

Head & Neck Tumours

Part I

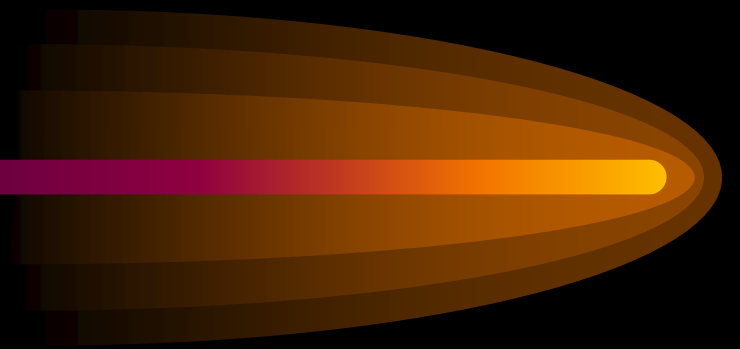
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**Advance Head and Neck Oncology , Thyroid
and Parathyroid, Microvascular Reconstruction,
Skull Base Surgery**

Thyroid and Parathyroid Glands



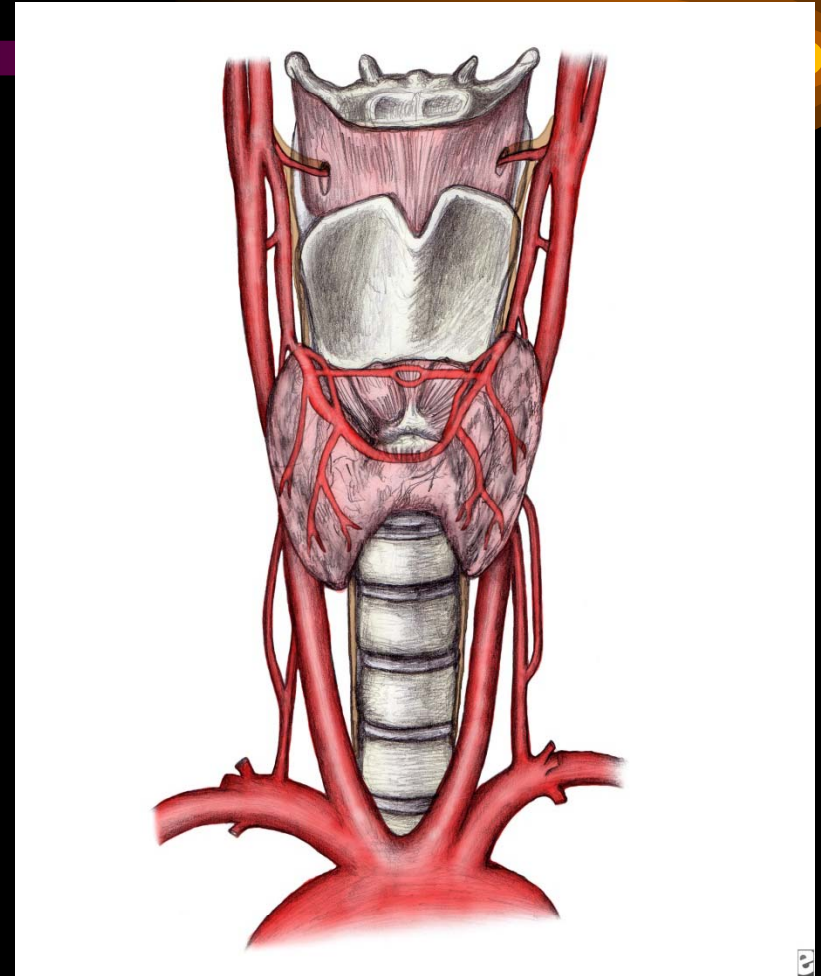
Thyroid Gland



- **Anatomy**
- **Evaluation of Thyroid Nodule**
- **Thyroid Cancer: Types & Treatment**

Thyroid Anatomy

- **Shield shaped, may be H- or U-shaped**
- **2 lateral lobes connected by an isthmus**
- **Isthmus at level of 2nd to 4th tracheal cartilages (may be absent)**
- **Rarely, small muscle (levator of the thyroid gland) attaches gland to hyoid bone**



Lobes of Thyroid

- **Each lobes measures approx 4cm high, 1.5cm wide, 2cm deep**
 - Lobes have superior and inferior poles
- **Superior pole: may extend as far as the oblique line of the thyroid cartilage**
- **Inferior pole: may extend inferiorly as far as the 5th or 6th tracheal rings**

