
- Tracheal obstruction - ISTHMUSECTOMY

THYROID LYMPHOMA

INTRODUCTION

- Uncommon lymphoma
- 2.5 %of all thyroid malignancies

Involve thyroid as a part of systemic lymphoma or may arise primarily in thyroid.

PREDISPOSING FACTORS

- Autoimmune diseases (Lymphocytic thyroiditis)
- Advanced age(>70 yr)
- More frequent in women (four times)

SIGNS AND SYMPTOMS

- Rapid enlarging neck mass
- Hoarseness
- Dysphagia
- Fever
- Diffuse pain

PHYSICAL EXAMINATION

- Firm, slightly tender, fixed mass

INVESTIGATIONS

- Ultrasound
- MRI
- Trucut biopsy
- PET imaging

TREATMENT OF LYMPHOMA

RADIATION+CHEMO= treatment of choice

Tracheal obstruction : urgent chemotherapy

CHOP/CVDP regimen:

Cyclophosphamide

Doxorubicin Vincristine

Role of surgery only in:

- ✓ Biopsy
- ✓ Pressure symptoms
- ✓ No response to chemo .

SURGICAL MANAGEMENT AND COMPLICATIONS

Anandhu JB

Roll No : 16

☐ For a preoperatively proven case of

- ✓ Differentiated carcinoma
- ✓ Medullary Carcinoma

TOTAL THYROIDECTOMY

Central neck dissection

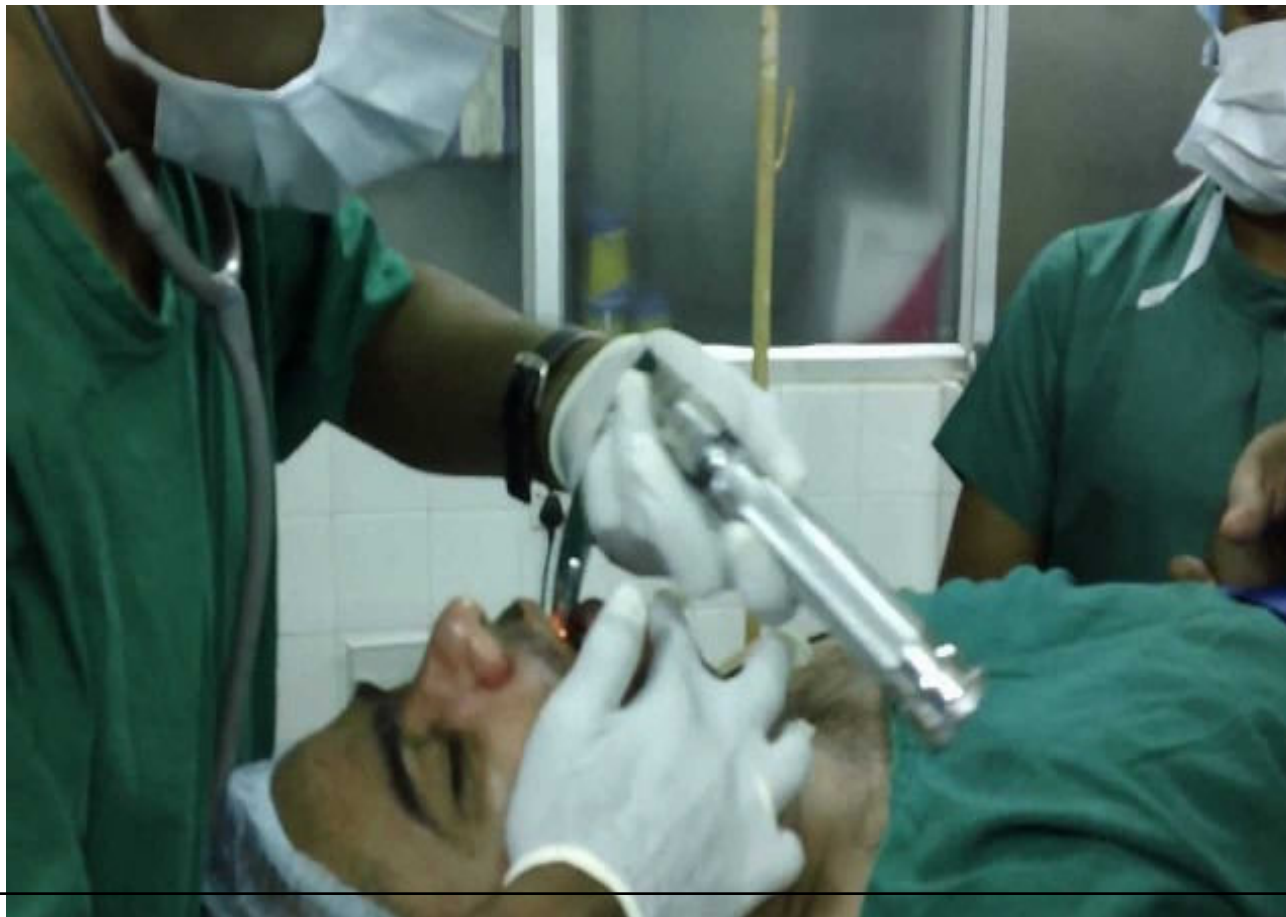
Modified Radical Neck Dissection

TOTAL THYROIDECTOMY

- Facilitates radioiodine ablation later.
- As there is chance for multifocal d/s.
- Facilitates use of thyroglobulin as tumor marker in followup.

STEPS OF SURGERY

- General anaesthesia with endotracheal intubation.

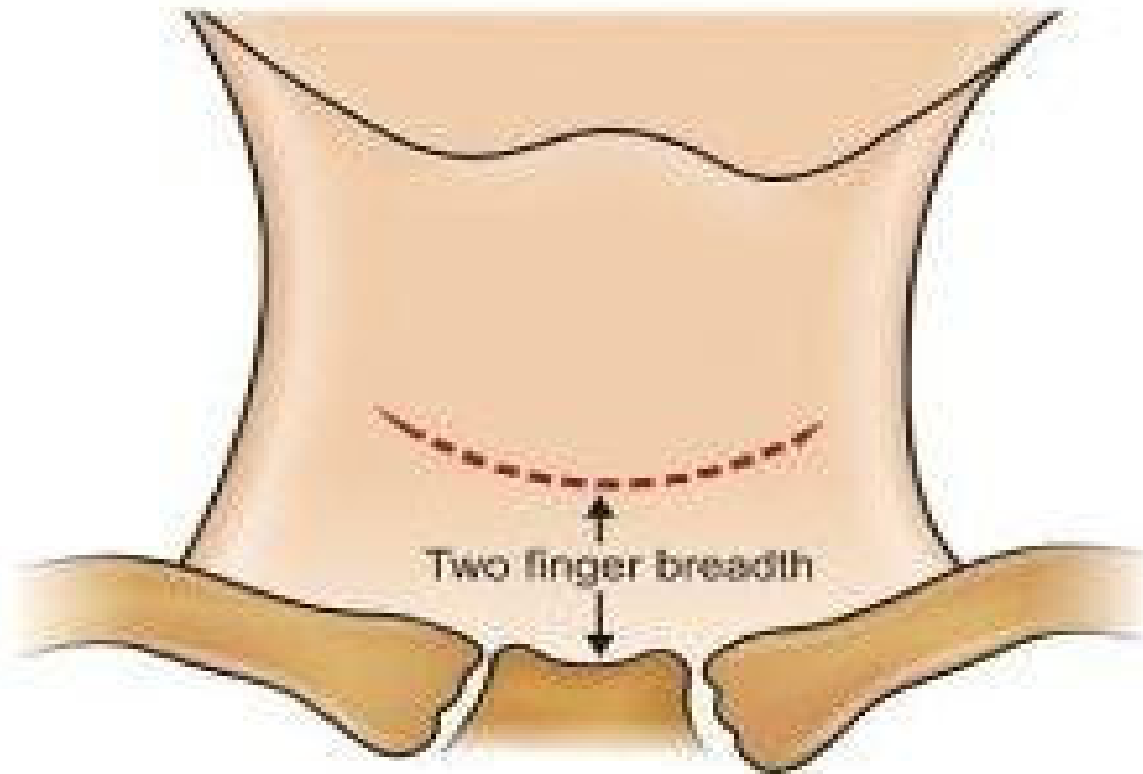


- Supine position - sand bag placed transversely under the shoulders
- A head ring – to stabilize head
- Table tilted up - 15° at the head end.

