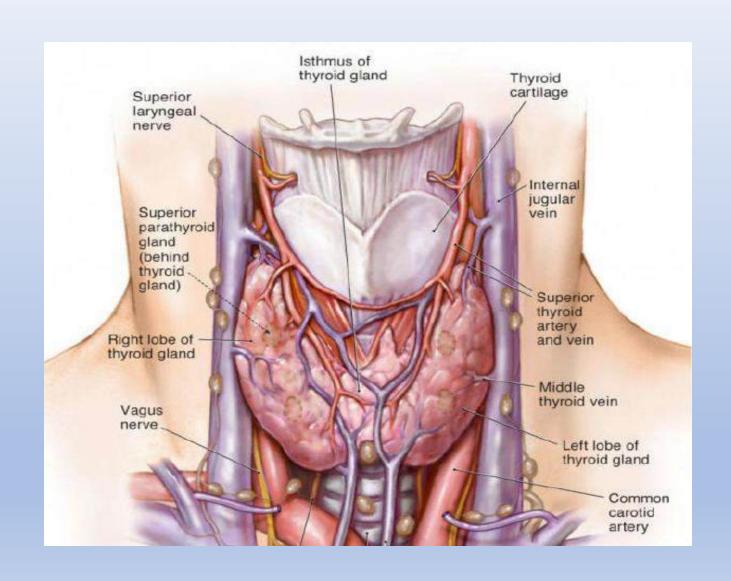


Dr. Lubana Nasreen

Dr. Nur Ahmed

Dr. Timir Kumar Debnath

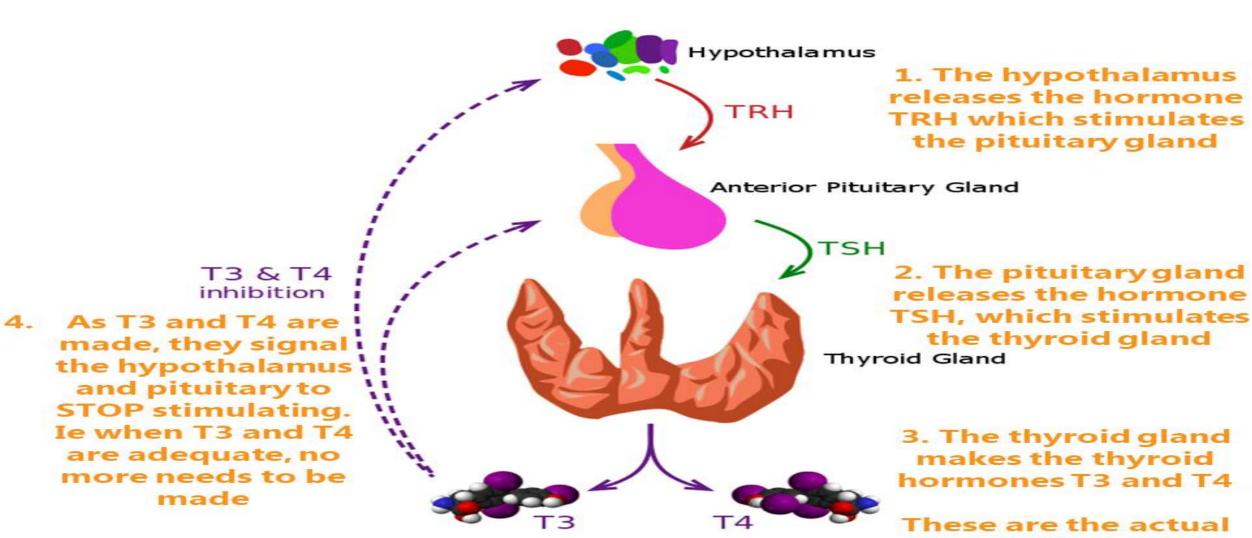
Anatomy Of Thyroid Gland



Thyroid Physiology

inhibition

made



thyroid hormones

Increased metabolism Growth and development Increased catecholamine effect

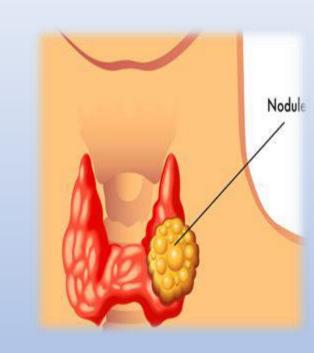
Definition of Thyroid Nodule

 Discrete lesion within the thyroid gland that is radiologically distinct from the surrounding parenchyma.



Prevalence

- Thyroid nodules are common
- Prevalence: 1-5%
- Prevalence on high resolution USG: 20-68%
- Thyroid sonograms in a clinical study revealed
 - ≥22% of thyroid glands contained solitary nodule
 - ➤ 45% contained multiple thyroid nodules
- The risk of cancer in clinically detected thyroid nodules is 6-15%



Pathophysiology Of Thyroid Nodule

Persistent TSH stimulation

Diffuse hyperplasia of thyroid gland

Fluctuation of TSH level

Mixed areas of active & inactive lobules

Active lobules becomes vascular & hyperplastic

Haemorrhagic necrosis within center

Nodule formation

Center of nodule is active & margin inactive

Formation of many nodules

Multinodular goiter

Types of Thyroid Nodule

Benign(95%)	Malignant(5%)