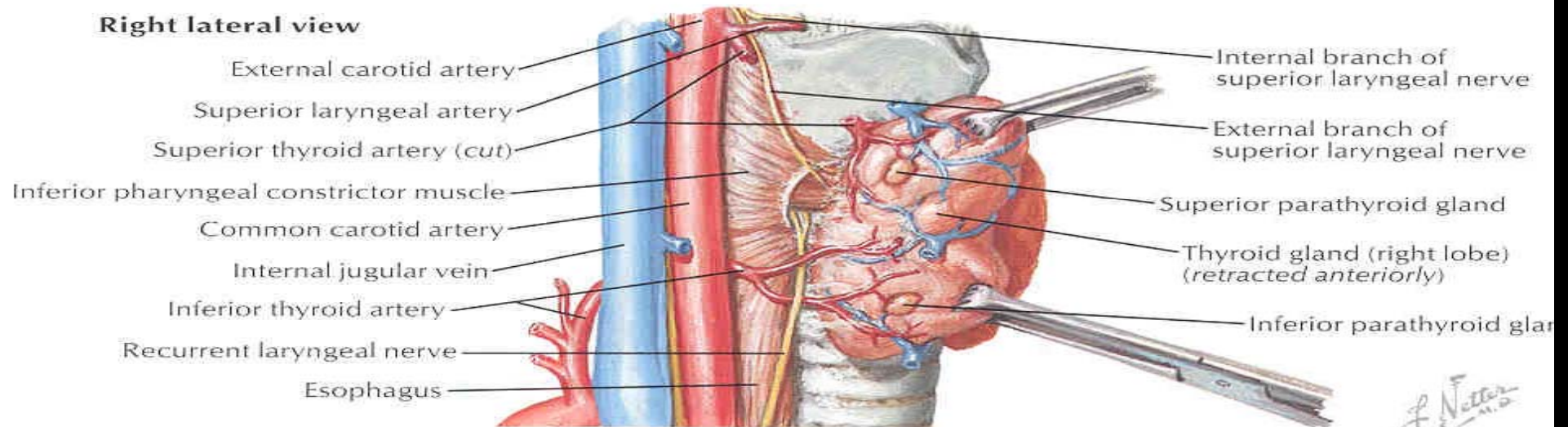
Attachments of Thyroid

- **Firmly attached to larynx and trachea**
- **Elevated with deglutition**
 - May allow to distinguish between thyroid nodule and other mass (LN, dermoid, branchial cleft cyst)
- **Attached by anterior and posterior suspensory ligaments**
 - Anterior -> anterior trachea to undersurface of thyroid
 - Posterior (Ligament of Berry) → lateral upper tracheal rings to bilateral thyroid lobes

Arterial Blood Supply

- **Superior thyroid artery (STA)**
 - 1st branch of ECA
 - Followed by SLN until superior pole
 - Anastomoses with contralateral STA
- **Cricothyroid Artery**
 - Small branch off STA near superior pole to cricothyroid muscle
 - Anastomoses with contralateral artery
 - Cricothyroidotomy

Right lateral view



Arterial Blood Supply Cont'd

- **Inferior thyroid artery (ITA)**
 - From thyrocervical trunk (1st part of subclavian at 1st rib)
 - Ascends anterior to vertebral artery
 - At C6 → ascending vertebral artery
 - Enters TE groove, runs next to RLN
 - Supplies posterior lateral lobes of thyroid
 - Anastomoses with STA near superior pole (Longitudinal branch)

