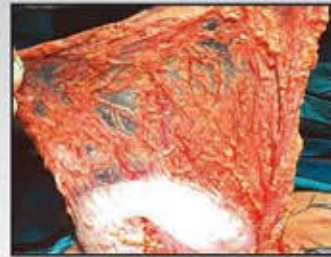




A must-buy book for FMGE Entrance Exam



Quick Review of **SURGERY** for *NEET and FMGE*

***Including Latest Exam Pattern Questions,
Important Annexures and Image-based Questions***

Updated from Bailey and Love 27/E,
Sabiston 20/E, Schwartz 11/E,
Smith Urology 18/E, Campbell Urology 11/E
and Harrison's 20/E

Updated with 8th AJCC (2017)

Pritesh Singh



JAYPEE

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***** Most Important
 **** Very Important
 *** Important

■ THYROGLOSSAL CYST

THYROGLOSSAL CYST

- Cystic swelling developed in the remnant of the **thyroglossal duct** or **tract**
- Present in **any part of the thyroglossal tract**^o (thyroglossal tract extends from foramen caecum to isthmus of thyroid)

Common Sites

- Subhyoid (MC)^o
- Region of the thyroid cartilages
- Suprahyoid
- Floor of mouth
- Beneath the foramen caecum

Clinical Features

- It is a **midline swelling**^o, except in the region of thyroid cartilage, where thyroglossal tract is pushed to one side, usually to the left.
- Though it's a **congenital swelling**^o MC **age of presentation** is between **15 and 30 years**^o.
- Cyst can be **moved sideways** but not vertically.
- Peculiar characteristic which helps in distinguishing thyroglossal cyst from other neck swelling
 - **Moves up with protrusion of tongue**^o as the thyroglossal tract is attached to the tongue.
 - **Moves with deglutition**^o so do all thyroid swellings, subhyoid bursitis.
- Cyst is lined by pseudostratified columnar epithelium and squamous epithelium with **heterotopic thyroid tissue** present in **20%** of cases.

Complications

- Recurrent infections^o
- Formation of **thyroglossal fistula**^o
- Carcinomatous change (**papillary carcinoma**^o)

Treatment

- **Sistrunk operation**: En-bloc **cystectomy** and **excision of central hyoid bone**^o to minimize recurrence.



■ RETROSTERNAL GOITER

RETROSTERNAL (SUBSTERNAL/MEDIASTINAL/INTRATHORACIC GOITER)

- A goiter is said to be **retrosternal**, **substernal** or **mediastinal** if **> 50%** of **thyroid tissue** is **below the opening of thoracic cage**^o.
- Usually arises from **lower pole** of a **nodular goiter**^o.

Clinical Features

- Often **symptomless**, discovered on a routine **chest X-ray**^o.
- Can lead to **tracheal deviation** and **scabbard trachea**^o (flattening of trachea caused by compression)

Severe Symptoms due to Mass Effect on the Trachea, Esophagus, Great Vessels and Nerves

1. **Dyspnea (MC symptom)** particularly at night, **cough** and **stridor**^o
2. Dysphagia
3. Enlargement of neck veins and superficial veins on the chest wall
4. Recurrent nerve palsy
5. **Pemberton's sign**^o: Symptoms of faintness with evidence of facial congestion and external jugular venous obstruction when the arms are raised above the head.

Treatment

- Virtually all **intrathoracic goiters** can be **removed via a cervical incision**^o.

■ INVESTIGATIONS IN THYROID DISORDERS

THYROID SCAN

- Whereas ultrasound allows anatomic evaluation, **radionuclide scans** allow assessment of **thyroid function**^o.
- ¹²³I and ¹³¹I iodine scintigraphy is also used to evaluate the functional status of the gland.
- Advantages of scanning with ¹²³I include a **low dose of radiation** (30 mrad) and **short half-life**^o.
- ¹³¹I has a **longer half-life** (8 days) and **emits higher levels of β-radiation**^o.
- ¹³¹I is optimal for **imaging thyroid carcinoma**. It is the **screening modality of choice** for the **evaluation of distant metastasis**^o.

Isotope	t _{1/2}
I ¹³²	2.3 hours ^o
I ¹²³	13 hours ^o
I ¹³¹	8 days ^o

RADIOACTIVE IODINE (I¹³¹) THERAPY

- I¹³¹ is an **effective agent** for **delivering high radiation doses** to **thyroid tissue**^o
- It **emits mainly beta radiation** (90%), which **penetrates only 0.5 mm**^o of the **tissue** & allow therapeutic effects on thyroid **without any damage** to the surrounding structures, particularly **parathyroids**.

Mechanism of Action

- I¹³¹ emits **beta particles**^o and **γ-rays**.
- Beta rays** are utilized for their **destructive effects** on **thyroid**^o cells.
- X-rays** are useful for **tracer studies**.

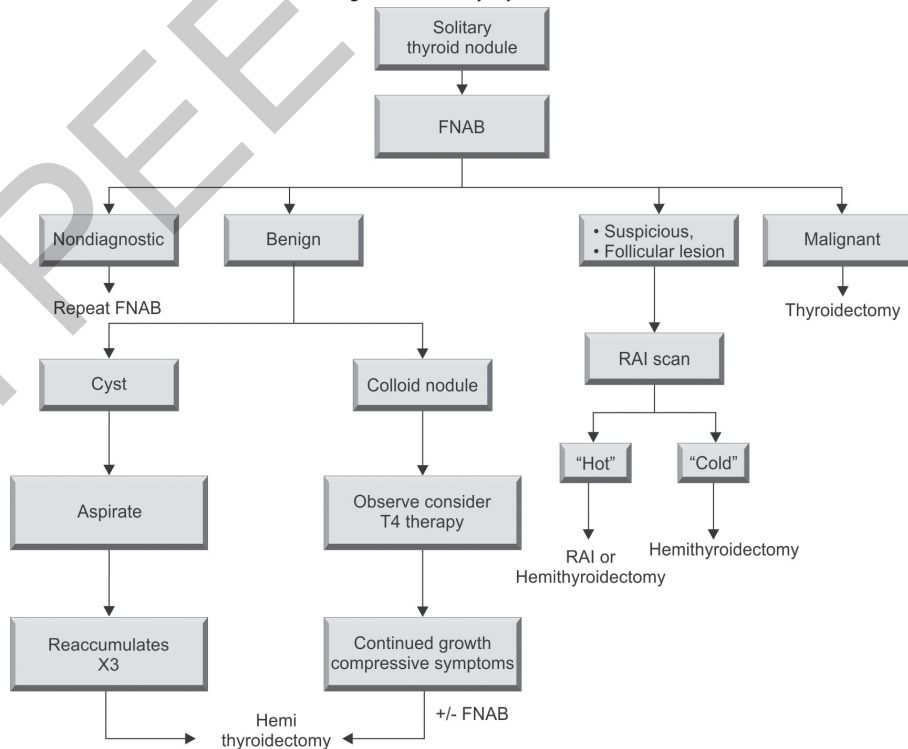
Indications in Carcinoma Thyroid	Contraindications of I ¹³¹ Therapy
1. Distant metastasis ^o at diagnosis	1. Childhood ^o
2. Incomplete tumor resection ^o	2. Pregnancy ^o
3. Patients at high risk for mortality or recurrence ^o	3. Lactation ^o

■ SOLITARY THYROID NODULE

SOLITARY THYROID NODULE

- MC solitary thyroid nodule** is **benign colloid nodule**^o, it accounts for **60%** cases of solitary thyroid nodule.
- 2nd MC cause** of solitary thyroid nodule is **follicular adenoma** (30%)^o.

