

Thyroid Gland

(key to uns)
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Name the Arteries Supplying the Thyroid Gland From which Artery these Arise.

Superior Thyroid Artery 1st branch of External Carotid A

Inferior Thyroid Artery branch of thyrocervical Trunk

which arise from Subclavian

Thyroid Ima Artery From brachiocephalic or

Direct branch of Arch of Aorta

Name the Ectopic Sites of Thyroid Gland &

Anomalies of Thyroglossal Tract.

Associated with Tongue (Lingual Thyroid) along

Pathway (Pyramidal lobe)

Thyroglossal Duct cyst Thyroid Fistula

What is Struma Ovari.

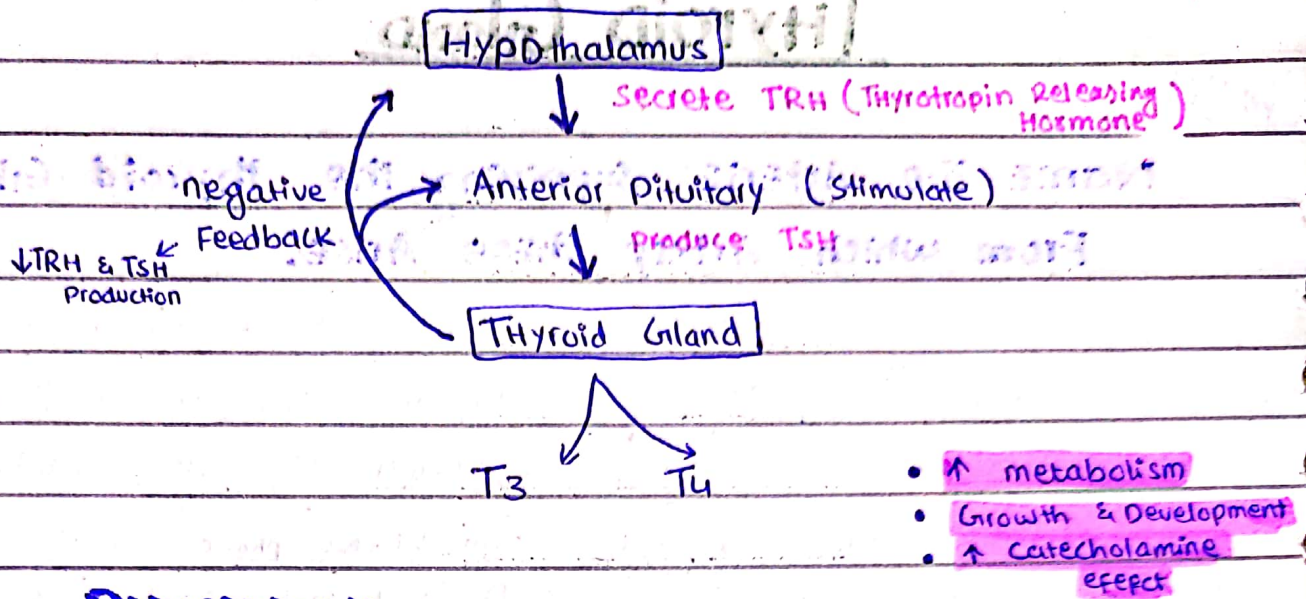
It is a Rare form of monodermal Teratoma

that contain Thyroid Tissue

and may cause Hyperthyroidism.

Despite its name struma Ovarii is not Restricted

to the ovary. Majority are benign Tumors.



Physiology

① Thyroxine:

• Tri-iodothyronine (T₃)

• Thyroxine (T₄)

Synthesis of thyroid hormone

Steps:

- ① Trapping of iodide from blood by iodide pump into follicular cell
- ② oxidation of iodide to iodine by peroxidase enzyme
- ③ Binding of iodine to tyrosine → monoiodotyrosine.
- ④ Coupling of mono & di-iodotyrosine & result in formation of T₃ & T₄
- ⑤ secretion of T₃ & T₄ released into plasma in response to stimulus from TSH.

Synthesis & liberation of T₃ & T₄ control with TSH from AP

which in turn regulated by TRH from Hypothalamus.

A 14 year old Girl presented to OPD with a swelling 2x2 cm since childhood but increased in size last 2 year. O/E swelling is pulled upward with Tongue movement.