ROSE'S POSITION



KOCHER'S COLLAR INCISION



- Horizontal curved - Midway between the notch of the thyroid cartilage and suprasternal notch.
- One sternocleidomastoid to other.

- Skin, superficial fascia cut upto investing layer of deep fascia
- Flaps are raised
 - Upper upto laryngeal prominence
 - Lower upto suprasternal notch
- Investing layer of deep fascia is incised vertically.
- Retract strap muscles laterally

- Identify the pedicles

1. Superior pedicle

- (sup. thyroid A & V)

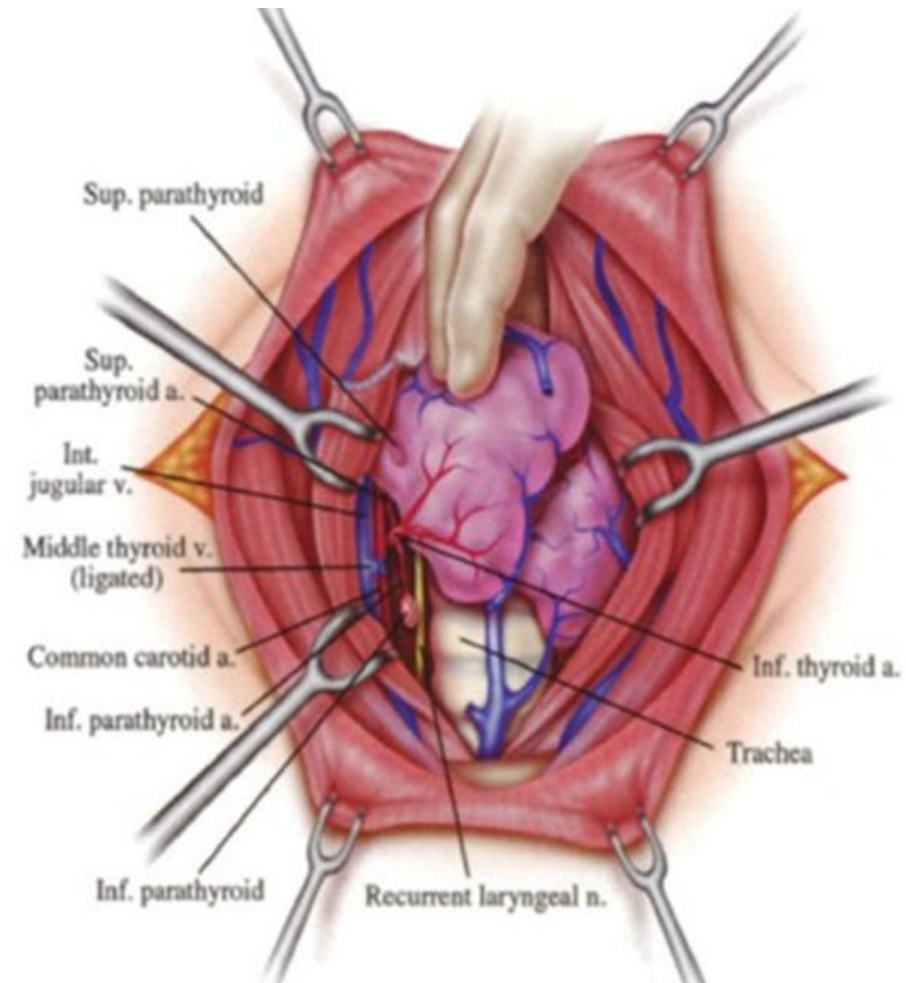
2. Middle pedicle

- (middle thyroid V only)

3. Inferior pedicle

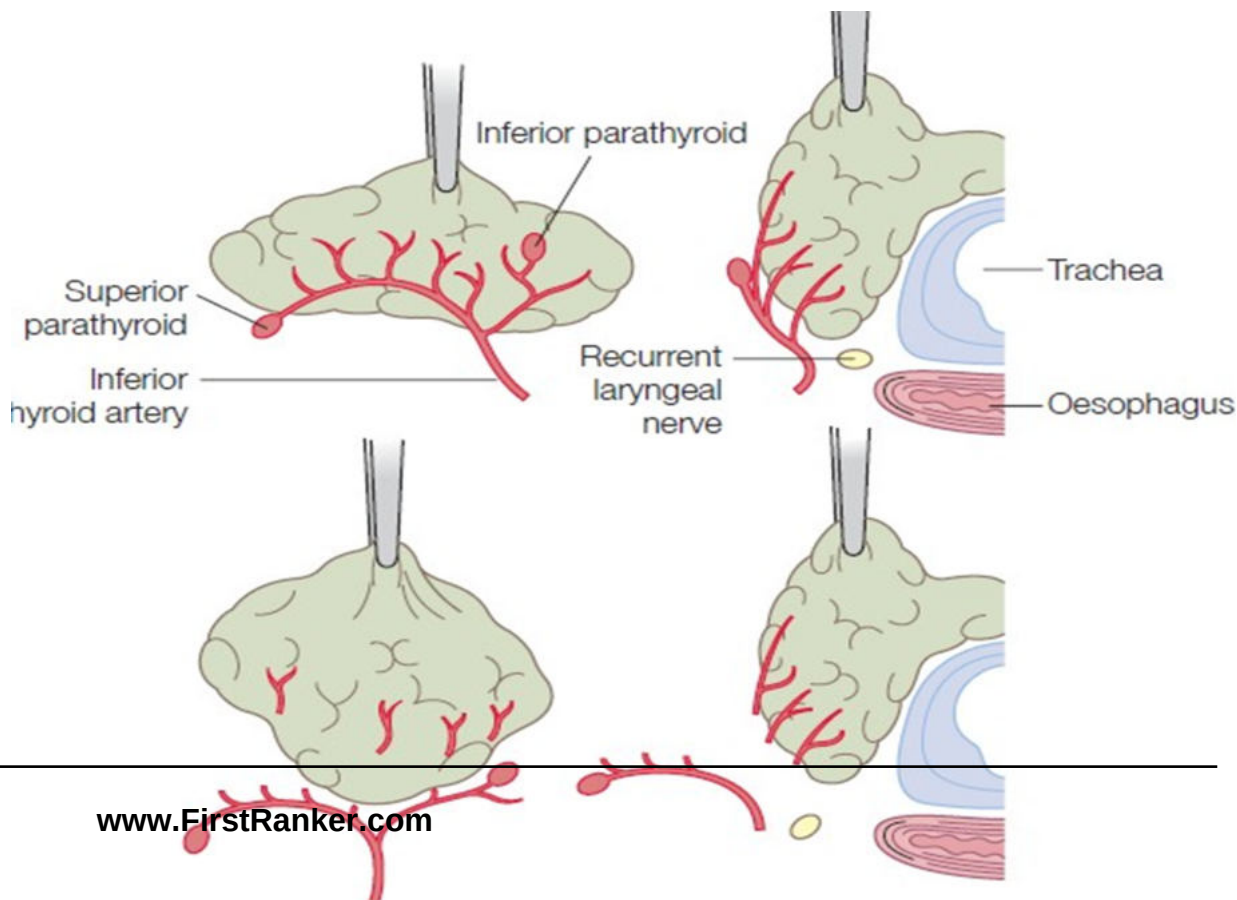
- (inferior thyroid A only)

- Ligate middle thyroid vein **first**.