Management of Solitary Thyroid Nodule



■ ACUTE (SUPPURATIVE) THYROIDITIS

ACUTE (SUPPURATIVE) THYROIDITIS

- Acute thyroiditis is rare and due to **suppurative infection** of the **thyroid**^Q.
- **More common in children** and often is **preceded by an upper respiratory tract infection** or **otitis media**^Q.

Etiology

- Thyroid gland is inherently resistant to infection due to its extensive blood & lymphatic supply, high iodide content, and fibrous capsule.

Infectious Agents Can Seed Thyroid

1. Via **hematogenous** or **lymphatic route**^Q
2. Via direct **spread** from **persistent pyriform sinus fistulae** or **thyroglossal duct cysts**^Q
3. As a result of **penetrating trauma**^Q
4. Due to **immunosuppression**^Q

- **MC organism** responsible: **Staph. aureus** > **Streptococcus**^Q
- In **children & young adults**, **MC cause** is presence of a **pyriform sinus**^Q (remnant of the **fourth branchial pouch** that connects the oropharynx with thyroid), such sinuses are predominantly **left-sided**^Q.
- **Long-standing goiter** and **degeneration in thyroid malignancy** are risk factors in **elderly**^Q

Clinical Features

- **Thyroid pain**, often referred to the throat or ears, and a **small, tender goiter**^Q
- **Fever, dysphagia** and **erythema** over the thyroid.
- Systemic symptoms of a **febrile illness** and **lymphadenopathy**^Q.

Diagnosis

- **ESR** and **WBC count** are usually **increased**, but **thyroid function** is **normal**.
- **FNA biopsy** shows infiltration by **polymorphonuclear leukocytes**.
- **Culture** of the sample can identify the organism.
- **Persistent pyriform sinus fistula** should be suspected in **children** with recurrent acute thyroiditis. A **barium swallow** demonstrates the anomalous tract with **80% sensitivity**^Q.

Treatment

- **Parenteral antibiotics** and **drainage of abscesses**^Q.
- Patients with **pyriform sinus fistulae** require **complete resection**^Q of the sinus tract, including the area of the thyroid where the tract terminates, to **prevent recurrence**.

■ SUBACUTE THYROIDITIS

SUBACUTE /DE QUERVAIN'S/ GRANULOMATOUS/ VIRAL THYROIDITIS/GIANTCELL THYROIDITIS

- Also termed de Quervain's thyroiditis, granulomatous thyroiditis, or viral thyroiditis.
- Peak incidence: **30–50 years**; **women** are affected three times more frequently than men.
- Usually follows **upper respiratory tract infection**^Q
- A **viral etiology** has been proposed
- **Strong association** with the **HLA-B35 haplotype**^Q

The Disorder Classically Progresses through Four Stages

1. Initial **hyperthyroid phase**, due to release of thyroid hormone
2. **Euthyroid** phase
3. **Hypothyroidism**, occurs in about 20 to 30% of patients
4. **Resolution** and return to the **euthyroid state** in 90% of patients.

- In the **early stages** of the disease, **TSH** is **decreased**, and **Tg, T₄**, and **T₃** levels are **elevated** due to the release of preformed thyroid hormone from destroyed follicles.
- **ESR** is typically **>100 mm/h**^Q.
- **RAIU** is **decreased**^Q

Clinical Features

- **Painful** and **enlarged thyroid**, sometimes accompanied by fever.
- Features of **thyrotoxicosis** or **hypothyroidism**, depending on the phase of the illness.

Contd...

- Malaise and symptoms of an **upper respiratory tract infection** may precede the **thyroid-related features**^o by several weeks.
- The patient typically complains of a **sore throat** and **small exquisitely tender goiter**^o
- Pain is often referred to the jaw or ear.
- **Complete resolution** is the **usual outcome**^o
- Permanent hypothyroidism can occur, particularly in those with coincidental thyroid autoimmunity.

Laboratory Findings

- **ESR** is **markedly elevated**^o
- **Antithyroid antibodies** are **low** with T4, T3 and TSH levels depend on the stage of disease.

- **RAIU** is **decreased** during the hyperthyroid stage (distinguishes from Grave's disease)
- In doubt: **FNAC** (shows characteristic **giant multinucleated cells**)^o

Treatment

- Treatment is **primarily symptomatic**, as disease is **self-limited**^o.
- **Aspirin** or other **NSAIDs** are sufficient to control symptoms in most cases.
- **Severe cases** with marked local or systemic symptoms may require **glucocorticoids**.
- **Short-term thyroid replacement** may be needed in the **hypothyroid phase**.
- **Thyroidectomy** is reserved for the **rare patients** who have a prolonged course **not responsive** to medical measures.

■ RIEDEL'S THYROIDITIS

RIEDEL'S THYROIDITIS

- A rare variant of thyroiditis also known as **Riedel's struma**^o or **invasive fibrous thyroiditis**
- Characterized by the **replacement** of all or part of the **thyroid parenchyma** by **fibrous tissue**
- Also **invades** into **adjacent tissues**^o.
- **Etiology**: Primary **autoimmune etiology** (probably)

Riedel's Thyroiditis is Associated with

- **Mediastinal** and **retroperitoneal** fibrosis
- **Periorbital** and **retro-orbital** fibrosis
- **Sclerosing cholangitis**

Clinical Features

- Occurs predominantly in **women**, **30–60 years**.
- Presents as a **painless, hard anterior neck mass**^o, which progresses over weeks to years to produce **symptoms** of **compression**, including dysphagia, dyspnea, choking, and hoarseness.
- Patients may present with symptoms of **hypothyroidism** and **hypoparathyroidism**^o as the **gland** is **replaced** by **fibrous tissue**.
- Physical examination: **Hard, "woody" thyroid gland** with **fixation**^o to surrounding tissues.