- midline swelling
- move upward with swelling & Tongue Protrusion

Diagnosis :

Thyroglossal Duct cyst

Investigation :

History

Examination : Swelling move upward with

- Swallowing
- Tongue protrusion

Blood Test : Assess Thyroid Function

Ultrasound : To create image of Blood vessels, Tissues

Thyroid Scan : Reveal Physical Abnormality of Thyroid

Fine Needle Aspiration : Remove cell from cyst for Diagnosis.

Treatment :

Excision of whole Thyroglossal Tract (which include removal of body of Hyoid bone)

up to the base of Trunk. "Sistrunk Operation"

D/Ds :

Thyroid Adenoma

Dermoid cyst

Thyroid Fistula

Sebaceous cyst

Bronchial cyst

Lymphoma

Laryngocele

(Supply 2019)

DEFINE & CLASSIFY GOITER. How will you investigate a Lady 50 year with Goiter and S° Thyrotoxicosis.

Goiter: Enlargement of Thyroid Gland without Hypo or Hyperfunctioning.

Classification:

Simple Goiter (Euthyroid)

Diffuse (Hyperplastic)

Multinodular Goiter

Toxic (Hyperthyroidism)

Diffuse (Grave's Disease)

Multinodular

Toxic adenoma

Hypothyroidism usually multinodular (Hashimoto Thyroiditis)

Neoplastic

Benign → Follicular adenoma

Hurthle cell adenoma

Malignant → Papillary CA 60% (most common)

Follicular CA 20%

Anaplastic CA 10%

Medullary CA 5%

Malignant Lymphoma 5%

Inflammatory:

Autoimmune → Hashimoto Thyroiditis

Chronic Lymphocytic Thyroiditis

Granulomatous → De Quervain Thyroiditis

Fibrosing → Riedel's Thyroiditis

Infective → Bacterial, viral

Others → Amyloid

(Annual)
2016

Hyperthyroidism

A 50 year old Female presented with a nodular swelling in front of her neck for past 6 years. She complains of palpitation & heat intolerance, weight loss & good appetite.

(Key to UHS)
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A 30 year old Female presented in surgical OPD with complaints of palpitation for past 6 months. O/E there is a 2cm swelling in front of neck.

(Key to UHS)
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A 25 year old Female presented with multiple swelling in front of her neck. She gave history of palpitation, weight loss & disturbance of menstrual cycle. Her pulse is 110/min. O/E swelling is firm in consistency & moves upward with swallowing. Neck radiography shows trachea deviation.

Hypothyroidism

A 30 year old Female complains of lethargy, lassitude, weight gain. O/E she has cold intolerance, pale puffy, slurred speech. Her pulse 60/min.

- Diagnosis
- Investigations
- Treatment
- Signs

Hyperthyroidism

DEFINATION:

It is overproduction of T₃ & T₄ because of feedback mechanism, serum TSH level are reduced / undetectable.

Causes or Clinical Types:

Common:

- ① Diffuse Toxic Goiter: Thyroid Stimulating Antibodies (Grave's Disease)
- ② Toxic nodular Goiter: S^o Thyrotoxicosis
- ③ Toxic nodule:

Rare:

- ① Jod-Basedow thyrotoxicosis → due to large dose of iodide given pts → Hyperplastic Goiter
- ② Thyrotoxicosis factitia: exogenous over administration of Thyroxin
- ③ Acute Thyroiditis: Liberation of hormone from Damaged Tissue

Clinical Features:

Symptoms:

Palpitation
Heat intolerance
Weight loss
Good Appetite
Menstrual irregularity
Insomnia
Restlessness
Diarrhoea.

Signs:

Tachycardia
Cardiac Arrhythmia
Hot, moist, palm
eye [Exophthalmos
Lid Lag / Retraction
Thyroid Bruit
Fine Resting Tremor
→ Prethorax myxedema

Hypothyroidism

Deficiency in circulating level of thyroid hormone T₃ & T₄ leads to Hypothyroidism.