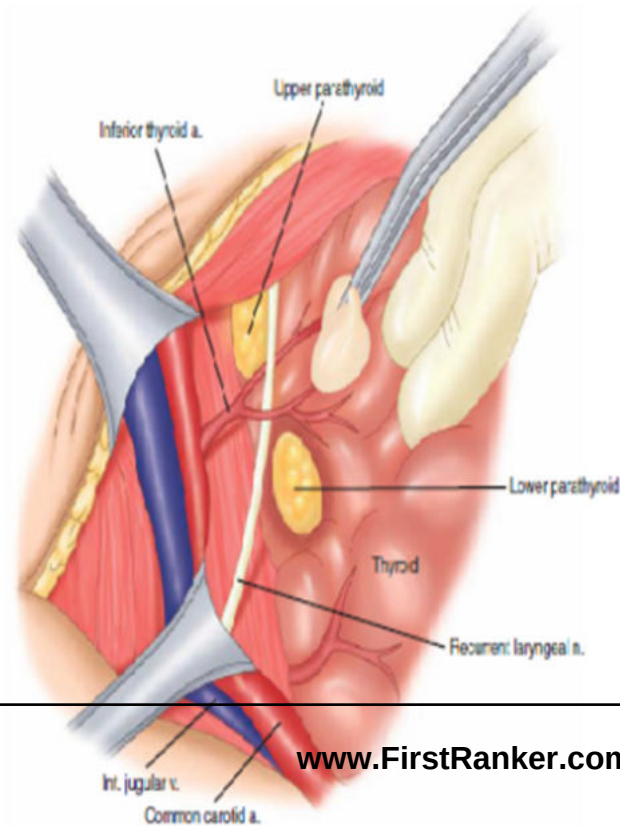
Ligate superior thyroid A & V separately & close to capsule (CAPSULAR LIGATION)

- Ligate inferior thyroid A close to the gland after safe guarding recurrent laryngeal nerve.



• Identification of parathyroid

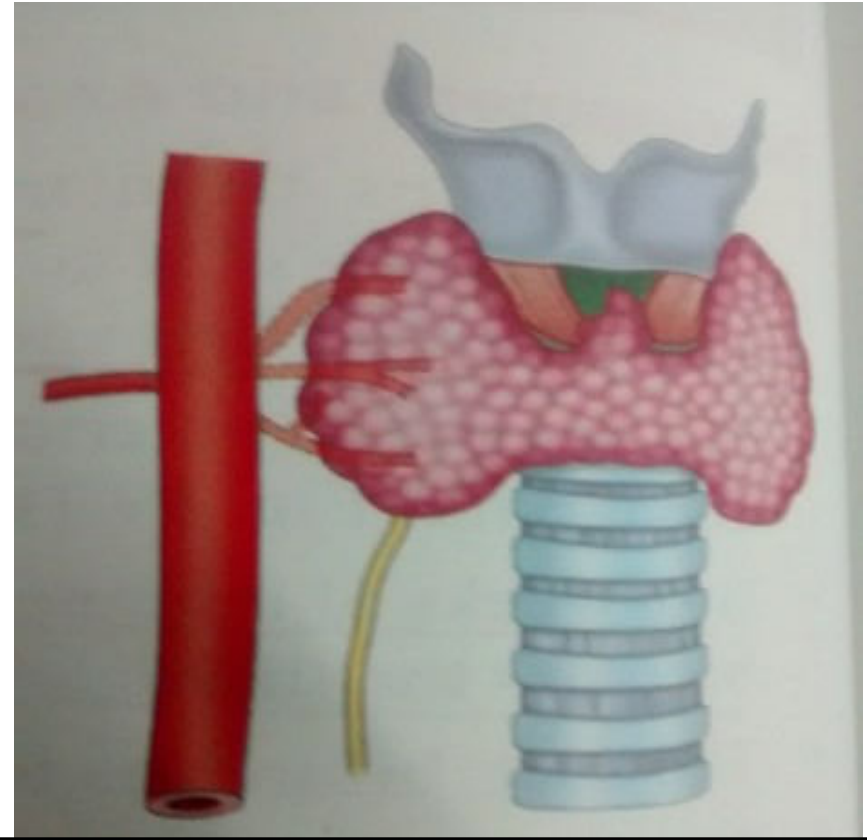
- :Yellowish pink
- :Position – in relation to **ITA-RLN** junction
- Sup. parathyroid – above & behind
- Inf. Parathyroid – below & anterior