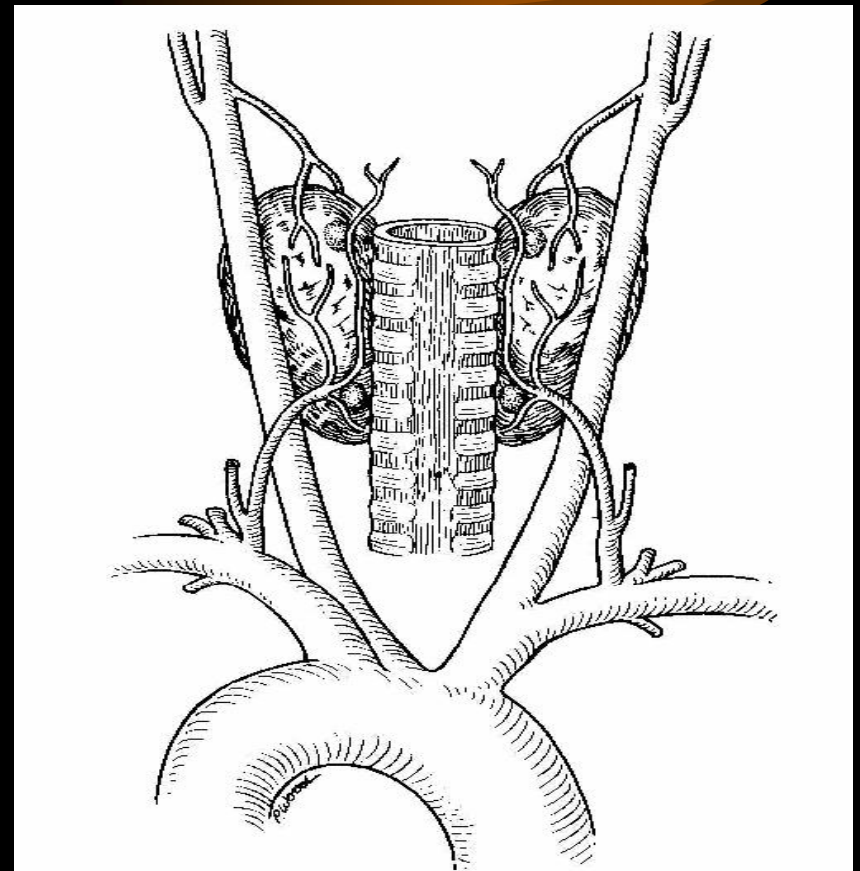


Fig. 128-3. Distribution of the thyroid arteries, posterior view.

Venous Drainage

- **3 pairs of veins**
 - Superior thyroid vein
 - Parallels course of STA on ant surface thyroid
 - Ascends to drain into internal jugular vein (IJV)
 - Middle thyroid vein
 - Direct lateral course from thyroid to IJV
 - Shortest of 3 veins
 - Inferior thyroid vein
 - Ant surface thyroid (opposite of ITA)
 - Vertical downward course to brachiocephalic v.

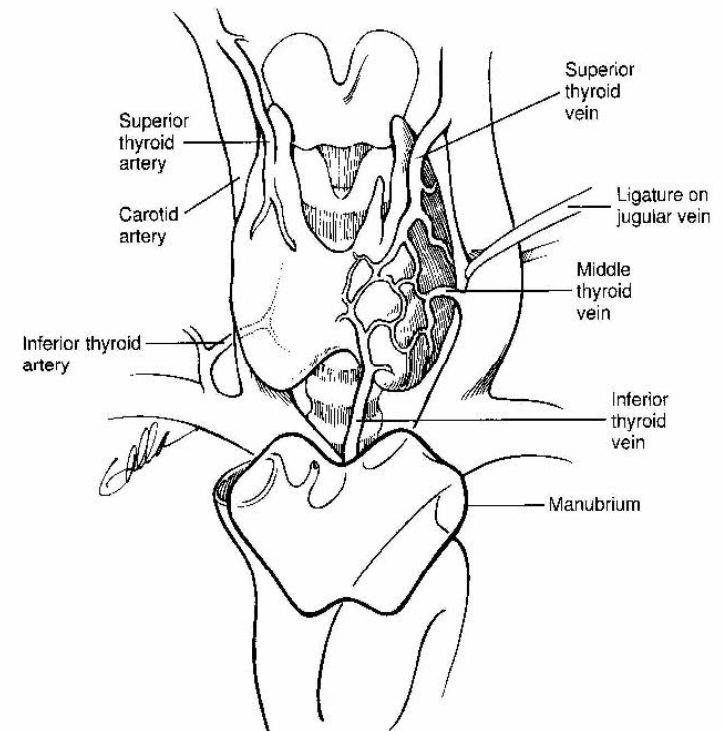


Figure 28-3. Superior thyroid and inferior thyroid arteries (left figure) and superior, middle, and inferior thyroid veins (right figure).

Thyroid Nodule - Evaluation



- **Start with P/E, Hx**
- **Thyroid function tests**
 - thyroxine (T4)
 - triiodothyronin (T3)
 - thyroid stimulating hormone (TSH)
- **Serum Calcium, Calcitonin**
- **Thyroglobulin (TG)**

Thyroid Nodule - Evaluation

- **U/S**
- **Pre-operative Laryngoscopy**
 - Assess RLN function / infiltration
 - Essential in revision cases (6.7% of patients with previous thyroid surgery had VC paralysis)
- **Bx**
- **Other Imaging**