Multinodular(sporadic) goiter	Papillary carcinoma -Commonest
Hashimoto's Thyroiditis	Follicular carcinoma
Cyst: Colloid, simple, or hemorrhagic	Medullary carcinoma
Follicular adenoma	Anaplastic carcinoma
Hurthle-cell(oxyphil-cell) adenoma	Primary thyroid lymphoma
	Metastatic carcinoma: Breast, renal cell,
	lungs & others

Factors That Increase The Risk Of Malignancy

- History of neck irradiation in childhood
- Endemic goiter
- Hashimoto's thyroiditis (个 Risk of lymphoma)
- Prolonged stimulation by elevated TSH
- Solitary thyroid nodule
- Family or personal history of thyroid adenoma or carcinoma
- Male Sex

Physical Findings of Possible Thyroid Malignancy

Hard nodule & Fixation of the nodule to surrounding tissues

Vocal cord paralysis

Cervical lymphadenopathy

With the discovery of a thyroid nodule, complete history and physical examination focusing on the thyroid gland and adjacent cervical lymph nodes should be performed.



Clinical examination

- Visual inspection
- Palpation of thyroid, neck nodes, and supraclavicular nodes
- Fixed, mobile, soft, tender
- Heart rate, BP, weight

Examination

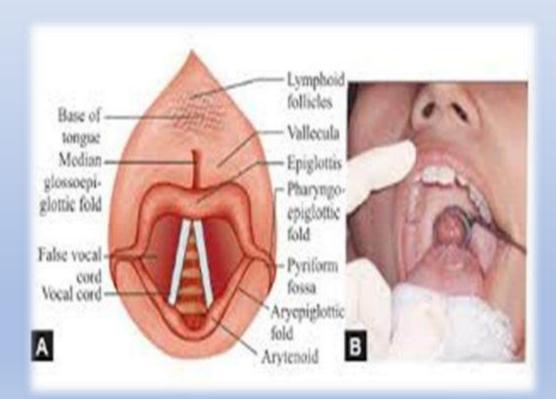




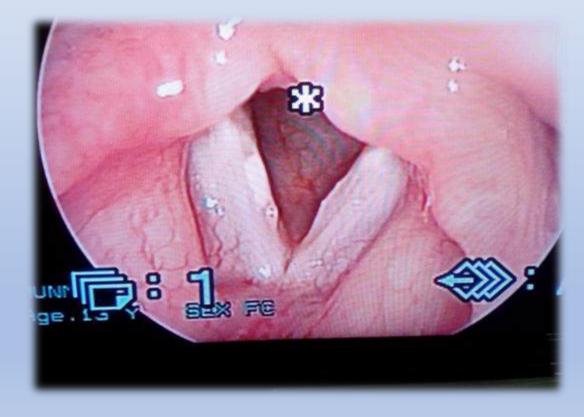


Laryngoscopy

Indirect Laryngoscopy



Fiberoptic Laryngoscopy(FOL)