- Identification of RLN

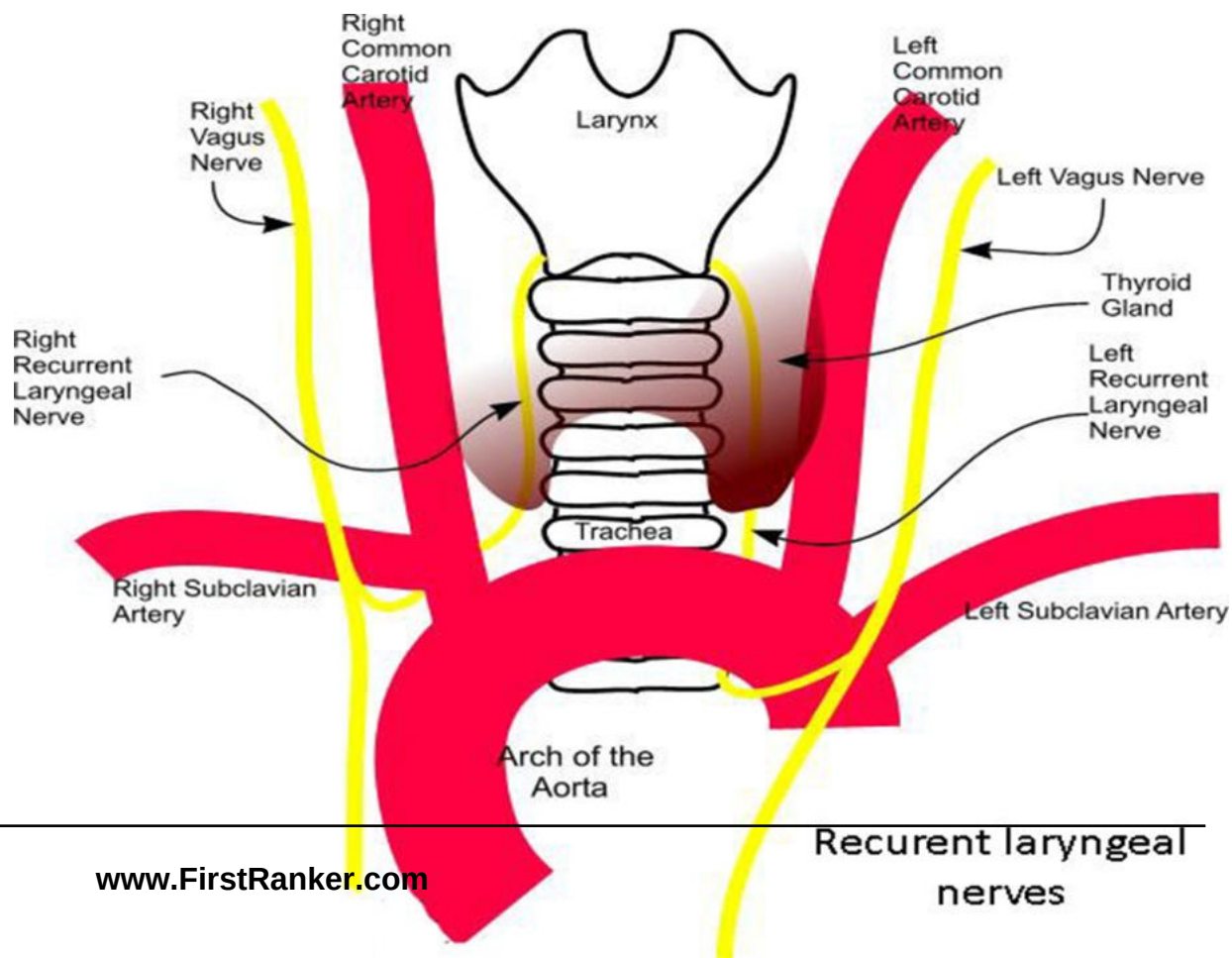
- 1. RIDDLE'S TRIANGLE

- Inferior thyroid artery- above
- Common Carotid artery- laterally (base)
- Trachea - medially



2. Nerve traced upwards to point of its entry into the larynx at the cricothyroid junction.

- 3. Tubercle of Zuckerkandl



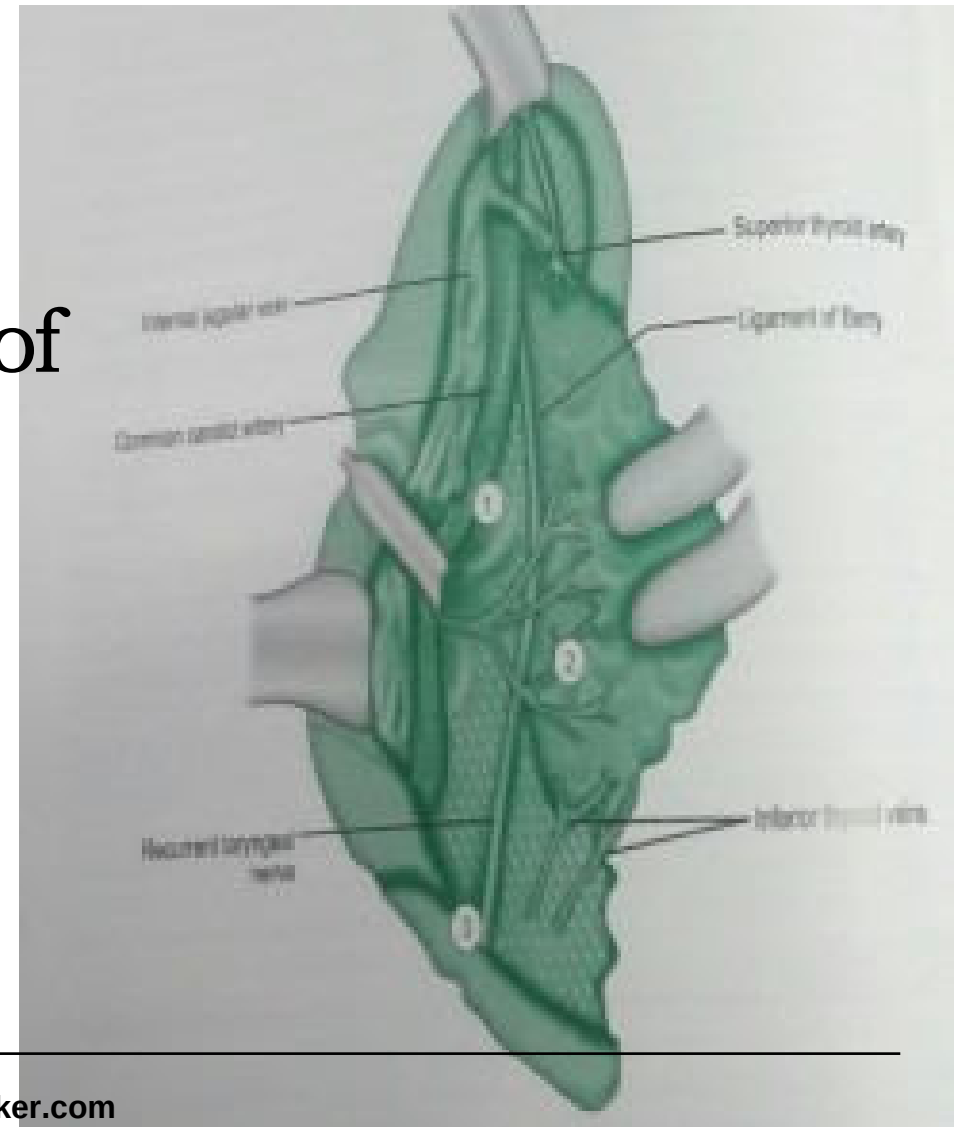
RLN damage points.