Thyroid Imaging



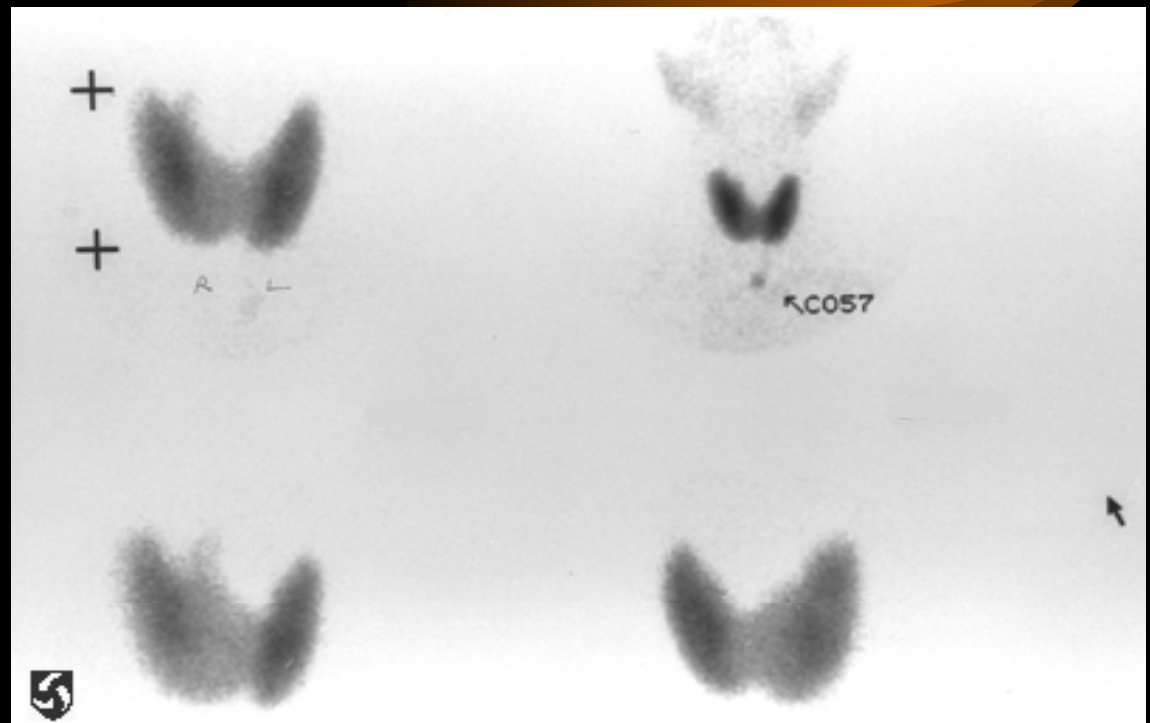
- U/S
 - Often first modality, helps delineate architecture
 - Accessible, inexpensive, safe
 - Help locate nodule, assist with FNA
 - Micro-calcifications and central blood flow
 - Suggests CA
 - Not useful for large masses

Thyroid Imaging Cont'd

- **CT**
 - Useful for cervical lymphadenopathy
 - Dye can interfere with function testing and radioactive treatment for up to 8 weeks
 - Can provoke hyperthyroidism from dye
 - Recommended for FNA showing PTC
- **MRI**
 - Used less commonly

Thyroid Imaging Cont'd

- **Scintigraphy**
 - Hard to distinguish benign vs malignant nodule
 - 2D → difficult to localize lesion



Thyroid Biopsy



- **FNA**
 - Gold standard
 - Sensitivity → 65% to 98%
 - Specificity → 72% to 100%
- **Results**
 - Benign → adenoma, goitre, thyroiditis
 - Malignant → most common PTC
 - Indeterminate → FTC and Hurthle most common
 - Non-diagnostic → re-aspiration diagnostic in 50%

Thyroid Biopsy



- **FNA Disadvantages**

- Inability to distinguish benign microfollicular adenomas from differentiated FTC
- Inability to distinguish Hurthle cell lesion from adenoma or Hashimoto thyroiditis
- Papillary Carcinoma
 - Slide preparation may mimic PTC findings

Management of the Thyroid Nodule

Serial exam

- **Physical examination**
 - Benign
 - Asymptomatic palpable nodule
- **U/S**
 - F/u a benign, non palpable nodule
 - F/u a cystic nodule for reaccumulation

Management of the Thyroid Nodule

- **Trial of suppression of TSH**
 - Benign or indeterminate FNA (controversial)
 - Maintain TSH level between 0.1 and 0.5 mIU/L per day
 - Decrease tumor volume up to 50% in 40% pts.
 - A shrinking tumor is not likely malignant

Malignant Thyroid Lesions

1. Well Differentiated (85%)

- Papillary Thyroid Carcinoma (PTC)
- Follicular Thyroid Carcinoma (FTC)
- Hurthle Cell Carcinoma (HCC)

2. Poor differentiated malignant neoplasms

- **Medullary thyroid carcinoma (MTC)**
- **Anaplastic thyroid carcinoma (ATC)**

3. Other malignant tumors:

- **Lymphoma**
- **Metastatic tumors**

Malignant Thyroid Lesions

- **Risk factors for Thyroid Cancer**
 - Age (<20 or >60)
 - Male (Female > risk of nodules)
 - Rapid Growth
 - Invasive or compressive Symptoms
 - Previous Radiation exposure
 - Prior Thyroid disease
 - Goiter, Hashimoto, Grave's, adenomas
 - Family Hx