Investigations

- Thyroid function test
 - ✓ Serum TSH (Thyroid stimulating hormone)
 - ✓ Serum FT3 (Tri-iodothyronine)
 - ✓ Serum FT4 (Thyroxin)

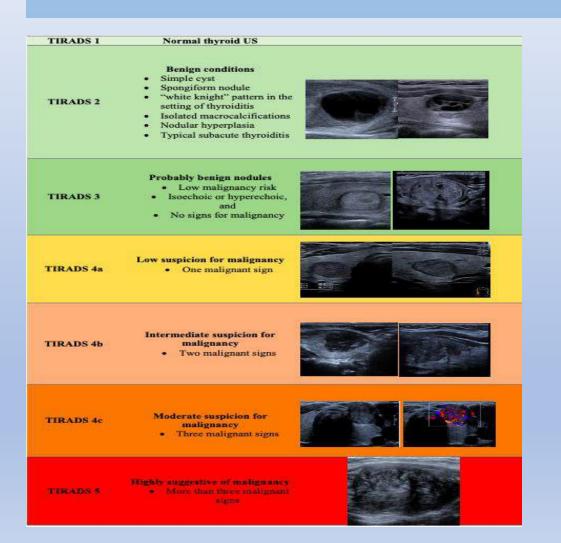
✓ Serum antithyroid peroxidase (anti-TPO) and antithyroglobulin (anti-TG) antibodies are key indicators for diagnosing autoimmune thyroiditis, particularly Hashimoto's thyroiditis

Ultrasound

- Thyroid sonography should be performed in all patients with known or suspected thyroid nodules.
- Sonographic evidence of thyroid malignancy
 - √ Microcalcifications
 - ✓ Marked Hypoechogenicity
 - ✓ Increased intranodular vascularity
 - ✓ Irregular or lobulated margin
 - ✓ Nodule is taller than wide

Ultrasound

TI-RADS= THYROID IMAGING REPORTING AND DATA SYSTEM



HIGH SUSPICIOUS ASPECTS

- Taller-than-wide shape
- Irregular or microlobulated margins
- Microcalcifications
- Marked hypoechogenicity

≥ 3 signs and/or adenopathy TIRADS 5

1 or 2 signs and no adenopathy TIRADS 4B

TIRADS 4A

TIRADS 3

LOW SUSPICIOUS ASPECT

- None of the high suspicious aspect
- Moderately hypoechogenic

PROBABLY BENIGN ASPECTS

- None of the high suspicious aspect
- Isoechogenic
- Hyperechogenic

BENIGN ASPECTS

- Simple cyst
- Spongiform nodule
- 'White knight' aspect
- Isolated macrocalcification
- Typical subaute thyroiditis

TIRADS 2

Normal thyroid US

TIRADS 1

Fine Needle Aspiration Cytology (FNAC)

- FNAC is the investigation of choice for thyroid Nodules.
- As FNAC distinguishes between benign and malignant lesions quite effectively, its use has markedly decreased the number of unnecessary thyroid surgeries.
- USG guidance FNAC increases the accuracy
- Sensitivity: 93.4%; Specificity: 74.9%

Recommendation:

- FNAC should be done for evaluation of all thyroid nodules, preferably USG guided.
- FNAC should be reported using Bethesda System for Reporting Thyroid
 Cytopathology.