Treatment

- **Surgery**^o is the **mainstay** of the treatment (decompress the trachea by **wedge excision of isthmus**)
- Some patients show dramatic improvement with **tamoxifen & corticosteroids**.

■ HASHIMOTO'S THYROIDITIS

HASHIMOTO'S THYROIDITIS

- First described by Hashimoto as **struma lymphomatosa**^o, i.e. a transformation of thyroid tissue to lymphoid tissue.
- **MC inflammatory disorder** of the thyroid and **leading cause** of **hypothyroidism**^o.

- **Thyroid lymphoma**^o is a rare but **well-recognized complication**
- **Papillary thyroid carcinoma**^o may be occasionally associated

- **Genetic association** has been noted with **HLA B8, DR3 and DR5**^o.
- More common in **women** (Male:female, 1:10), near menopause (**30-50 years**).

Etiopathogenesis

- **Autoimmune** disease
- Thought to be initiated by **activation** of **CD4+T (helper) lymphocytes** which further recruit cytotoxic CD8+T cells.

Contd...

Contd...

- Thyroid tissue is destroyed by **cytotoxic T cells** and **autoantibodies**^o.

Autoantibodies are Directed against
1. Thyroglobulin (Tg): 60%
2. Thyroid peroxidase (TPO): 95% ^o
3. TSH-R: 60%

- It is also thought to be **associated with**:
 - Increased intake of **iodine**
 - Drugs such as **interferon alpha, lithium, amiodarone**

Pathology

- Gross examination: Mildly enlarged thyroid**^o with pale, gray-tan cut surface
- Microscopic examination**:
 - Gland is **diffusely infiltrated** by **small lymphocytes** and **plasma cells**^o
 - Follicles are lined by **Hürthle** or **Askanazy cells**^o (characterized by abundant eosinophilic, granular cytoplasm).

Clinical Features

- MC presentation: **Minimally or moderately enlarged firm gland**^o.
- On examination an **enlarged pyramidal lobe** is often palpable.
- Mild hyperthyroidism may be present initially (due to destruction of thyroid tissue).
- Hypothyroidism** is inevitable and **usually permanent**^o.

Laboratory Findings

- Elevated TSH** and presence of thyroid **autoantibodies confirm the diagnosis**^o.
- Elevated TSH, reduced T4** and T3 levels^o.
- Presence to thyroid autoantibodies (particularly **TPO antibody**)^o.
- In case of doubt, diagnosis is confirmed by **FNA biopsy**.

Management

- Thyroid hormone replacement therapy** for overtly **hypothyroid** patients or in euthyroid patients to **shrink large goiters**^o.
- Surgery** may occasionally be indicated for **suspicion of malignancy** or for **goiters** causing **compressive symptoms** or cosmetic deformity.

■ PAINLESS OR SILENT THYROIDITIS

PAINLESS OR SILENT THYROIDITIS

- Painless thyroiditis, or "silent" thyroiditis, occurs in patients with **underlying autoimmune thyroid disease** and has a **clinical course similar to that of subacute thyroiditis**.
- Occurs in up to 5% of **women 3–6 months after pregnancy** termed as **postpartum thyroiditis**.
- Associated with presence of TPO antibodies antepartum**, three times **more common** in women with type 1 DM.

Clinical Features

- Characterised by **brief phase of thyrotoxicosis** lasting 2–4 weeks, followed by **hypothyroidism** for 4–12 weeks, and then resolution.

Diagnosis

- Uptake of ^{99m}Tc pertechnetate or radioactive iodine is initially suppressed**.
- In addition to the **painless goiter**, silent thyroiditis can be **distinguished from subacute thyroiditis** by a **normal ESR** & **presence of TPO antibodies**.

Treatment

- Glucocorticoid treatment** is not indicated for silent thyroiditis.
- Severe thyrotoxic symptoms: Propranolol**
- Thyroxine replacement** for hypothyroid phase but **should be withdrawn after 6–9 months**, as **recovery is the rule**.

■ GRAVE'S DISEASE (DIFFUSE TOXIC GOITER)

GRAVE'S DISEASE (DIFFUSE TOXIC GOITER)

- MC cause of **hyperthyroidism**, caused by **stimulatory autoantibodies** to TSH-R^o.
- Autoimmune disease** with strong **familial predisposition**^o.
- More common in **females** with peak incidence between **40–60 years**.
- Characterized by **thyrotoxicosis, diffuse goiter** & **extrathyroidal conditions**^o (ophthalmopathy, dermopathy, thyroid acropachy and gynecomastia).

Contd...

Contd...

Etiopathogenesis

- **Autoimmune process** with possible **triggers** (post-partum state, iodine excess, lithium therapy and bacterial or viral infections)
- Associated with **HLA-B8, HLA-DR3, HLA-DQA1*0501 and CTLA-4^Q**
- **Thyroid stimulating antibodies^Q** are hallmark of **Grave's disease**

Clinical Features

- **Hyperthyroid symptoms^Q** (heat intolerance, increased sweating and thirst, weight loss despite adequate caloric intake)
- **Symptoms of adrenergic stimulation^Q** (palpitations, nervousness, fatigue, emotional lability, hyperkinesia and tremors)
- **MC GI symptom** is **increased frequency of bowel movements and diarrhea^Q**

- **Female patients** often develop **amenorrhea, decreased fertility and increased incidence of miscarriage^Q**
- **Children** experience **rapid growth with early bone maturation^Q**
- **Older patients** present with **CVS complications (AF and CHF)^Q**

- Weight loss, facial flushing, warm and moist skin, tachycardia, cutaneous vasodilatation, **collapsing pulse** is seen on examination
- A **fine tremor, muscle wasting and proximal muscle group weakness with hyperactive tendon reflexes** often are present^Q

- **Overlying bruit or thrill at upper pole^Q** due to **increased vascularity**
- **Loud venous hum^Q** in supraclavicular space
- **Ophthalmopathy** (orbital proptosis) occurs in **50%, dermopathy in 1–2%.^Q**
- Dermopathy is characterized by deposition of **glycosaminoglycans** leading to **thickened skin in pretibial region and dorsum of foot^Q** (pretibial myxedema).

- **Gynecomastia** is common in **young men^Q**
- Rare bony involvement leads to **subperiosteal bone formation and swelling in metacarpals^Q** (thyroid acropachy).

Diagnosis

- **Suppressed TSH** with or without an elevated free T4 or T3 level. **If eye signs are present**, other tests are generally not needed^Q.
- **In absence of eye signs**, elevated RAIU with **diffusely enlarged gland^Q** confirms the diagnosis.
- Elevated TSH-R or thyroid-stimulating antibodies (TSAb) are **diagnostic^Q** of Grave's disease and increased in about **90%** patients.
- **Anti-Tg and Anti-TPO antibodies** are **non-specific** and elevated in up to **75%** cases.
- **MRI of orbits** are useful in evaluating **Grave's ophthalmopathy**.