Malignant Lesions



- **Papillary Carcinoma**
 - Ill defined margins
 - Histology = papillae and typical nuclear features
 - Psammoma bodies (concentric calcified layers)
 - Multicentric involvement of thyroid
 - Extra-thyroidal extension common
 - Muscle, RLN and Trachea

PTC Cont'd



- **Lymph node involvement in 30%**
- **Distant mets least common**
 - 1 - 25% during illness or 1 - 7% at Dx
- **Predisposing Factors**
 - Ionizing radiation
 - Familial (Cowden Syndrome = hamartomas, breast tumors and follicular / papillary tumors)
 - 5 - 10% of pts have +ve Family Hx
- **Clinical presentation**
 - Young females, palpable mass in thyroid or cervical LN (1/3rd have lymphadenopathy)

Follicular Carcinoma

- **13% of all thyroid carcinomas**
- **More aggressive, well differentiated compared to PTC**
- **10 yr survival = 60% (PTC = 95%)**
- **More hypercellular**
- **Malignant lesion = capsular +/- vascular invasion**
- **No characteristic cytology**
 - Impossible to dx on FNA, difficult with Frozen

FTC Cont'd

- **Hematogenous spread more common than PTC**
- **Two variants : Minimally invasive vs Widely invasive**
- **Predisposing Factor**
 - Radiation exposure
 - Goitre endemic areas
- **Clinical Presentation**
 - Solitary neck nodule or mass
 - Distant mets in 10 - 15% of cases

Hurthle Cell Carcinoma

- **Subtype of FTC (15% of FTC's)**
- **Like FTC, cannot exclude carcinoma vs adenoma based of FNA or frozen**
- **Clinical Presentation**
 - Thyroid nodule or mass
 - 35 % will have distant mets during illness
 - Higher rate of nodal mets than FTC

Management WDTC

Surgical options

- **Total thyroidectomy (>1.5cm)**
- **Thyroid lobectomy (<1.5cm)**
- **+/- Neck dissection**
- **Bailey's**
 - High risk patients → total thyroidectomy
 - Low risk → total thyroidectomy if gross nodules in contralateral lobe, otherwise lobectomy

Adjuvant Therapy

- **Post-op I-131**
- **External beam RT**
 - Tumors that do not pick up I-131
 - Advanced disease (mets, residual disease)

Medullary Thyroid Carcinoma

- **Sporadic (80%)**
 - More aggressive type
 - Late presentation (age 40 – 60)
 - Worst prognosis with spindle cell variant, increased CEA staining, decreased calcitonin staining
 - Early mets to regional lymph nodes (50%)
 - Larger tumors (>1.5cm) often have distant mets (70%)

Medullary Thyroid Carcinoma

- **Familial (20%)**
 - MEN IIA, MEN IIB, Non-endocrinopathic
 - Mutation in RET-protooncogene
 - Autosomal Dominant
 - Early presentation (birth – 20's)

TABLE 115.4. MULTIPLE ENDOCRINE NEOPLASIA SYNDROMES

Wermer syndrome (MEN type I)
Parathyroid adenomas or hyperplasia, usually adenomas
Pituitary tumors
Pancreatic tumors
Miscellaneous
Carcinoid tumors
Ovarian tumors
Differentiated thyroid carcinoma
Melanoma
Sipple syndrome
Type IIA
Parathyroid hyperplasia or adenoma
Medullary thyroid carcinoma (100%)
Pheochromocytoma (bilateral in 60%–75% of patients)
Type IIB
Same as type IIA except for
Presence of mucosal neuromas
Marfanoid habitus with pectus excavatum
No hyperparathyroidism

MEN, multiple endocrine neoplasia.

Treatment of MTC

- **Total thyroidectomy with bilateral SLND**
- **Prophylactic surgery for relatives with RET mutation (preferably before age 7)**
- **No adjuvant therapy advocated**
- **Radiotherapy and chemotherapy for palliation (usually ineffective)**

Anaplastic Thyroid Carcinoma

- **Less than 5% of thyroid malignancies**
- **Highly aggressive and fatal**
- **Median survival 3 - 6 months**
- **Distant mets common (lung)**
- **Grossly, large and bulky tumors**
 - Invade into surrounding tissue
- **Clinical Presentation**
 - Rapid expansion
 - Horner's Syndrome (ptosis, miosis, enophthalmos, anhidrosis)

ATC Cont'd



- **P/E**
 - Firm, irregular mass fixed to surrounding structures
 - RLN involvement and VC paralysis common
- **Tx (often palliative intent)**
 - Surgery
 - Adjuvant RT
 - Chemotherapy