BETHESDA CATEGORY	ESTIMATED RISK %	RECOMMENDATION
l Insufficient, non- diagnostic	1-4	Repeat US- guided FNAB
II Benign	0-3	Surveillance with clinical and US review at intervals of 1-3 years depending on findings
III Atypical, follicular lesion of undetermined significance	5-15	Repeat US-guided FNAB and may require diagnostic surgery
IV Suspicious for follicular neoplasm	15-30	Thyroid lobectomy +/-completion thyroidectomy
V Suspicious for malignancy	60-75	Hemi or total thyroidectomy
VI Malignant	97-99	Total thyroidectomy

LIMITATIONS OF FNAC

- Cannot differentiate between follicular adenoma and carcinoma
- False positive results found in:
 - ➤ Hashimoto's thyroiditis
 - ➤ Graves's disease
 - >Toxic nodules

Computed Tomography/CT Scan

Recommendation:

CT scan should be performed when suspected lesion has become:

- ✓ Extrathyroidal
- ✓ Invades Laryngeal cartilages
- ✓ Laterally encroaching/involving neurovascular bundle
- ✓ Posteriorly invading prevertebral muscles and vertebra
- ✓ Pulmonary metastasis.



Recommendation:

MRI can be done in following situations:

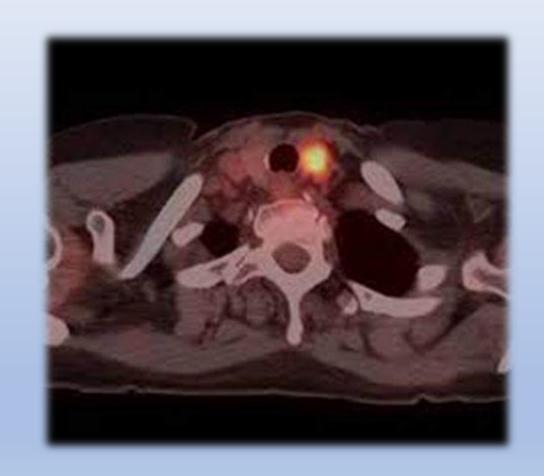
- ✓ To avoid iodine contrast
- √ To see involvement of strap muscles or other muscle
- ✓ Laterally, to see encroachment of vessels & Carotid wall invasion
- ✓ Better assessment of lateral neck for nodal metastasis and capsular breakdown

Positron Emission Tomography (PET) Scan

Indication of PET-Scan:

- ✓ Residual or recurrent thyroid cancer
- ✓ When elevated Thyroglobulin(TG)

 and Radio-iodine scan negative



Differentiated Thyroid Cancer Staging

STAGING (TNM)

□Tumor

- T1: Tumor 2 cm or less in greatest dimension limited to the thyroid
- **T2**: Tumor more than 2 cm, but not more than 4cm, in greatest dimension limited to the thyroid
- T3: Tumor more than 4 cm in greatest dimension limited to the thyroid.
- T4a: Tumor of any size extending beyond the thyroid capsule to invade subcutaneous soft tissue, larynx, trachea, esophagus or recurrent laryngeal nerve
- **T4b**: Tumor invades prevertebral fascia or encases carotid artery or mediastinal vessels

Differentiated Thyroid Cancer Staging

□Lymph nodes

- Nx: Regional lymph nodes cannot be assessed
- NO: No regional lymph node metastasis
- N1a: Metastasis in level VI (Pre-tracheal and para-tracheal, including pre-laryngeal and Delphian lymph nodes)
- N2a: Metastasis to unilateral, bilateral, or contralateral cervical or superior mediastinal lymph nodes.

□Metastasis

- M0: Clinically no distant metastasis
- M1: Distant metastasis clinically.