Treatment

- Treatment modalities: **Antithyroid drugs**, thyroid ablation with radioactive ¹³¹I and **thyroidectomy^Q**.

TREATMENT OF GRAVE'S DISEASE**TREATMENT OF GRAVE'S DISEASE**

- Treatment modalities are antithyroid drugs, thyroid ablation with radioactive ¹³¹I, and thyroidectomy.

Antithyroid Drugs

- Administered in **preparation for RAI ablation or surgery^Q**.
- Drugs commonly used: **Propylthiouracil and methimazole^Q**.
- **Propylthiouracil** can cause **liver failure in pregnancy**.
- **Methimazole** is associated with **aplasia cutis & choanal atresia**.

- **Antithyroid drug of choice in Graves: Methimazole^Q**
- **Antithyroid drug of choice in pregnancy: Carbimazole^Q**
- **Antithyroid drug of choice in thyroid storm: Propylthiouracil^Q**

- Most patients have **improved symptoms in 2 weeks** and become **euthyroid** in about **6 weeks^Q**.
- **Catecholamine response** of thyrotoxicosis can be **alleviated by propranolol^Q**.

Radioactive Iodine Therapy (¹³¹I)

- ¹³¹I emits **beta (90%) and gamma rays^Q**

Indications of RAI Therapy

1. **Older patients with small or moderate-sized goiters^Q**
2. Patients **relapsed after medical or surgical therapy^Q**
3. **Antithyroid drugs or surgery are contraindicated^Q**

Contraindications of RAI

Contraindications of RAI	
Absolute Contraindications	Relative Contraindications
<ul style="list-style-type: none"> • Pregnancy^Q • Lactation^Q 	<ul style="list-style-type: none"> • Young patients (children and adolescents)^Q • Thyroid nodules^Q • Ophthalmopathy^Q

Contd...

Contd...

Surgical Treatment

- Surgery is recommended when RAI is contraindicated^Q
- Treatment of choice: Total Thyroidectomy

Indications of Surgery	
When RAI is Contraindicated	Relative Indications
<ul style="list-style-type: none"> • Confirmed cancer or suspicious thyroid nodules^Q • Young patients^Q • Pregnancy and Lactation^Q • Severe reactions to antithyroid medications • Large goiters causing compressive symptoms • Reluctant to undergo RAI therapy 	<ul style="list-style-type: none"> • Smokers, with moderate to severe Grave's ophthalmopathy^Q • Patients desiring rapid control of hyperthyroidism with a chance of being euthyroid • Poor compliance to antithyroid medications.

■ TOXIC ADENOMA**TOXIC ADENOMA (PLUMMER'S DISEASE)**

- Hyperthyroidism from a **single hyperfunctioning nodule**^Q typically occurs in **younger patients**
- Increased thyroid hormone production occurs **independent of TSH control**^Q.
- Characterized by **somatic mutations** in the TSH-R gene^Q

Clinical Features

- **Recent growth** of a **long-standing nodule** along with the symptoms of **hyperthyroidism**^Q.
- Hyperthyroidism from a **single hyperfunctioning nodule** typically occurs in **younger patients**
- Physical examination: **Solitary thyroid nodule** without palpable thyroid tissue on the contralateral side.
- Eye signs are not common, mainly **CVS dysfunction**
- **Rarely malignant**^Q.

Diagnosis

- **RAI scanning** shows a **"hot" nodule**^Q with suppression the rest of the thyroid gland.

Treatment

- **Smaller nodules** may be managed with **antithyroid medications** and **RAI**^Q.
- **Most patients** are **euthyroid** after **radioiodine therapy**^Q (radioiodine preferentially accumulates in hyperfunctioning nodules)
- Surgery (**Hemithyroidectomy**) is preferred in **young patients** with **larger nodules**^Q.

■ THYROTOXICOSIS**CVS FINDINGS IN THYROTOXICOSIS**

- **MC cardiovascular manifestation** is **sinus tachycardia**^Q, often associated with **palpitations**, occasionally caused by **supraventricular tachycardia**^Q.
- **Exertional dyspnea**^Q
- Hyperactive precordium with **loud first heart sound**, an accentuated pulmonic component of the second heart sound, and a **thirds heart sound**^Q.
- **Systolic ejection click**^Q
- The high cardiac output produces a **bounding pulse, widened pulse pressure**^Q, and an **aortic systolic murmur** and can lead to worsening of angina or heart failure in the elderly or those with preexisting heart disease.
- **Atrial fibrillation** is more common in patients **>50 years of age**^Q.
- A systolic scratch, also known as **Means-Lerman scratch**^Q, is occasionally heard in 2nd left intercostal space during expiration.
- **Systolic hypertension**

Cardiovascular Manifestations of Thyrotoxicosis	
Increased Atrial Irritability	High Cardiac Output
<ul style="list-style-type: none"> • Sinus tachycardia (MC)^Q • Palpitations^Q • Supraventricular tachycardia^Q • Atrial fibrillations^Q 	<ul style="list-style-type: none"> • Bounding pulse • Wide pulse pressure^Q • Hyperdynamic precordium^Q • Loud first heart sound^Q, an accentuated pulmonic component of the second heart sound, and a thirds heart sound^Q. • Aortic systolic murmur^Q • Means-Lerman scratch^Q

Contd...

Contd...

THYROID STORM (THYROTOXIC CRISIS)

- It is an emergency due to decompensated hyperthyroidism^o.

Treatment

- Non-selective beta blocker (Propranolol):**
 - Most valuable measure in thyroid storm^o.
 - In thyroid storm most of the symptoms are because of adrenergic over activity due to increased tissue sensitivity to catecholamines in hyperthyroidism.
 - This increased sensitivity is due to increased number of beta receptors^o.
- Quick relief is obtained by blocking beta receptors.
- Propylthiouracil:**
 - Antithyroid drug of choice for thyroid storm^o
 - Reduces hormone synthesis as well as peripheral conversion of T₄ to T₃^o
- Corticosteroids (Hydrocortisone):**
 - Inhibits both release of thyroid hormone from the gland and peripheral conversion of T₄ to T₃^o
- Iodides (Potassium iodide or ipanoic acid):**
 - Used to inhibit further hormone release^o from the gland.
- Other Measures:**
 - Diltiazem, if tachycardia is not controlled by propranolol alone.
 - Rehydration, anxiolytics, external cooling and appropriate antibiotics

■ CARCINOMA THYROID

Type of Thyroid Carcinoma	Prevalence
Papillary (MC)	80–90%
Follicular	5–10%
Medullary	10%
Anaplastic	Rare
Lymphoma	1%