Lymphoma



- **Rarely presents within thyroid gland**
- **Dx in 60's**
- **Females > males**
- **Low - intermediate grade B-cell NHL**
- **Increased risk wth Hashimoto**
- **Clinically**
 - Rapidly expanding mass on background of Hashimoto
 - Hoarsness, dysphagia, VC paralysis, Horner Syndrome
- **Tx**
 - RT, Chemo

Post Op Complications



- **RLN Injury**
- **Hypocalcemia**
- **Hematoma**

Parathyroid Gland

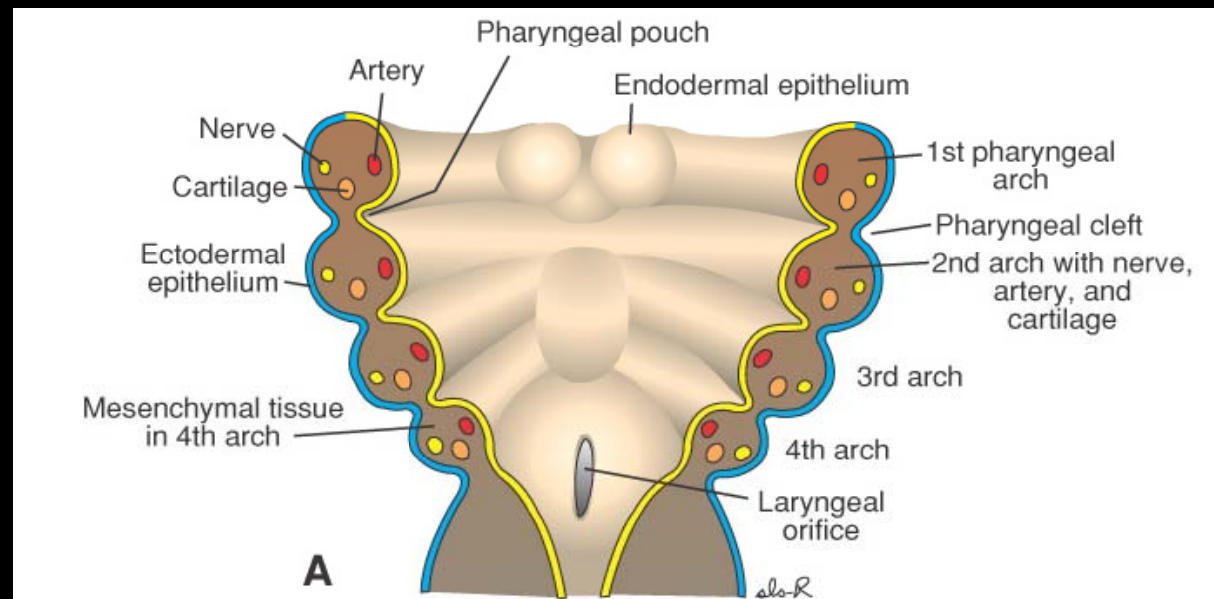


- **Embryology & Anatomy**
- **Evaluation of Hyperparathyroid**
- **Treatment of Hyperparathyroidism**