AGES Scoring System

(Age, Grade, Extrathyroidal invasion and Size)

Low Risk Group	High risk group
Young <40 years	Older >40 years
Well differentiated tumor	Poorly differentiated tumor
No metastasis	Distant metastasis
Small primary lesion (<4cm)	Large primary lesion (>4cm)

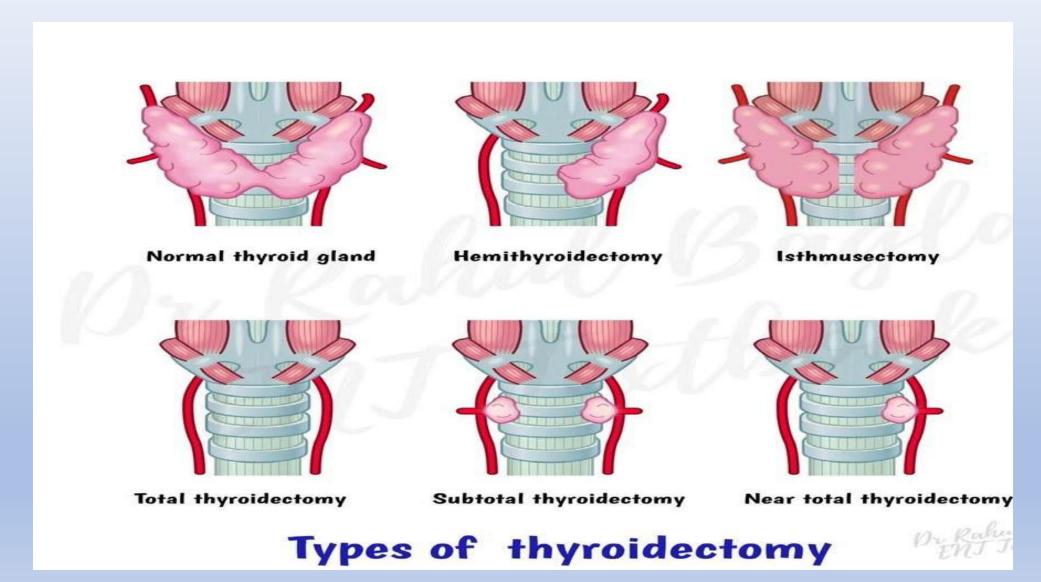
Management

- Surgery
- Radio iodine ablation
- Thyroxine supplementation
- Follow Up

Indications For Surgery

- Thyroid carcinoma
- Hyperthyroidism (Graves' disease, toxic multinodular goiter & toxic nodule)
- Large or symptomatic goiters
- Suspicious of malignancy (Thyroid nodule)
- Recurrent Thyroiditis
- Cosmetic purposes

Types Of Thyroidectomy



Surgical Management

Hemithyroidectomy:

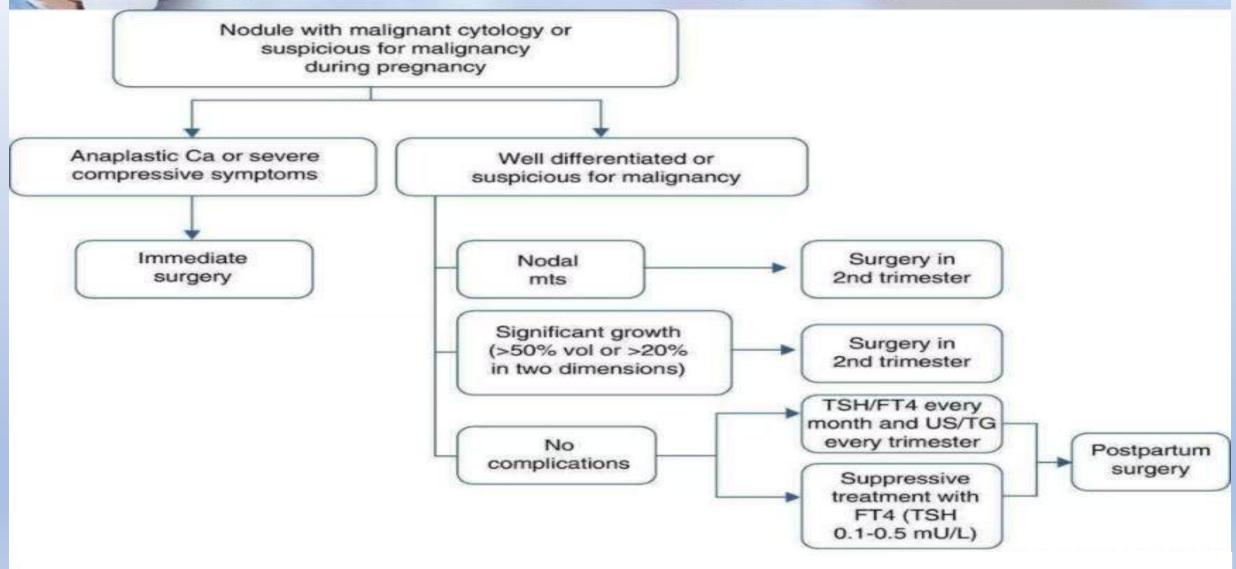
- ✓ Solitary toxic and non-toxic nodule
- √ Follicular adenoma
- ✓ Benign disease involving one lobe
- √Thyroid cancer (<1cm) without extrathyroidal extension and N0 in
 low-risk group
 </p>