Well Differentiated Thyroid Cancer

- Papillary carcinoma of thyroid^o
- Follicular carcinoma of thyroid^o
- Follicular variant of papillary carcinoma thyroid^o
- Hurthle cell carcinoma (variant of follicular carcinoma thyroid)^o

Carcinoma Thyroid		
Type	Mode of spread	MC site of metastasis
Papillary carcinoma	Lymphatic ^o spread	Lungs
Follicular carcinoma	Hematogenous ^o spread	Bones
Medullary carcinoma	Both lymphatic and hematogenous ^o spread	Liver
Anaplastic carcinoma	Direct invasion ^o	Lungs

Pulsating Secondaries

- Follicular carcinoma thyroid^o
- RCC^o

Bone Metastasis in Carcinoma Thyroid

Follicular carcinoma	Osteolytic metastasis (Pulsating secondaries in flat bones) ^o
Medullary carcinoma	Osteoblastic metastasis ^o

■ PAPILLARY CARCINOMA OF THYROID**PAPILLARY CARCINOMA OF THYROID**

- Accounts for 80% of all thyroid malignancies in iodine-sufficient areas^o
- MC thyroid cancer in children & individuals exposed to external radiation^o.
- More often in women, 30–40 years.

Contd...

Contd...

Pathology

- **Grossly:** **Hard & whitish remain flat** on sectioning with a blade with **macroscopic calcification, necrosis, or cystic changes**

- **Multifocality**^o is **common** (up to 85% of cases) on **microscopic examination**.
- **Multifocality** is associated with an **increased risk of cervical nodal metastases**^o, rarely **invade adjacent structures** such as the trachea, esophagus & RLNs.

- **Rarely encapsulated**^o (PCT are **seldom encapsulated**)
- **Other variants:** **Tall cell**^o, **insular**^o, columnar, diffuse sclerosing, clear cell, **trabecular**, and poorly differentiated types; account for about 1%; associated with a **worse prognosis**.

Histological Characteristics of Papillary Carcinoma Thyroid

- **Papillary projections**^o: PTC contains branching papillae of cuboidal epithelial cells
- **Orphan Annie eye nuclei:**
 - The nuclei contain finely dispersed chromatin, which imparts an **optically clear or empty appearance**, giving rise to term **ground glass** or **Orphan Annie eye nuclei**^o.
 - **Invaginations of cytoplasm** in cross-sections: **Intranuclear inclusions**^o (**pseudo-inclusion**) or **intranuclear grooves**^o.
 - **Diagnosis of PTC is based on these nuclear characteristics**^o even in the absence of papillary structures.
- **Psammoma bodies**^o: **Microscopic, calcified deposits** representing clumps of sloughed cells

Clinical Features

- Most patients are **euthyroid** & present with a **slow-growing painless mass**^o in the neck.
- Dysphagia, dyspnea dysphonia are associated with locally advanced invasive disease.
- **Lymph node metastases** are **common**^o, especially in **children young adults**, and may be the presenting complaint.

- **“Lateral aberrant thyroid”** denotes a **cervical lymph node** that has been **invaded by metastatic cancer**^o.

- **Distant metastases** are **uncommon** at initial presentation, but may ultimately develop in up to 20% of patients.
- **MC sites of metastasis:** **Lungs**^o >bone >liver >brain.

Diagnosis

- **Diagnosis** is established by **FNAC** of the **thyroid mass** or **lymph node**^o.
- Once thyroid cancer is diagnosed on FNAC, a **complete neck ultrasound** to evaluate the **contralateral lobe** and for **LN metastases** in the central & lateral neck compartments.

Treatment

- **Total or near-total thyroidectomy**^o
- During thyroidectomy, **enlarged central neck nodes** should be **removed**^o.
- **Biopsy-proven lymph node metastases** detected clinically or by imaging in the lateral neck in patients with papillary carcinoma are managed with **modified radical neck dissection**.

Prognosis

- PTC have an **excellent prognosis** with a **>95% 10-year survival rate**^o.

■ FOLLICULAR CARCINOMA THYROID**FOLLICULAR CARCINOMA OF THYROID**

- FTC account for **10% of thyroid cancers**
- Occurs more commonly in **iodine-deficient areas**^o.
- **More common** in **women** with mean age of 50 years
- **Genes implicated in FCT:** p53^o, PTEN^o, Ras^o, PAX8/PPAR1

Pathology

- Usually **solitary lesion** surrounded by **capsule**^o.
- **Malignancy** is defined by the presence of **capsular** and **vascular invasion**^o.
- **Tumor infiltration and invasion**, as well as **tumor thrombus** within the **middle thyroid** or **jugular veins**, may be apparent at operation.

Clinical Features

- Usually present as **solitary thyroid nodules**, occasionally with a history of **rapid size increase**, and **long-standing goiter**^o.
- Preoperative clinical diagnosis of cancer is difficult unless distant metastases are present.
- Large follicular tumors (**>4 cm**) in **older men** are **more likely** to be **malignant**^o.

- **MC site of metastasis is bone** (**Osteolytic metastasis with pulsating secondaries in flat bones**)^o
- **MC site of metastasis:** **Vertebra**^o >**Ribs** >**Pelvis Bones** >**Skull**

Contd...

Contd...

Diagnosis

- FNAC is **unable to distinguish benign** follicular lesions **from follicular carcinomas**^Q.
- **Intraoperative frozen-section** examination usually is **not helpful**, but should be **performed** when there is evidence of **capsular or vascular invasion**, or when **adjacent lymphadenopathy** is present.

Treatment

- **Follicular lesion: Hemithyroidectomy**^Q (80% of these patients will have **benign adenomas**)
- **Thyroid cancer: Total thyroidectomy**^Q
- **Prophylactic nodal dissection** is **unwarranted**^Q because nodal involvement is infrequent.