- ① Autoimmune Thyroiditis: Chronic Lymphocytic Thyroiditis
Non-Goitrous: P^o myxoedema
Goitrous: Hashimoto's Disease
- ② Iatrogenic:
After thyroidectomy
After Radio-iodine therapy
Drug induced (Anti-thyroid para-aminosalicylic acid)
- ③ Dys-hormonogenesis
- ④ Goitrogens
- ⑤ Thyroid agenesis
- ⑥ Endemic cretinism

Symptoms

Lethargy & Fatigue
intolerance to cold
Weight Gain
Hoarseness of voice
Constipation
Dry skin
Loss of Hair
memory problems
Carpal Tunnel Syndrome

Sign:

- Bradycardia
- Cold Extremities
- Peri-orbital puffiness
- Bradykinesia
- Wolman's Sign:
sites → Achilles
Pteilar
Biceps Tendon
→ delayed relaxation of Ankle Jerk

Investigations:

- ① Raised T_3 & T_4
 - ② \downarrow TSH
 - ③ Autoantibodies
 - ④ Thyroid Scan \rightarrow in case of nodularity & Toxicity
 - ⑤ FNAC
 - ⑥ Ultrasound
 - ⑦ CT-scan
- } common

Management:

General:

Rest
sedation
Reassurance

Specific:

① Medications:

(Anti-Thyroid Drugs)

Carbimazol

PTU

propranolol & Nadolol

iodide \rightarrow Reduce vascularity

② Radio-iodine:

Surgery:

After making Pts Euthyroid

① Sub-Total Thyroidectomy

② Total Thyroidectomy

① Thyroid Function Test: normal

② Thyroid Antibodies: rule out autoimmune Thyroiditis
TPO

③ X-ray chest: To see Deviation & Compression

④ FNAC: only for Dominant swelling in Goiter

⑤ US

⑥ CT-scan

Management:

- oral Thyroxine 50 μ g (0.1-0.2 mg)

- For elderly & cardiac Pts Dose is 0.05 mg daily

- If rapid response is required \rightarrow Tri-iodothyronine used.

Infantile Hypothyroidism:

Diagnostic Features:

- Hoarse cry
- Macroglossia
- Umbilical Hernia
- Feature of Thyroid Failure

Myxoedema

It is a condition in which symptoms of Hypothyroidism is exaggerated.

Myxoedema Coma:

It is a most severe form of Hypothyroidism with high mortality rate (30-60%).

It is usually seen in patients already suffering from Hypothyroidism when exposed to stressful events like Surgery, Trauma, cold, Pneumonia, & use of medicine like ... sedative, Anesthesia & narcotics

Clinical Features:

- Facial Appearance is typical, Bloating look, Pouting Lip & Dull Expression
- Supraclavicular Puffiness, malar Flush, Yellow tinge to skin
- Myxoedema Coma: Hypothermia, Altered mental conscious level
Respiratory Failure
Cardiac dysfunction.

Treatment:

- A Bolus of 500mg of T₄ / 100µg of T₃ (iv/orally)
- If body Temperature is less than 30°C Pts must be warmed slowly
- 1/v Broad spectrum Antibiotics
- Hydrocortisone

PENDRED'S Syndrome:

It is a form of Dyshormogenesis in which Deficiency of TPO. In which Goiter associated with sensorial hearing impairment
Bony Labyrinth abnormality → observed in CT

A 50 year male presented with a swelling in front of neck for last 6 months. He recently noticed changed his voice. O/E swelling moves with deglutation, hard & irregular.

A 30 year male presented with painless solitary swelling at right side of neck moves with deglutation. He has radiation exposure to neck to his childhood because of some disease patient is clinically euthyroid. US shows solid swelling with multiple enlarged ipsilateral lymph nodes. Papillary carcinoma

A young female presented to emergency with complaint of lump in neck 2x2cm. Cervical lymph node involved hard, irregular, painless solitary (USG). Neck shows solid swelling with lymph node. Papillary carcinoma

Diagnosis: Thyroid Carcinoma

TYPES:

	<u>Etiology</u>	<u>spread</u> :
<u>Papillary</u> :	Radiation exposure	Lymphatics (cervical LN)
<u>Follicular</u> :	Endemic Goiter Result TSH stimulation	Blood into Bone, Lung Liver Bony metastasis Pulsatile.
<u>Medullary</u> :	mutation in RET proto-oncogene MEN 2A & MEN-2B	Lymphatic & Hematogenous Route
<u>Anaplastic</u>		
<u>Malignant Lymphoma</u>	Autoimmune Thyroiditis	

Investigations:

① Thyroid Function Test (T₃ & T₄ & TSH)

② Thyroid Scan

③ FNAC - Dominant / isolation → Helpful in Lobectomy / Total Thyroidectomy can performed.