Surgical Management (contd.)

Total-Thyroidectomy

- ✓ Thyroid cancer (>1cm) without extrathyroidal extension without clinical evidence of any lymph node metastasis (N0)
- √ Graves 'disease
- ✓ Toxic multinodular goiter (MNG)
- ✓ Large or symptomatic MNG (Euthyroid)

Thyroid Ca during pregnancy

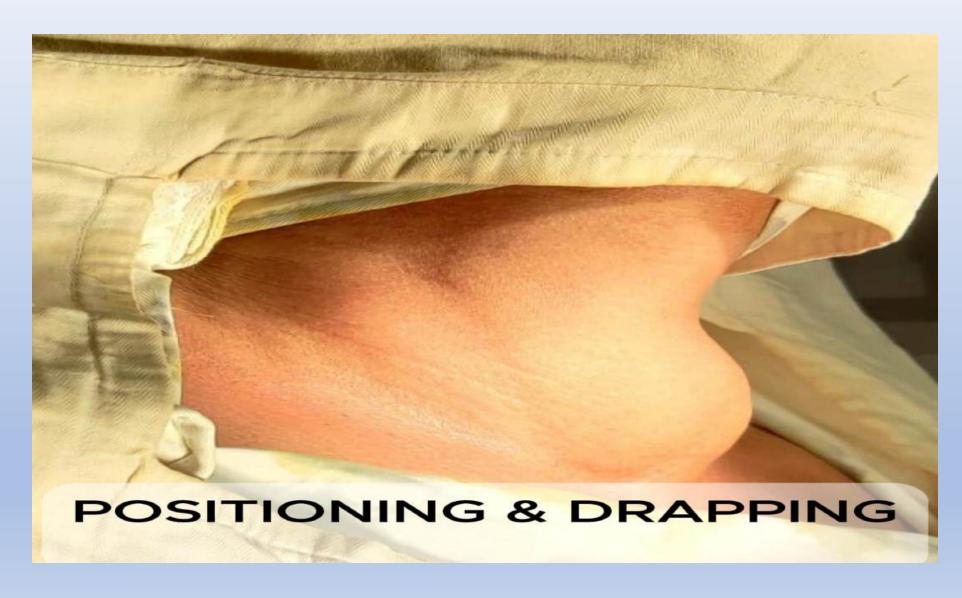


Management (contd.)

Radio Iodine Ablation:

- National Institute of Nuclear Medicine & Allied Sciences (NINMAS) suggest that patients after total thyroidectomy should be referred to them within one week of surgery for the convenience of scheduling for postsurgical evaluation and subsequent Radio iodine ablation. Patients should be kept without levothyroxine replacement.
- ➤ Radio iodine ablation is recommended after total thyroidectomy for Intermediate & High risk DTC patients.