1. At crossing with inferior thyroid artery.

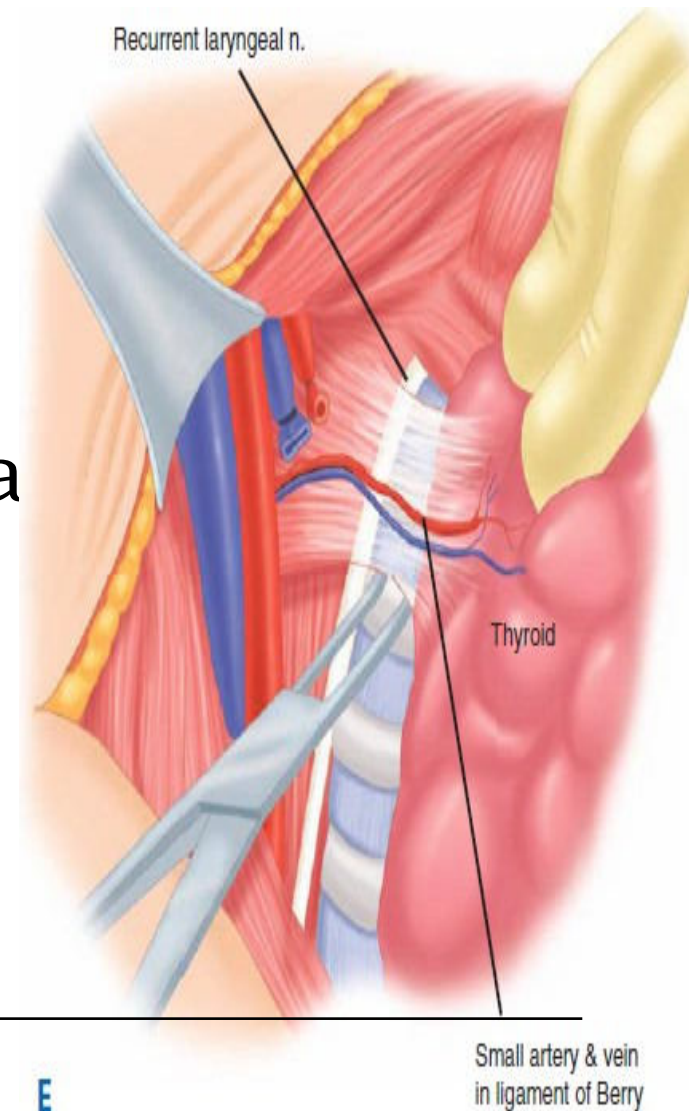
2. In the vicinity of ligament of Berry

3. In Riddle's Triangle

4. Tubercle Of Zuckerkandl

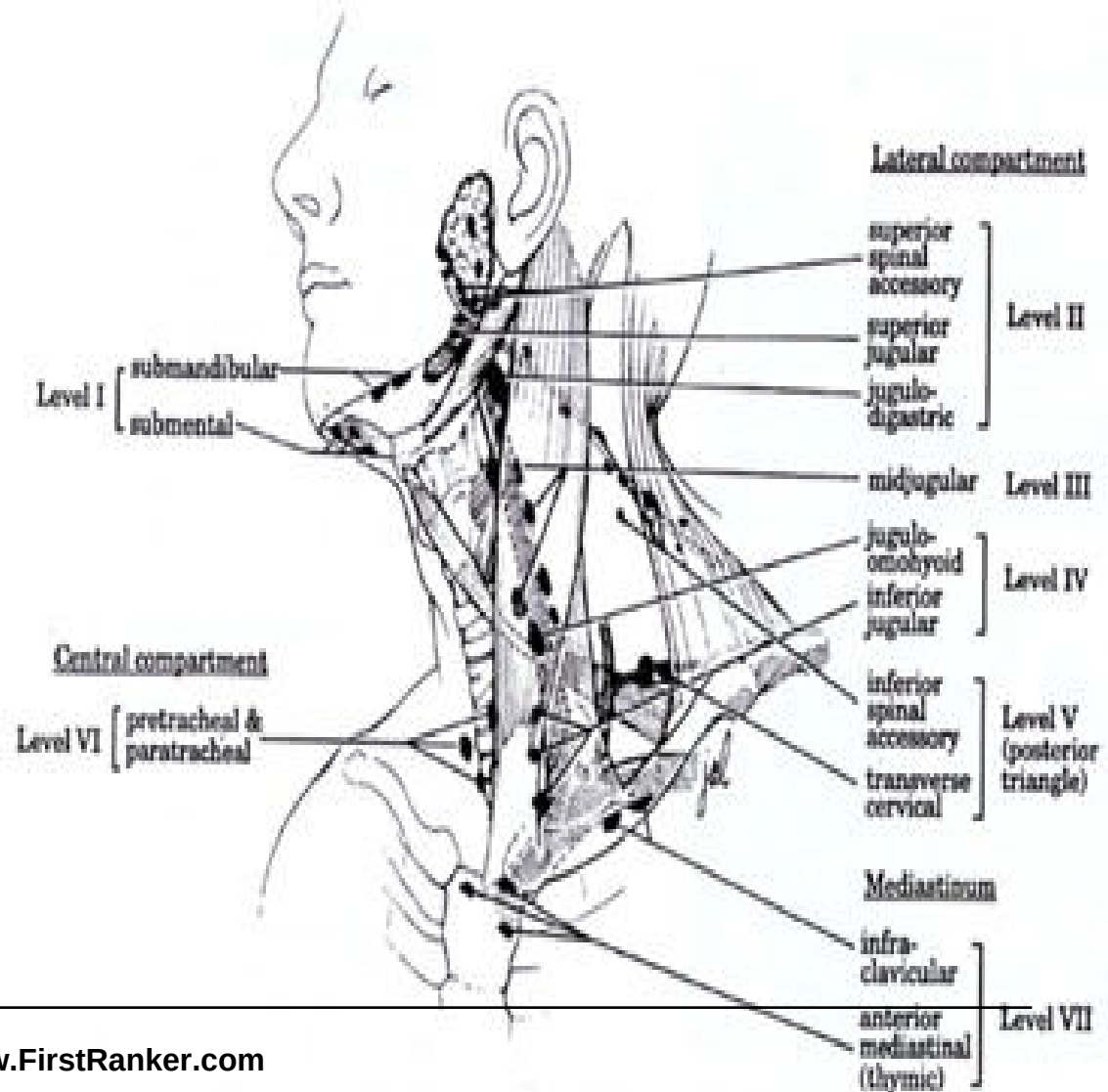


- Ligament of Berry is divided.
- The thyroid gland is separated from the underlying trachea.
- Complete hemostasis maintained
- Draining and Wound closure:
 - Reapproximate strap muscles a platysma
 - Skin closure



Central compartment dissection

Thyroid and thymus removed en bloc with level VI nodes—paratracheal, pretracheal and prelaryngeal.



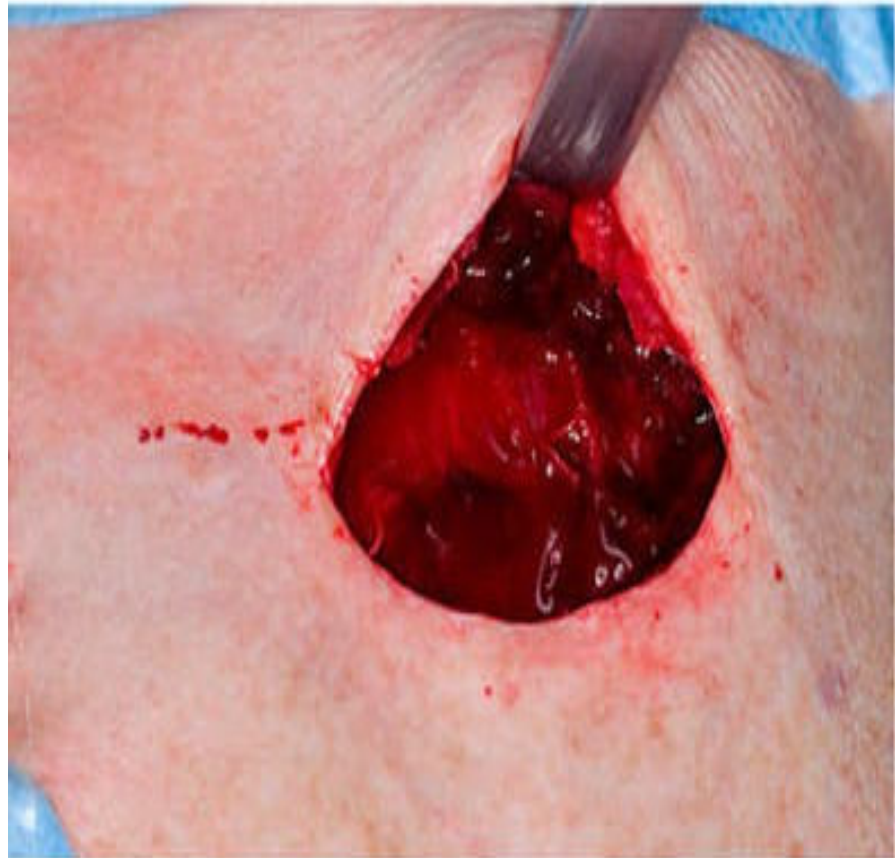
- Based on lateral node status lateral neck dissection is done.