④ X-ray

Ultrasound

CT-Scan

MRI

} Detect Extension & L.N involvement

⑤ Biopsy — [Tru-cut → in case of irre-movable anaplastic
Excisional

⑥ Serum Calcitonin Level

Serum Calcium Level

Treatment:

① Surgery:

- Total Thyroidectomy

IF cervical L.N involve → Neck Dissection Carried out

② Radioactive-iodine : Isotope I¹³¹

③ Chemotherapy : Cisplatin

④ Postoperative

Long-life : Thyroxine 200 ug to avoid
iatrogenic hypothyroidism

Follow-up : 6 month than yearly

Check thyroglobulin level if raised

whole body thyroid scan → Detect metastasis

Summary:

Differentiated thyroid carcinoma: (Papillary & Follicle)

Total Thyroidectomy + Radioablation

Follow up with Thyroglobulin level & whole body thyroid scan

Treat the recurrence / metastasis with Radioactive iodine

Life Long thyroxine therapy.

MEDULLARY carcinoma:

Total Thyroidectomy + neck node dissection

Follow up with calcitonin & CEA; recurrence is again Treated with Surgery

NO ROIE OF Radioactive iodine therapy

Prophylactic thyroidectomy at age of 1 & 6 year in MEN-2B & 2A respectively

Anaplastic:

Symptomatic Treatment

Relieve tracheal compression by isthmectomy

External beam radiotherapy has a role.

Lymphoma OF thyroid:

Stage I & II = Radiotherapy

stage III & IV = Chemotherapy

(Annual 2016)

Enlist the operative steps OF Total Thyroidectomy For multinodular Goiter.

Steps of Thyroidectomy

① General Anesthesia is given

② Neck is Extended and head side of operating table is Elevated.

③ Transverse incision (4-5cm) is Given 2cm above suprasternal notch (collar incision)

④ Subcutaneous Tissue & platysma incised Sharply
Subplatysmal Flap raised

Superiorly: To level of Thyroid Cartilage

Inferiorly: Suprasternal notch

⑤ Incise median Raphe & mobilize the Strap muscles (TOSS)

Strap muscle retracted Laterally if Goiter small can be divided in Large Goiter.

⑥ Retract the Affected lobe medially.

Identify middle thyroid vein ligate & divide it

Be Careful OF Recurrent Laryngeal nerve.

⑦ Identify & mobilize Superior pole:

Ligate & Divide vessel (sup. Thyroid Artery) + (vein)

Avoid to Damage External Laryngeal nerve.

TOSS

- Thyrohyoid
- omohyoid
- Sternohyoid
- sternothyroid

⑧ **Identify & mobilize inferior Pole:**

Ligate & divide inferior Thyroid vein & Artery separately

Be careful & identify recurrent laryngeal nerve

which is close to the inferior pole vessels.

⑨ Dissected: Lobectomy / Total Thyroidectomy Done by repeating Procedure on opposite side.

⑩ Hemostasis Secured

Strap muscle are Approximated

Platysma stitched by Continuous absorbable sutures

Skin stitches are Applied in subcuticular fashion.

Complications (Post-operative)

Hemorrhage

wound infection

Hypertrophic scar / keloid

[Respiratory obstruction

Tracheomalacia

[Thyroid insufficiency

Thyrotoxicosis crisis

[Recurrent laryngeal nerve Damage

Hypocalcemia (parathyroid insufficiency)

Stitch Granuloma.

Enumerate causes of breathless after Thyroid Surgery

① Hematoma

③ Laryngeal edema

② Tracheal collapse

④ Bilateral recurrent laryngeal nerve damage.