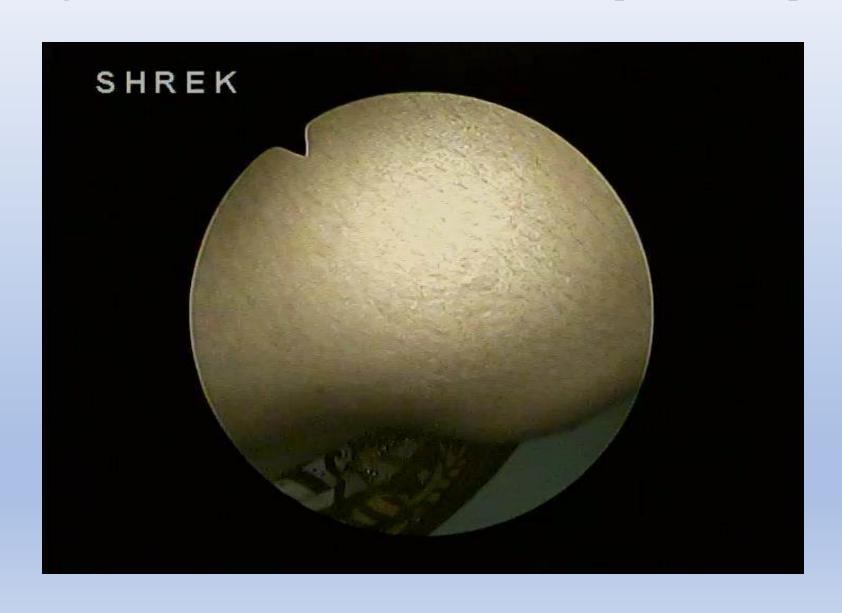
Thyroid Surgery Steps



Complications of Thyroidectomy

Early	Late
Recurrent laryngeal nerve palsy	Hypothyroidism
 External branch of superior 	Recurrent thyrotoxicosis
laryngeal nerve palsy	Progressive exophthalmos
Respiratory obstruction	Hypertrophic scar or keloid
Thyroid storm or crisis	
 Parathyroid insufficiency (Tetany) 	
Hemorrhage	
Wound infection	

Right Vocal cord palsy (Post.TT)



Hypocalcemic Tetany



Hypertrophic scar



Prevention of Complications

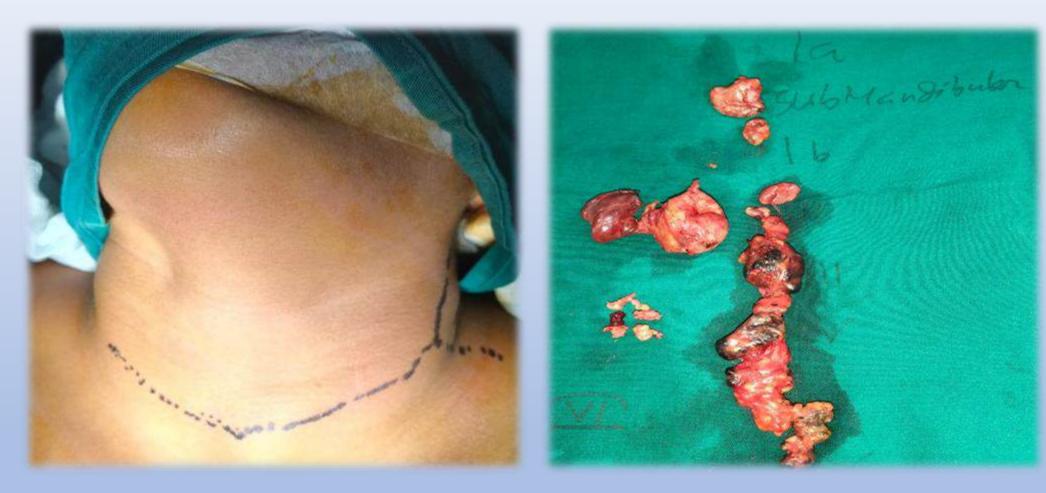
- Good anatomical knowledge
- Surgeon's Evaluation & Vocal Cord function
- Optimize medical conditions
- Identify & Preserve Recurrent Laryngeal nerve ,External branch of superior laryngeal nerve ,Parathyroid gland ,
- Use nerve monitor if available