COMPLICATIONS OF THYROIDECTOMY

- Intraoperative
- Early post operative
- Late post operative

INTRAOPERATIVE COMPLICATIONS

- Haemorrhage
- Nerve injury



EARLY POSTOPERATIVE

- Haematoma
- Laryngeal edema
- Respiratory obstruction
- Hypoparathyroidism
- RLN injury & problems
- Thyrotoxic crisis

LATE POSTOPERATIVE

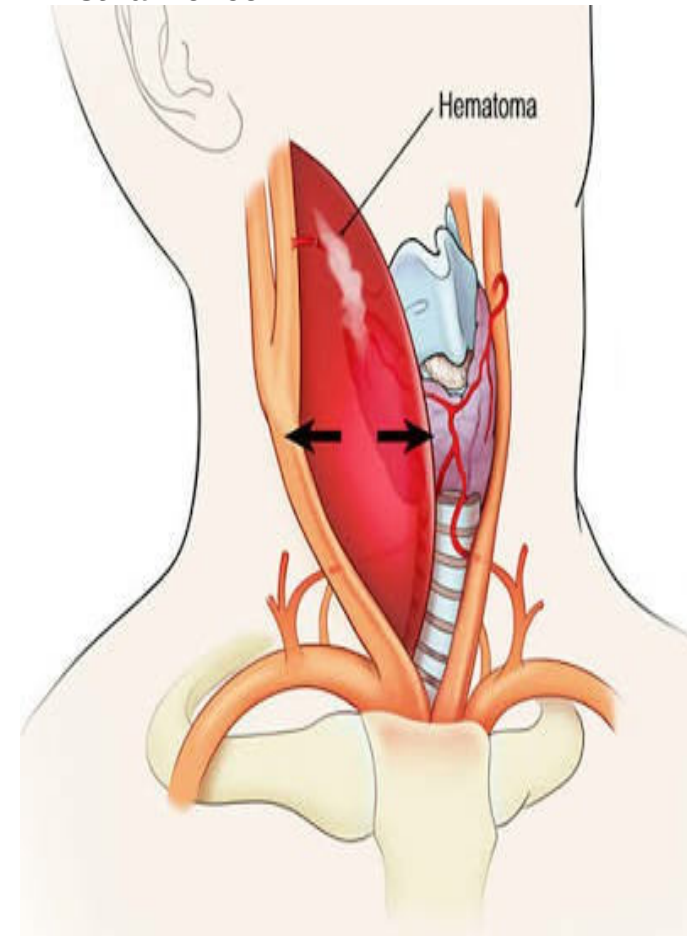
- Hypothyroidism
- Recurrent nodule
- Recurrent toxicity
- Wound infection
- Granuloma / keloid

HEMORRHAGE

- ❑ Primary
- ❑ Reactionary
- ❑ Secondary

Treatment

- Release of sutures
- Evacuation of hematoma
- Re exploration & control bleeding



RESPIRATORY OBSTRUCTION

- Haematoma Laryngeal edema
 - Bilateral recurrent laryngeal nerve
 - paralysis
- Hypocalcemic tetany Tracheomalacia
- -

MANAGEMENT

Release the tension haematoma If
not relieved - - - intubate

RECURRENT LARYNGEAL NERVE INJURY

- Hoarseness
- Dysphonia
- Paralytic aphonia
- Periodic aspiration
- Ineffective cough

RLN injury may be unilateral or bilateral.

UNILATERAL RLN PALSY

- Ipsilateral paralysis of all intrinsic muscles except cricothyroid

In Indirect laryngoscopy,

- Vocal cord - median or paramedian position

www.FirstRanker.com www.FirstRanker.com

MANAGEMENT

- ✓ **STEROIDS** – within 7 days of injury
(Prednisolone 15mg tid for 10 days)
- ✓ **SPEECH THERAPY**
- ✓ **MEDIALIZATION OF THE CORD** –
by Teflon injection
- ✓ **LARYNGOPLASTY** - if compensation does
not take place

Bilateral RLN palsy

- Inspiratory stridor
- Dyspnea or
- Minimal dysphonia.

Management

- ✓ Emergency endotracheal intubation
- ✓ Tracheostomy
- ✓ Cordectomy or endoscopic laser treatment
- ✓ Thyroplasty

INJURY TO THE EXTERNAL BRANCH OF SUPERIOR LARYNGEAL NERVE

- Approximately in 20%
- Proximity to the superior thyroid
- Loss of tension in the vocal cord
- VOICE FATIGUE - Diminished power range in the voice.

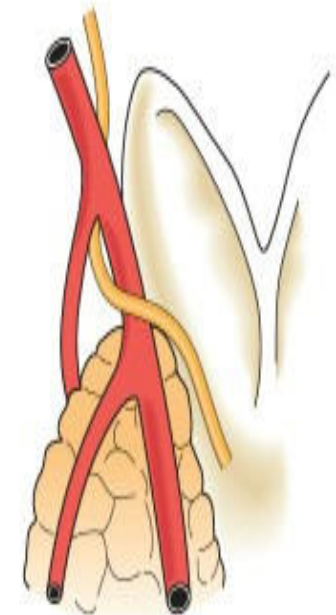


FIGURE 36-1 Relationship between the external branch of the superior laryngeal nerve (yellow) and the superior thyroid artery. The nerve can course inferiorly and medially and may run partly along with or around the artery or branches of the artery as they enter the superior lobe of the thyroid. (From Duh QY: Surgical anatomy and embryology of the thyroid and parathyroid glands and recurrent and external laryngeal nerves. In Clark OH, Duh QY, editors: *Textbook of endocrine surgery*, Philadelphia, 1997, Saunders, p 11.)

COMBINED PARALYSIS

UNILATERAL

- Paralysis of all muscles of larynx on one side except interarytenoid.
- Cadaveric position (3.5mm from midline)

Treatment

- ✓ Speech therapy
- ✓ Injection of teflon paste
- ✓ Muscle or cartilage implanted to paralysed cord

BILATERAL

- Both cords in cadaveric position
- Total anesthesia of larynx

Features

Aphonia

Aspiration

Inability to cough

Bronchopneumonia

Retention of secretion in the chest

Respiratory arrest

Treatment

1. Tracheostomy
2. Epiglottopexy (epiglottis is folded backwards and fixed to the arytenoid)
3. Plication of vocal cord to prevent aspiration

HYPOPARATHYROIDISM

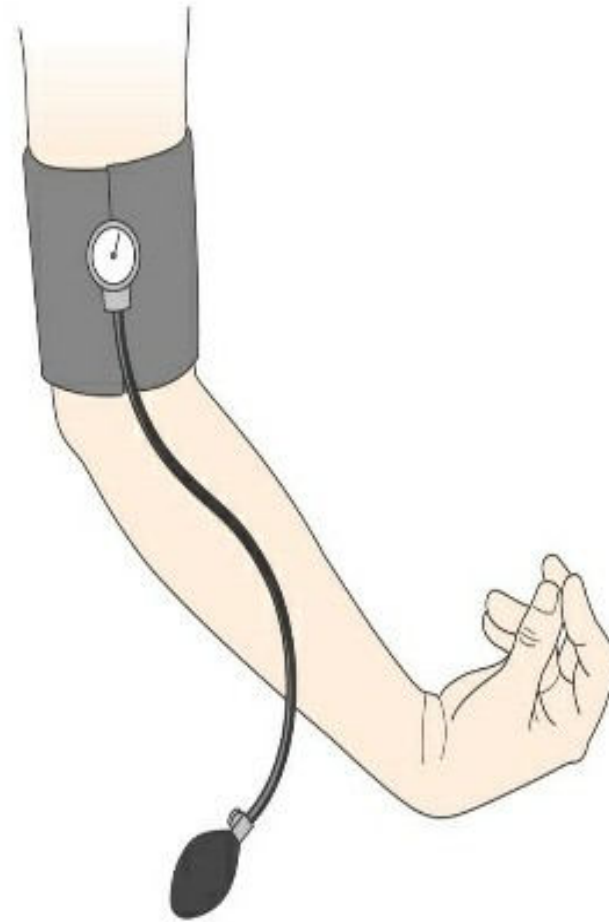
- ✓ Transient in 50%
- ✓ Permanent in $< 2\%$.
- ✓ Usually manifests within 72 hrs after surgery
- ✓ The first symptom is circumoral paresthesia.