Pre-operative Preparation

Before surgery it must be assured that patient is euthyroid

in case of Thyrotoxicosis:

Carbimazole (drug of choice) 10mg x TDS (8-12 week)
when pts become euthyroid reduced dose 5mg TDS

Peripheral Action of Thyroxine:

Controlled by Beta Blockers (Propranolol 40mg TDS)

Mechanism of Action: inhibit peripheral conversion of T_4 into T_3 & also inhibit effect on end organ.

Reduced vascularity of Gland

Iodine Given with Carbimazole / β Blocker 10 day before operation.

What is Total, SubTotal, near Total Thyroidectomy.

Total: Both lobes & isthmus is removed

SubTotal: 8g of Thyroid Tissue preserved on each side.

Near-Total: 8g of Thyroid Tissue Preserved on one side with Total Lobectomy on other side. (Hartley-Dunkill procedure)

Lobectomy: Removal of one lobe & isthmus.

(Key to OHS
Supply 2020
2024)

A mother bring her 5 year old son with a history on the Right side of neck. it is Soft, Fluctuant non-Tender.

Translucination Test is Positive.

Diagnosis: Cystic hygroma

Describe two other swellings in the neck with differentiating

Features:

① Bronchial cyst

Fluctuant

non-Transluminent

② Carotid body Tumor

Painless lump

move side by side

Complications:

Haemorrhage

infection

Large cystic hygroma Obstruct Trachea & Oropharynx &

Cause Respiratory insufficiency.

Treatment:

Surgical Excision

Sclerotherapy: respond to injection of hypertonic saline sol.

A 20 year Female got Fractured OF Right Femur at it's mid shaft During lifting some weight. She has history of Passing Stones in Urine. Her Family notice that she frequently losses his Temperature. Her investigation shows high serum Calcium Level.

Diagnosis: Primary Hyperparathyroidism

TYPES:

Primary: Arise From \uparrow PTH production From abnormal Parathyroid Gland & Result in Disturbance of normal feedback exerted by serum Ca^{2+}

Secondary: Reversed by correction of underlying Problems.
Kidney Transplant For Chronic Renal Failure

Tertiary: Persistant & Recurrence of Hypercalacemia after Successfully Renal Transplant result in T° PTH.

CAUSES:

Adenoma	85%
Hyperplasia	13%
Carcinoma	1-2%

Clinical Features:

Kidney stones : Result from hypercalacemia

Broken bones : \uparrow osteoclastic activity Result Pathological fracture

Abdominal Groans : Nause, vomiting, Peptic ulcer, Constipation, Pancreatic

Psychiatric moans :

Fatigue overtones :

INVESTIGATIONS:

① Total serum calcium level = 1.0 gm/dl

② 24 hours urinary calcium $> 400 \text{ mg}$

③ Creatinine clearance : $\downarrow 30\%$

④ Bone mineral Density
t-score < -2.5

Hypophosphatemia & \uparrow urinary Ca^{2+} excretion

Alkaline phosphatase level \uparrow : because of bone resorption

Treatment:

Medical Treatment:

① General measures:

Adequate hydration

\downarrow Dietary calcium

\downarrow Cessation of Thiazide & Lithium

SURGERY:

All pts with Symptomatic

Hyperparathyroidism

\downarrow

under age of 50 year

② Bisphosphonates & Estrogen Therapy

$\rightarrow \downarrow \text{Ca}^{2+}$ in circulation

undergo

Parathyroidectomy

③ Ca^{2+} Receptor agonist (cinacalcet)

indications for surgery

④ Pts with Parathyroid crisis

Severe Hypercalcemia

\rightarrow nausea, vomiting, confusion, Hypotension
abdominal pain

• **Admit in ICU**

• **IV saline**

• **Bisphosphonate therapy**

① Serum Ca^{2+} : 1.0 gm/dl above upper
limit of normal

② 24 hr urinary Ca^{2+} : $> 400 \text{ mg}$

③ Creatinine clearance $\downarrow 30\%$

④ Bone mineral Density

t-score < -2.5 at any site

How will you localize the Lesion:

Localization is only helpful for Surgical Planning

Ultrasound of neck and Technetium - 99m labeled sestamibi (MIBI) isotope scan can localize 80% of adenoma.

It has been noticed that Adenoma usually involve single gland (80%) and if hyperplasia it involve all four glands.

Advantage: - more limited operations.

Some of under local Anesthesia.