Prognosis

- **Most important prognostic factor: Age and distant metastasis.**

Poor Long-term Prognosis	
<ul style="list-style-type: none"> • Age >50 years^Q • Tumor size >4 cm^Q • Higher tumor grade^Q 	<ul style="list-style-type: none"> • Marked vascular invasion^Q • Extrathyroidal invasion^Q • Distant metastases^Q

■ MEDULLARY CARCINOMA THYROID

MEDULLARY CARCINOMA THYROID

- Neuroendocrine carcinoma **arising from parafollicular 'C' cells**^Q of thyroid
- **Parafollicular 'C' cells** are derived from the **ultimobranchial bodies**^Q & **secrete calcitonin**^Q
- 'C' Cells are concentrated **superolaterally** in thyroid lobes, from where MTC usually develops
- **Most MTCs (75–80%) arise sporadically**^Q
- **Spread** is both **lymphatic & hematogenous**^Q
- **MC site of metastasis: Liver**^Q

Medullary Carcinoma Thyroid	
Sporadic: 80% ^Q	Familial: 20% ^Q (Non-MEN setting/ MEN-2A/MEN-2B)
<ul style="list-style-type: none"> • Originate in one lobe^Q • Seen in 6th decade • RET protooncogene^Q mutation 	<ul style="list-style-type: none"> • Multicentric and bilateral^Q • Occur in younger age^Q • Associated with C-cell hyperplasia^Q • RET protooncogene^Q mutation

Clinical Features

Medullary Carcinoma Should Be Suspected
<ul style="list-style-type: none"> • High level of serum Calcitonin^Q & CEA^Q • Cervical lymph nodes at time of presentation (LN involvement, thyroid and blood borne metastases occurs early)^Q • Diarrhea^Q at the time of presentation. • Amyloid^Q in stroma histologically. • MEN setting: Evidence of Pheochromocytoma/Hyperparathyroidism/Thyroid cancer in family. • (Discovery of medullary carcinoma thyroid makes family surveillance advisable)^Q

Diagnosis

- Diagnosed by FNAC^Q
- **I¹³¹ scan** is of **no use** as MTC is **TSH independent**^Q.
- **Tumor marker: Calcitonin** is raised in **almost all cases** of MTC
- **Calcitonin excess** in MTC is **not associated** with hypocalcemia

Treatment

- **Total thyroidectomy + Central LN dissection ± Ipsilateral MRND** if tumor **>1 cm**^Q
- If nodes are **positive on ipsilateral side: Bilateral MRND**
- **Vandetanib (EGFR inhibitor)** is the only drug approved by US FDA for treatment of **advanced & progressive MTC**

Follow-up

- Level of **Calcitonin** falls after resection and is raises again in cases of recurrence, **used for follow up**^Q.

Prognosis

- MTC is associated with **poor prognosis**^Q.

■ ANAPLASTIC CARCINOMA

ANAPLASTIC CARCINOMA

- Accounts for 1% of all thyroid malignancies
- Mainly affect women in 7th and 8th decade^o
- The typical patient has a **long-standing neck mass**, which **rapidly enlarges** and may be **painful**^o.
- **Most aggressive form of thyroid cancer**^o

Pathology

- **Grossly: Firm & whitish** in appearance.
- Microscopically, sheets of cells with marked heterogeneity & characteristic **giant & multinucleated cells**^o.

Clinical Features

- **Typical manifestation:** An older patient with **dysphagia, cervical tenderness & a painful, rapidly enlarging neck mass**^o.
- **Superior vena cava syndrome** can also be part of the findings.
- The clinical situation **deteriorates rapidly** into **tracheal obstruction & rapid local invasion**^o of surrounding structures.
- Associated symptoms: **Dysphonia, dysphagia & dyspnea**

- **Lymph nodes** usually are **palpable** at presentation.
- Evidence of **metastatic spread** also may be present.
- **MC site of metastasis: Lungs**^o

Diagnosis

- Confirmed by FNAC revealing characteristic **giant & multinucleated cells**^o.
- **Incisional biopsy** occasionally is needed to **confirm the diagnosis**

Treatment

- **Thyroidectomy** for **resectable mass**^o (may lead to a small improvement in survival, especially in younger individuals)
- Combined **radiation & chemotherapy** in an adjuvant setting in patients with resectable disease has been associated with **prolonged survival**^o.
- **Tracheostomy**^o to alleviate **airway obstruction**.

Prognosis

- **Most aggressive thyroid malignancies**^o, with **<6 months survival**

■ METASTATIC TUMORS OF THYROID

METASTATIC TUMORS OF THYROID

- Rare, most cases are found in autopsy
- MC site of primary: **CA Breast**^o > CA Lung
- If thyroid metastases is detected pre-mortem, MC site of primary: **RCC**^o > CA Breast > CA Lung

■ THYROID LYMPHOMA

THYROID LYMPHOMA

- MC type is **NHL B cell**^o type, of **intermediate** grade.
- Majority of patients have thyroid disease plus **cervical or mediastinal lymph nodes**^o.
- More common in **females**.
- Most thyroid lymphomas **develop** in patients with **Chronic Lymphocytic Thyroiditis**^o

Clinical Features

- **Lymphomas** are **rapidly growing tumours**, present with **rapidly enlarging neck mass** which is often **painless**.
- Patients may present with **acute respiratory distress & dysphagia**
- About 10–30% present with symptoms relating to local invasion, including **hoarseness, dyspnoea** with stridor, or **dysphagia**.

- **Painless**^o and associated with **fever**^o
- Patients with thyroid lymphoma virtually **never have hyperthyroidism** but frequently have **hypothyroidism**^o.
- Hypothyroid patients have evidence of **autoimmune thyroiditis** or **Hashimoto's thyroiditis**^o.

Diagnosis

- Diagnosis is confirmed by **core-needle biopsy**^o.

Treatment: External Beam Radiotherapy + Chemotherapy^o

- Patients with **thyroid lymphoma** respond rapidly to chemotherapy (**CHOP**—cyclophosphamide, doxorubicin, vincristine, and prednisone) and associated with **improved survival**.
- Combined treatment with **radiotherapy & chemotherapy** often is recommended.
- To alleviate **pressure symptoms, surgical resection** (Thyroidectomy and nodal dissection) is recommended.

■ THYROIDECTOMY

STEPS OF THYROIDECTOMY

- A **Kocher transverse collar incision**, typically **4 to 5 cm** in length, is placed in or parallel to a **natural skin crease 1 cm below cricoid cartilage**.
- Subcutaneous tissues & platysma are incised sharply and subplatysmal **flaps are raised superiorly** to the level of **thyroid cartilage** and **inferiorly** to the **suprasternal notch**^o
- **Strap muscles** are **divided in the midline** along the entire length of mobilized flaps, & thyroid gland is exposed.
- **Middle thyroid veins** are ligated and **divided**^o.
 - **Dissection plane** is kept as **close** to the **thyroid** as possible & **superior pole** vessels are individually identified, skeletonized, ligated, & divided low on the thyroid gland to **avoid injury** to **external branch of superior laryngeal nerve**^o.
- RLNs can be most consistently identified at the **level of cricoid cartilage**.
- **Parathyroids** usually can be identified **within 1 cm** of the crossing of the **inferior thyroid artery** and the **RLN**^o
 - **Inferior thyroid vessels** are dissected, skeletonized, ligated, and divided as close to the surface of thyroid gland as possible to **minimize devascularization of the parathyroids (extracapsular^o dissection)** or **injury to the RLN**^o.
- **RLN** is **most vulnerable to injury** in the vicinity of the **ligament of Berry**. Any **bleeding** in this area should be **controlled with gentle pressure** before carefully identifying the vessel & ligating it. Use of the **electrocautery should be avoided** in proximity to the **RLN**^o.
- Once the ligament is divided, the thyroid can be separated from the underlying trachea by sharp dissection.
 - **Parathyroid glands** that have been **inadvertently removed** during the thyroidectomy should be resected, confirmed as parathyroid tissue by frozen section, **divided into 1-mm fragments**, and **reimplanted into** individual pockets in the **sternocleidomastoid^o muscle**. The sites should be **marked with silk sutures** and a **clip**^o.