CHVOSTEK SIGN

TROUSSEAU'S SIGN



A. Positive Chvostek's Sign



B. Positive Trousseau's Sign

Management

- Emergency : 10 ml of 10% calcium gluconate I.V over 10-15 mnts

Chronic patients :

- Calcium carbonate or Calcium
- Vitamin D3



THYROTOXIC CRISIS (THYROID STORM)

1-2 % patients

Causes

- Inadequately prepared thyrotoxic patient
- Infection, trauma, diabetic ketoacidosis, emergency surgery, stress

Treatment

- **Supportive measures**
- **Anti adrenergic drugs** – D O C : Propranolol i.v
- **Thionamides** – Propyl thiouracil 200 mg 4th hrly
- **Iodide compounds** – 10-15 drops Lugol's iodide 8th hrly
- **Glucocorticoids** – hydrocortisone 5 mg/ kg 6th hrly
- **Bile acid suppressants** – cholestyramine 4 g 6th hrly

HYPOTHYROIDISM

- **For papillary and follicular carcinoma** - suppressive dose of thyroxine (200 – 300 mcg per day)
- **For medullary carcinoma** - supplementary dose of thyroxine (25 – 100 mcg per day)

KELOID



STITCH GRANULOMA



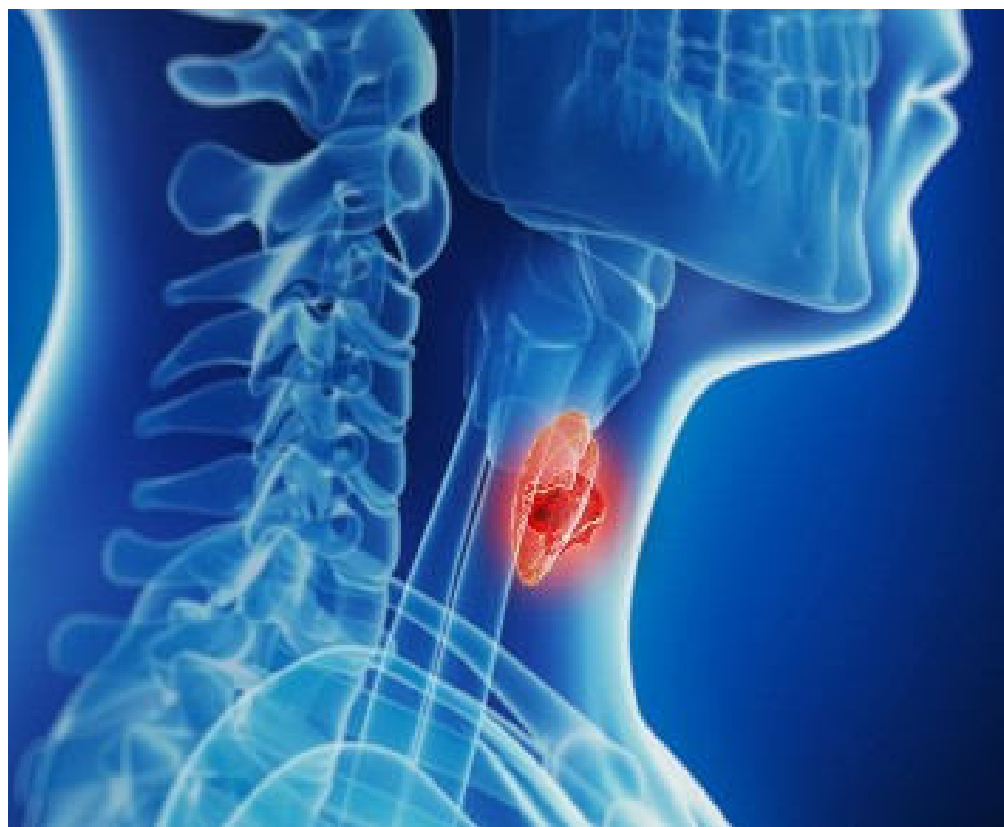
PROGNOSIS POSTOPERATIVE CARE FOLLOW UP

Andrews Paul

PROGNOSIS

Many scoring systems are available

- AMES
- AGES
- MACIS
- TNM



AGES AND AMES

PARAMETER	LOW RISK	HIGH RISK
AGE (YRS)	<40	>40
GENDER	FEMALE	MALE
EXTEND	NO LOCAL EXTENTION	LOCAL AND EXTRA THYROID EXTENSION
METASTASIS	NONE	REGIONAL OR DISTANT
SIZE	<4 CM	>4 CM
GRADE	WELL DIFFERENTIATED	POORLY DIFFERENTIATED

MACIS

FACTORS		SCORE
DISTANT METASTASIS	YES	3
	NO	0
AGE	<39 years	3.1
	>40 years	$0.08 * \text{age}$
INVASION INTO SURROUNDING AREAS	YES	1
	NO	0
COMPLETENESS OF SURGICAL RESECTION	Incomplete	1
	Complete	0
SIZE OF TUMOUR		$0.3 * \text{size(cm)}$

Sum Of MACIS Score	20 year survival
< 6.0	99%
6.0 – 6.99	89%
7.0 – 7.99	56%
> 8.0	24%

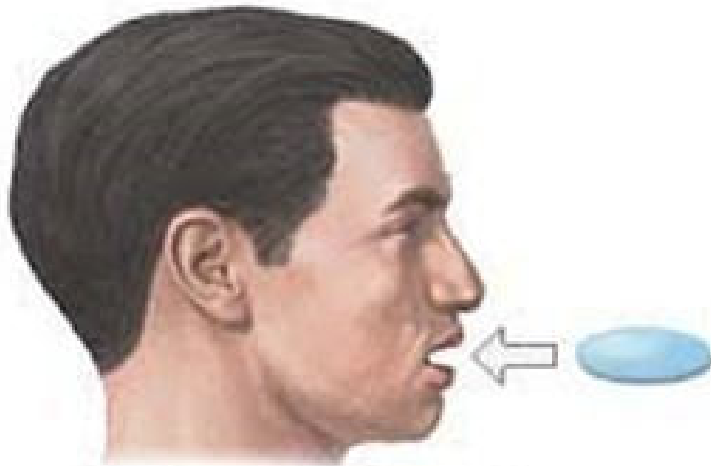
Postoperative Measures

Differentiated thyroid cancers

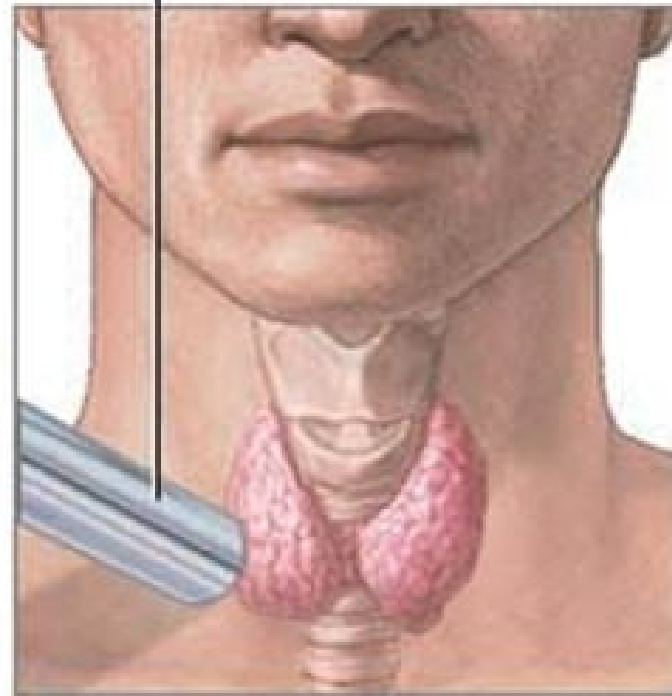
- Radioactive iodine scanning and ablation
- TSH suppression
- Follow up testing