Follow Up

- **1. Clinical Evaluation :** History & Physical Examination
- **2. Serum Biomarkers**
 - ➤ Thyroglobulin (TG)
 - ➤ Anti-Thyroglobulin Antibodies (TGAb)
 - ➤ S.TSH level

• **ii** 3. Imaging Tools

- ➤ Neck Ultrasound (USG)
- ➤ Radioiodine Whole-Body Scan (WBS)
- ➤ 18F-FDG PET/CT Scan
- ➤ Chest CT
- ➤ MRI or Bone Scan
- **4.** TSH Suppression Therapy Monitoring
 - ➤ Suppressive dose of Levothyroxine

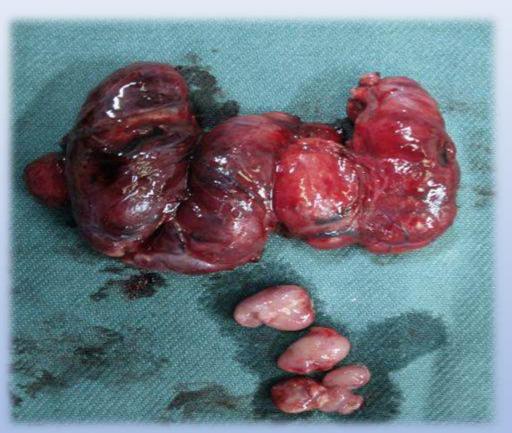


Total Thyroidectomy with Left Antero-lateral Neck dissection

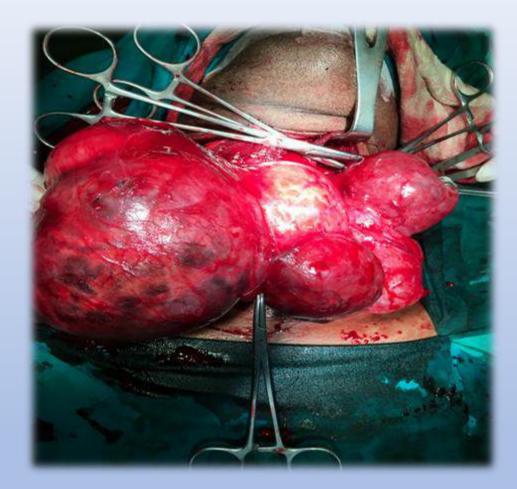


Total Thyroidectomy with Bilateral neck dissection with central clearance (Papillary carcinoma with bilateral neck nodes metastasis)





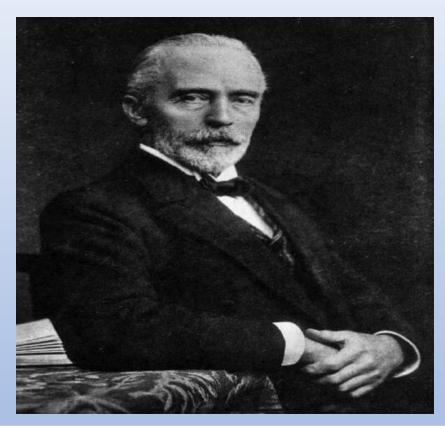
Total Thyroidectomy with central Neck dissection





Large Multinodular Goiter

Emil Theodor Kocher (25 August 1841 – 27 July 1917)





A Swiss Physician And Medical Researcher Who Received The 1909 Nobel Prize
In Physiology Or Medicine For His Work In The
Physiology, Pathology And Surgery Of The Thyroid