■ COMPLICATIONS OF THYROIDECTOMY

COMPLICATIONS OF THYROIDECTOMY

- **Hemorrhage**
 - Due to **slipping of ligature** on the **superior thyroid artery**^o, **bleeding from muscular artery**
 - **Hematomas** may cause airway compromise and **must be evacuated immediately**^o.
 - Hematomas may occur immediately or later on.
 - An **immediate bleed** occurs after or shortly before extubation when the patient lightens from anaesthesia and may **begin to cough**, causing a vessel to open.
- **Respiratory obstruction: Causes include**
 - **Tension hematoma**^o
 - **Laryngeal edema (by anesthetic intubation): MC cause of respiratory obstruction**^o
 - **Bilateral recurrent laryngeal nerve paralysis**^o
- **Recurrent laryngeal nerve paralysis**
 - May be unilateral or bilateral, transient or permanent.
 - Bilateral paralysis causes respiratory obstruction - Dyspnea, stridor.
- **Injury to other nerves**
 - **External branches of superior laryngeal nerve**^o (MC injured nerve during thyroid surgery: **External laryngeal nerve**^o)
 - Cervical sympathetic trunk - may cause Horner's syndrome.
- **Parathyroid insufficiency**
 - Due to **removal of the parathyroid glands** or **infarction due to vascular injury**^o.
 - **Vascular injury**^o is more important.
 - Cases usually present **2-5 days after operation**^o with symptoms of **hypocalcemia** (circumoral and fingertip numbness and tingling tetany, carpopedal spasm and laryngeal stridor)^o
 - Treatment with **oral calcium & vitamin D supplements**^o
 - **IV calcium gluconate**^o may be required in severe cases.
- **Thyroid insufficiency**
- **Thyrotoxic crisis**
 - Occurs if the thyrotoxic patient has been **inadequately prepared for thyroidectomy**^o.

Multiple Choice Questions

■ PAPILLARY CARCINOMA

- Psammoma bodies may be seen in all of the following, except: *(Recent Question 2016, All India 2011)*
 - Follicular carcinoma of thyroid
 - Papillary carcinoma of thyroid
 - Meningioma
 - Serous cystadenocarcinoma of ovary
- Most common thyroid malignancy is: *(DNB 2012, MHPGMCET 2002)*
 - Anaplastic carcinoma
 - Follicular carcinoma
 - Medullary carcinoma
 - Papillary carcinoma
- Which thyroid malignancy is common after radiation exposure? *(Recent Question 2016, MHSSMCET 2005)*
 - Follicular
 - Papillary
 - Medullary
 - Anaplastic
- Orphan Annie-eye nuclei seen in: *(Orissa 2011)*
 - Papillary carcinoma of thyroid
 - Medullary carcinoma of thyroid
 - Anaplastic carcinoma of thyroid
 - Follicular carcinoma of thyroid
- Which of the following would be the best treatment for a 2 cm thyroid nodule in a 50 years old man with FNAC revealing it to be a papillary carcinoma? *(All India 2009, Recent Question 2015)*
 - Hemithyroidectomy
 - Subtotal thyroidectomy with modified neck dissection
 - Near total thyroidectomy with modified neck dissection
 - Hemithyroidectomy with modified neck dissection
- True regarding papillary carcinoma of thyroid: *(MCI March 2006)*
 - Undifferentiated carcinoma
 - Blood-borne metastasis is commoner
 - Excellent prognosis
 - Capsulated
- Which type of thyroid carcinoma has the best prognosis? *(DNB 2010, All India 96)*
 - Papillary carcinoma
 - Anaplastic carcinoma
 - Follicular carcinoma
 - Medullary carcinoma
- Occult thyroid malignancy with nodal metastasis is: *(DNB 2005, 2001, AIIMS Sept 96)*
 - Medullary carcinoma
 - Follicular carcinoma
 - Papillary carcinoma
 - Anaplastic carcinoma
- A 21 years old woman has 3 cm node in the lower deep cervical chain on the left. The biopsy is interpreted as revealing normal thyroid tissue in a lymph node. The most likely diagnosis is: *(DNB 2012, DPG 2009 Feb)*
 - Subacute thyroiditis
 - Metastatic carcinoma thyroid
 - Hashimoto's disease
 - Lateral aberrant thyroid
- Most common type of carcinoma thyroid having least chances of hematogenous spread: *(Recent Question 2015)*
 - Follicular
 - Papillary
 - Anaplastic
 - Medullary
- Orphan-Annie eye nuclei is seen in: *(Recent Question 2017)*
 - Papillary carcinoma thyroid
 - Follicular carcinoma thyroid
 - Medullary carcinoma thyroid
 - Anaplastic carcinoma thyroid

- Psammoma bodies are seen in: *(Recent Question 2017)*
 - Papillary carcinoma thyroid
 - Follicular carcinoma thyroid
 - Medullary carcinoma thyroid
 - Thyroid lymphoma
- A 27 years old woman presents with 26 weeks of gestation with a lesion, which is found to be papillary carcinoma of thyroid. Which is the best treatment for this patient?
 - Thyroid ablation using radioactive iodine
 - Total thyroidectomy *(MCI June 2019)*
 - Observation
 - Hemi-thyroidectomy

■ FOLLICULAR CARCINOMA

- All of the following are true for follicular carcinoma of thyroid except: *(COMEDK 2006)*
 - Lymph node involvement rare
 - Vascular involvement common
 - Younger patients have good prognosis
 - Diagnosis by FNAC
- Thyroid carcinoma with pulsating vascular skeletal metastasis is: *(COMEDK 2007, All India 95)*
 - Follicular
 - Anaplastic
 - Medullary
 - Papillary
- FNAC is useful in all the following types of thyroid carcinoma except: *(UPPG 2010, MCI March 2005, All India 95)*
 - Papillary
 - Follicular
 - Anaplastic
 - Medullary
- Most probable malignancy that develops in a case of long-standing goiter is: *(MCI June 2018, Recent Question 2015, Kerala PG 2015, AIIMS Feb 97, Nov 2001)*
 - Follicular carcinoma
 - Anaplastic carcinoma
 - Papillary carcinoma
 - Medullary carcinoma
- Bone metastasis is common in which thyroid tumor:
 - Follicular
 - Papillary *(AIIMS Nov 99)*
 - Hurthle cell tumour
 - Anaplastic
- Metastasis from follicular carcinoma should be treated by:
 - Radioiodine
 - Surgery *(MCI Sept 2006)*
 - Thyroxine
 - Observation
- True regarding follicular carcinoma of thyroid: *(JIPMER 2014, 2013)*
 - Hematogenous spread
 - Commonly multifocal
 - Readily diagnosed by face
 - Most commonly carcinoma of thyroid
- FNAC cannot detect which of the following? *(AIIMS Nov 2014)*
 - Follicular carcinoma
 - Papillary carcinoma
 - Colloid goiter
 - Hashimoto's thyroiditis