Parathyroid

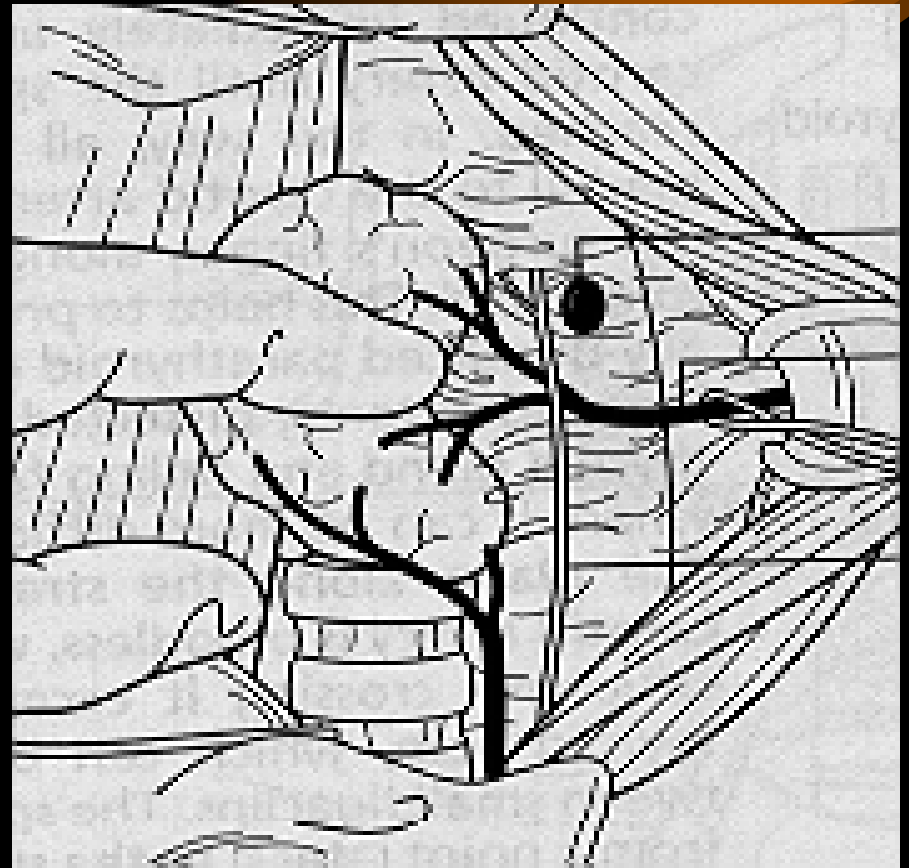
Embryology and Anatomy

- **3rd Branchial Arch (endoderm) – inferior Parathyroid glands and the thymus**
- **4th Branchial Arch (endoderm) – superior Parathyroid glands**



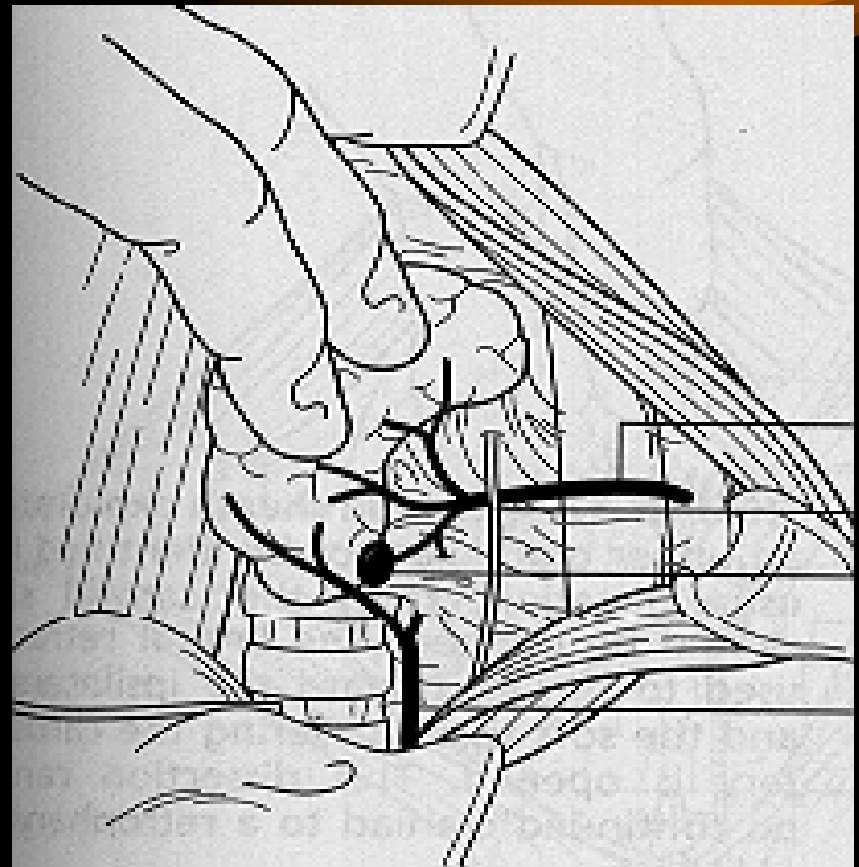
Parathyroid Anatomy

- **Superior gland**
 - Most consistent location
 - superior to inferior thyroid artery
 - posterior to RLN
 - Posterior aspect of thyroid
 - Within 1 cm of RLN pierce cricothyroid membrane



Parathyroid Anatomy

- **Inferior gland**
 - inferior to inferior thyroid artery (usually found within 1-2 cm of ITA entrance into thyroid gland)
 - anterior to RLN



Aberrant Sites



- **Seen in 15-20% of patients**
- **Bailey's**
 - Anterior mediastinum, usually thymus (3rd arch)
 - Posterior mediastinum (4th arch)
 - Aorto pulmonary window, middle mediastinum (3rd or 4th arch)
 - Retroesophagus, prevertebral
 - Tracheoesophageal
 - Intrathyroid
 - Carotid bifurcation

Parathyroid Blood Supply

- Inferior thyroid artery most common
- Rarely
 - superior parathyroid receives blood supply from both the ITA and STA, or
 - STA supplies both superior and inferior parathyroid glands