RADIOIODINE SCAN

Gamma probe measuring
thyroid gland radioactivity



Radioactive iodine
is ingested



Goals

To identify

- any remaining normal thyroid tissue
- residual thyroid cancer cells
- metastatic disease

Pre requisites

TSH level > 30 mU/L

-stop thyroxine for 4-6 weeks

-Patient advised to be on low iodine diet

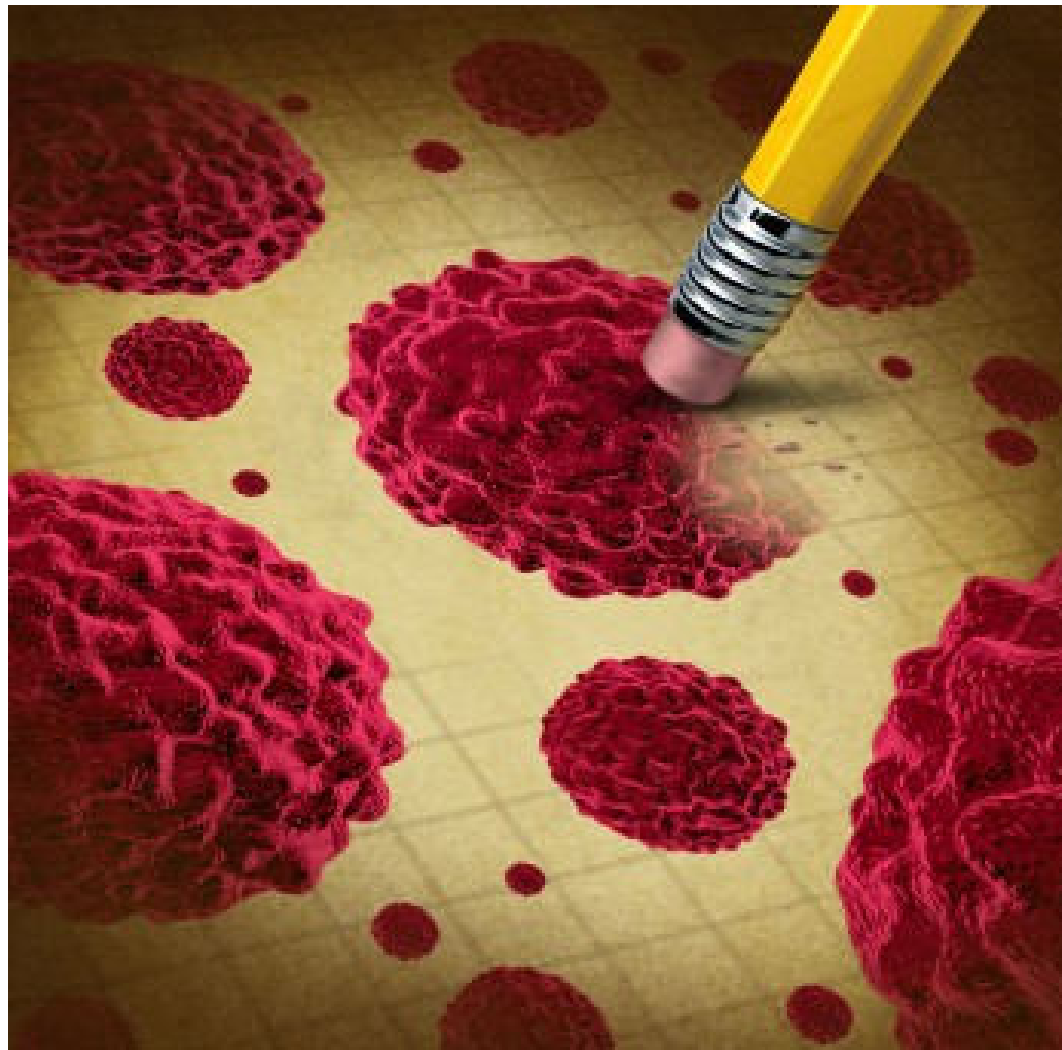
- Low doses of radioactive I^{123} or I^{131} is used.
- Given orally in liquid or capsule form.
- I^{123} : half life of 13 hrs, emits γ rays, better for diagnostic scanning.
- I^{131} : half life of 8 days, emits β and γ rays.

- If positive, Radio Remnant Ablation is done
- If negative, follow up with thyroglobulin level.
- If raised Tg level – WBS + US neck

THYROGLOBULIN ESTIMATION

- Serum tumor marker for DTC
- Circulating anti thyroglobulin antibodies interferes
- Undetectable levels – after thyroidectomy with TSH suppression
- Raised levels – recurrence/metastasis.
- Level above 2ng/l – abnormal

RADIO REMNANT ABLATION (RRA)



Radioactive iodine therapy (RAIT)

Purposes

- Remnant thyroid tissue ablation
- Adjuvant therapy with the intention of targeting occult metastatic disease
- Primary treatment of known persistent disease

Indications

- Tumor size > 4 cm
- Gross extra thyroidal extension
- Distant metastases
- Tumor size < 4 cm with lymph node metastases
- Rising serum thyroglobulin level

- Radioactive I^{131} is used.
- Dose : 100-200 mCi
- Post ablation WBS done after 5-8 days
- In low risk patients – with negative Tg and negative cervical US no need for WBS
- In intermediate and high risk patients – WBS after 6-12 months of ablation + Cervical US at 6,12 months and then annually for 3-5 years

- **Concerns with RAIT**
 - isolation of patients
 - C/I in pregnant, nursing women and children
 - Avoid pregnancy for 6 months.
- **Complications** : nausea and vomiting, sialadenitis, vocal cord paralysis, bone marrow suppression

TSH Suppression

- To prevent hypothyroidism
- To prevent recurrence of thyroid cancer
- T4 or levothyroxine is given orally
- Suppressive dose of thyroxine – 200-300 $\mu\text{g}/$
day

- For patients with high risk DTC, TSH < 0.1 mU/L
- For intermediate risk DTC, TSH b/w 0.1 – 0.5 mU/L
- For low risk DTC, TSH within 0.5 – 2 mU/L
- Risks associated – subclinical thyrotoxicosis, cardiac irregularities, osteoporosis

Follow up

- Physical examination
- Lifelong TSH suppression
- Thyroglobulin estimation
- Anti thyroglobulin antibodies
- Periodic neck ultrasound
- Radioiodine imaging



- Annual measurements of calcitonin and CEA levels
- Ultrasound, CT, MRI, PET scans - localize recurrent diseases
- 10 year survival rate is 80%
- Prognosis also depends on disease type - worst in patients with MEN2B

Anaplastic Carcinoma

- Most aggressive form with disease specific mortality approaching 100%
- External beam irradiation
- Palliative support and end of life planning

- Commonest malignant endocrine tumor
- Risk factors : Radiation exposure , Genetic alterations
- Divided into differentiated , undifferentiated and medullary thyroid carcinomas
- **Investigations:**

Clinical examination – history , physical examination

Thyroid function tests

Imaging – USG , Xray , MRI , PET Pathological – FNAC

- **Treatment:**

Papillary carcinoma – total thyroidectomy + CCND

Follicular

carcinoma – total thyroidectomy + CCND

Medullary carcinoma – total thyroidectomy + CCND

Anaplastic carcinoma – palliative treatment

THANK YOU