■ MEDULLARY CARCINOMA

- Screening method of medullary carcinoma thyroid is:
 - Serum calcitonin
 - Serum calcium
 - Serum alkaline phosphate *(All India 97, AIIMS Nov 95)*
 - Serum acid phosphatase
- Treatment of medullary carcinoma thyroid:
 - Surgery and Radiotherapy *(AIIMS May 2011)*
 - Radiotherapy and Chemotherapy
 - Surgery only
 - Radioiodine ablation

Explanations

■ PAPILLARY CARCINOMA

1. Ans. a. Follicular carcinoma of thyroid (Ref: Schwartz 11/e p1647, 10/e p1542; Sabiston 20/e p902; Bailey 27/e p818)

Psammoma Bodies (PSM)

- | | |
|---|---|
| 1. Papillary carcinoma thyroid ^Q | 2. Papillary carcinoma (RCC) ^Q |
| 3. Serous cystadenoma ^Q | 4. Meningioma ^Q |

2. Ans. d. Papillary carcinoma
3. Ans. b. Papillary
4. Ans. a. Papillary carcinoma of thyroid
5. Ans. c. Near total thyroidectomy with modified neck dissection
6. Ans. c. Excellent prognosis
7. Ans. a. Papillary carcinoma
8. Ans. c. Papillary carcinoma
9. Ans. d. Lateral aberrant thyroid
10. Ans. b. Papillary
11. Ans. a. Papillary carcinoma thyroid (Ref: Schwartz 11/e p1647, 10/e p1542; Sabiston 20/e p903)
12. Ans. a. Papillary carcinoma thyroid (Ref: Schwartz 11/e p1647, 10/e p1542; Sabiston 20/e p903)
13. Ans. b. Total thyroidectomy (Ref: Schwartz 11/e p1647; Sabiston 20/e p903)

■ FOLLICULAR CARCINOMA

14. Ans. d. Diagnosis by FNAC (Ref: Schwartz 11/e p1650, 10/e p1544, 1357; Sabiston 20/e p906; Bailey 27/e p818)

LIMITATIONS OF FNAC IN THYROID DISEASES

1. Not able to distinguish follicular adenoma from follicular carcinoma^Q
2. Not able to distinguish Hurthle cell adenoma from Hurthle cell carcinoma^Q
3. Useless in Reidel's thyroiditis^Q (Biopsy is preferred)^Q
4. FNAC is less reliable in patients who have history of head and neck irradiation or family history of thyroid cancer due to higher likelihood of multifocal lesions and occult cancer^Q

15. Ans. a. Follicular
16. Ans. b. Follicular
17. Ans. a. Follicular carcinoma
18. Ans. a. Follicular
19. Ans. a. Radioiodine
20. Ans. a. Hematogenous spread
21. Ans. a. Follicular carcinoma

■ MEDULLARY CARCINOMA

22. Ans. a. Serum calcitonin (Ref: Schwartz 11/e p1655-1656, 10/e p1549-1550; Sabiston 20/e p909; Bailey 27/e p820; Harrison 20/e p2716)
23. Ans. c. Surgery only (Ref: Schwartz 11/e p1656, 10/e p1550; Sabiston 20/e p909; Bailey 27/e p820)
24. Ans. a. 5 years
25. Ans. a. Calcitonin (Ref: Schwartz 11/e p1656, 10/e p1549; Sabiston 20/e p909; Bailey 27/e p820)
26. Ans. c. CEA
27. Ans. c. Ret proto-oncogene
28. Ans. b. Medullary carcinoma
29. Ans. c. Medullary carcinoma
30. Ans. c. It is dependent on TSH
31. Ans. a. Medullary carcinoma thyroid (Ref: Schwartz 11/e p1656, 10/e p1550; Sabiston 20/e p909; Bailey 27/e p820)
32. Ans. c. Medullary carcinoma thyroid (Ref: Schwartz 11/e p1656, 10/e p1550; Sabiston 20/e p909; Bailey 27/e p820)
33. Ans. a. Medullary carcinoma thyroid (Ref: Schwartz 11/e p1656, 10/e p1541; Sabiston 20/e p909)

■ ANAPLASTIC CARCINOMA

34. Ans. d. Anaplastic carcinoma
35. Ans. d. Anaplastic

Quick Review of SURGERY

Salient Features

- Synopsis added before questions to build concepts and to save precious time
- New NBE based pattern (wider coverage, concept development, one-liner approach)
- Image-based Questions with Answers (According to Recent Examinations) have been added
- Solved MCQs (PGMEEs 2019–1985) including All Recent Questions (2019–2013)
- Thoroughly verified answers from MCh aspirants and residents
- Explanations in tabulated form
- Explanations incorporating only relevant and high yielding facts
- Highlighted important and golden facts
- Explanations from most authentic surgery books
- Repeated questions grouped together to save your precious time
- Line diagrams to minimize tedious efforts
- Mnemonics for faster learning
- Controversial questions have been handled with special care.

This book is an attempt to provide you with the thorough knowledge of the subject but with a viewpoint that the most important thing is to clear the exam as the competition is intense. There is a difference between Just preparing for an exam, and preparing to achieve the topmost score. So, the book has covered all the topics but with special emphasis on the important and high yielding facts to minimize your tedious efforts and to save your precious time. Remember that without proper revision it is of no use to cover huge amount of syllabus. Last but not least, the surest way not to fail is to determine to succeed. All the best...

Dr Pritesh Singh, graduate from Maulana Azad Medical College and postgraduate from Lady Hardinge Medical College, New Delhi, India, is an excellent teacher and has been taking awe inspiring classes in various countries since 2009. He is amongst the best faculty and is very popular with students because of his spellbinding classes. He is a renowned educationist and author of Surgery Essence, which needs no introduction and AIIMS Essence and DPG entrance examination books. The students all over the country admire the way he teaches. He is not just a source of inspiration for his pupils rather he is their role model, as he is young and dynamic. He sets a positive example with his style of teaching, courtesy, cooperation and professionalism. Some students say he is a magician who keeps his students spellbound throughout his class. His performance speaks volumes about his knowledge and precision.



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