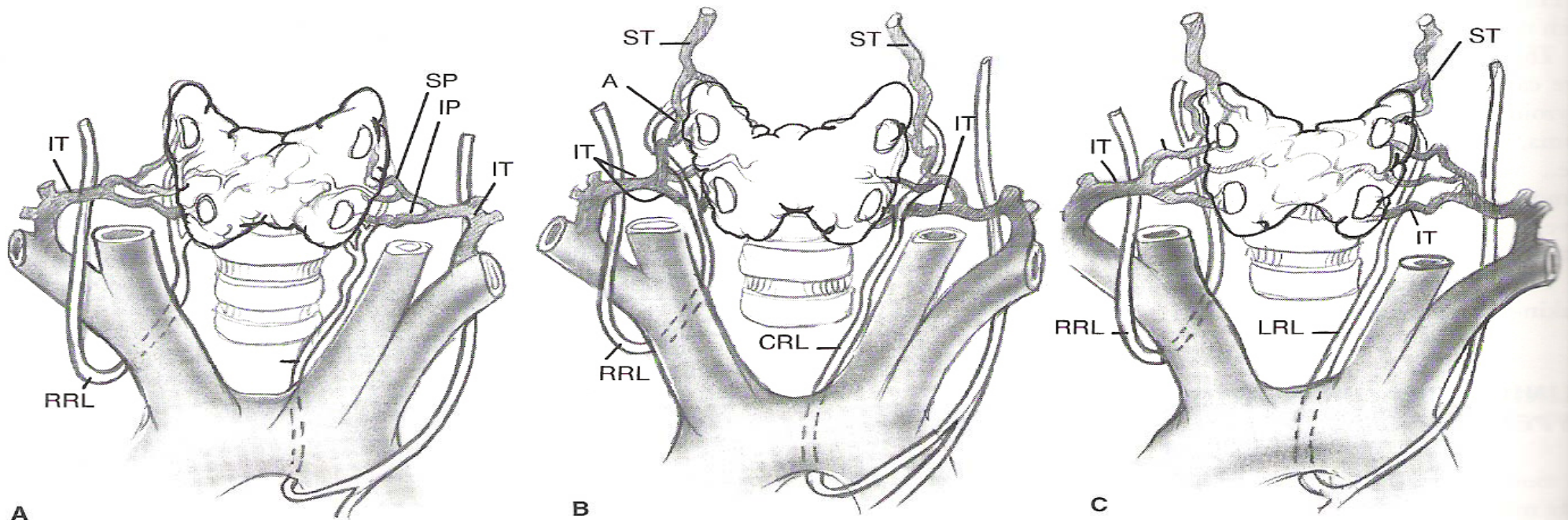


FIGURE 115.1. Variations in the blood supply to the parathyroid glands. Most of the time the blood

Parathyroid Lesions



- **Benign**

- Parathyroid Adenoma

- Most common cause of Hyperparathyroidism (80-90%)
 - Typically involve single gland
 - Superior and inferior glands affected equally

- Primary Chief Cell Hyperplasia

- 5 – 15% of cases, Women > Men
 - Proliferation of chief cells and oncocytes in multiple glands
 - Needs multiple gland sampling to distinguish from adenoma

Hyperparathyroidism

- **Primary vs Secondary vs Tertiary**
- **Clinical Presentation**
 - Primary often found on routine screening
 - Female:Male 3:1
 - Weakness, fatigue, depression
 - Muscle pain, Renal stones, gout
 - “Bones, Moans, Stones, Groans and Psych overtones”

HPT Cont'd



- **Surgical Indications**

- Serum Calcium > 1.0 mg/dl above N
- Hypercalciuria > 400 mg/day
- Cr Clearance $< 30\%$ of Normal
- Bone Density T-score < -2.5
- Age less than 50 without symptoms
- Pts with difficult follow up / surveillance

HPT - Pre-Operative Work Up

- **U/S**
 - Operator dependant
 - Adenomas → usually solid
- **Sestamibi Scan**
 - Retained by abnormal parathyroid tissue but rapid clearance from normal thyroid tissue
 - Delayed images useful
- **CT / MRI**
 - Better visualization of anterior mediastinum

Surgical Principles



- **Bloodless field to identify parathyroid**
- **Extreme care with RLN**
- **Avoid removal of normal parathyroids**
- **Intraoperative PTH**
 - 10 minute post excision
 - Should be normal
 - Should be 50% decreased from baseline

Post-op hypocalcemia



- **Seen in 20-30%**
- **Lowest levels seen in 1-3d post op**
 - Ca (po and iv)
 - Vit D
 - Check Mg (especially in bone wasting HPT)

Parathyroid Carcinoma



- **Rare**
- **4th – 6th decade**
- **No sex difference of incidence**
- **Death caused by severe hypercalcemia, not tumor**
- **Metastatic disease → remove as much tumor as possible to lower serum calcium**
- **Biopsy leads to seeding**
- **Need wide margin, en bloc resection**



Thank You