Solitary thyroid nodule

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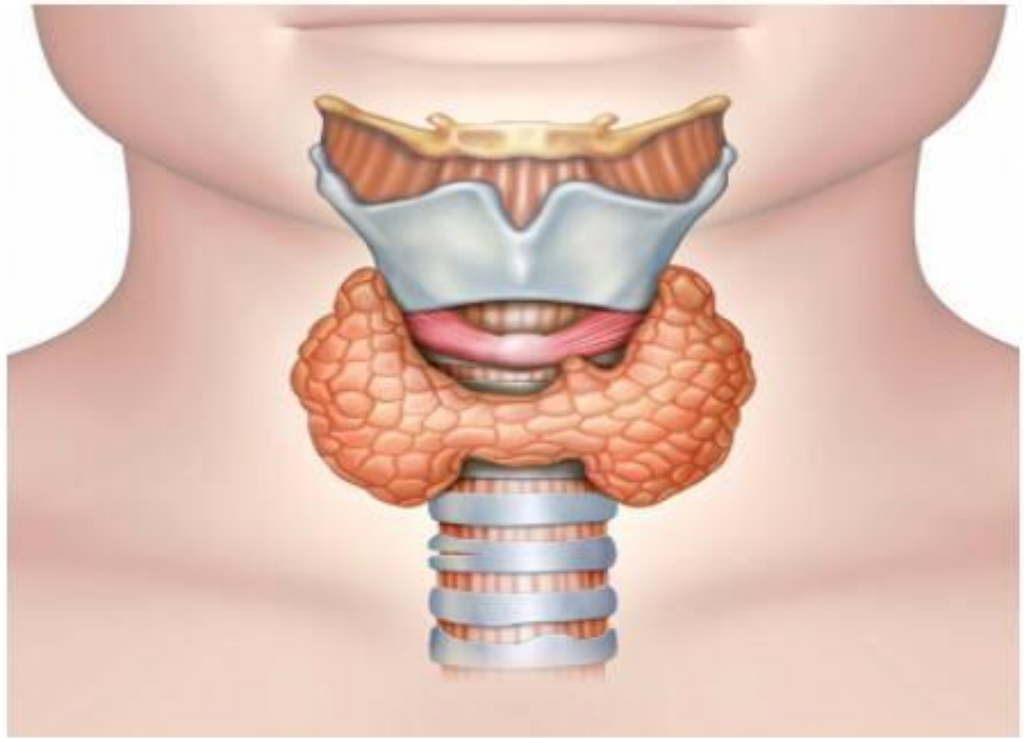
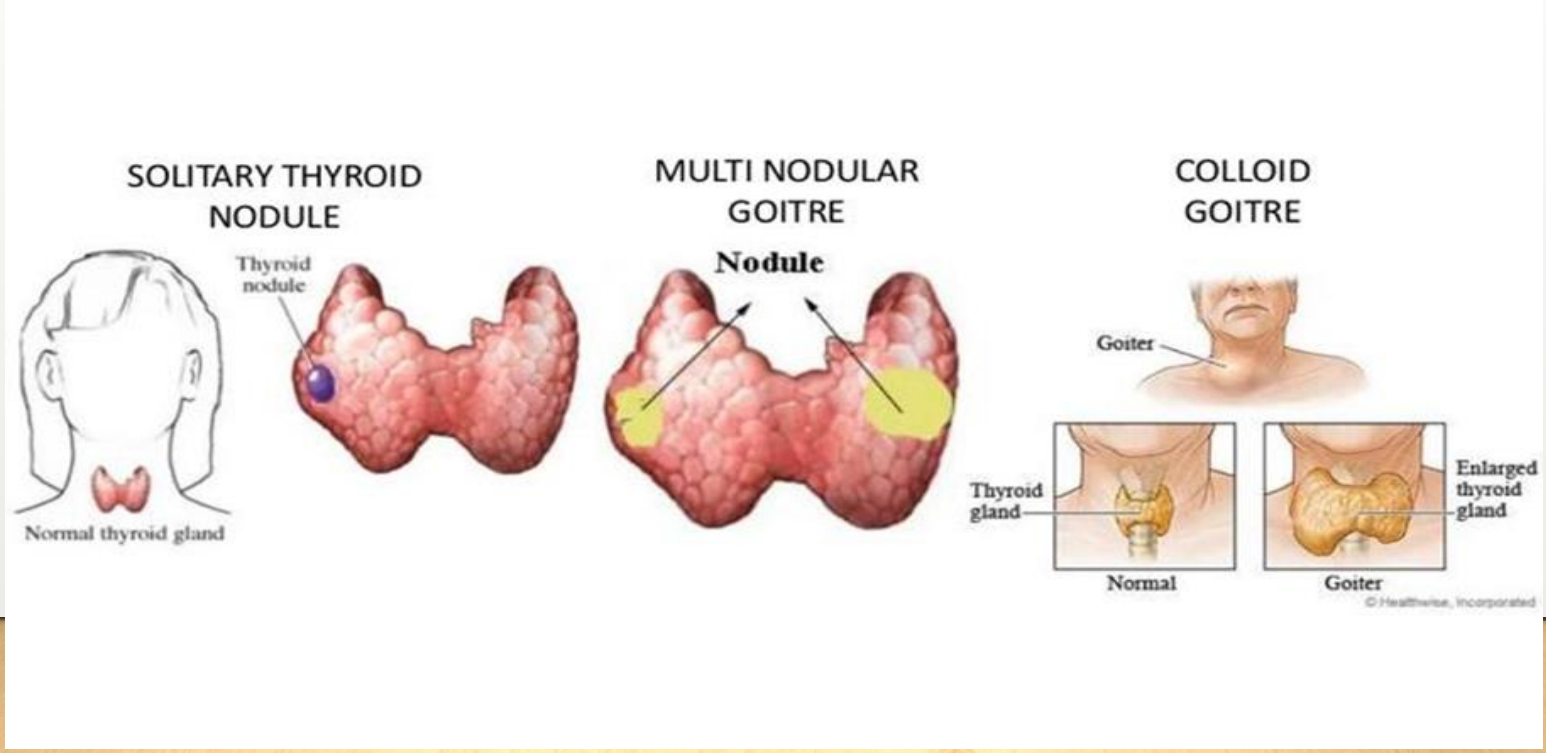
THYROID GLAND:

THE **THYROID GLAND** IS AN ENDOCRINE STRUCTURE LOCATED IN THE NECK. IT PLAYS A KEY ROLE IN REGULATING THE METABOLIC RATE OF THE BODY.



Solitary Thyroid Nodule

A discrete lesion/nodule, within the thyroid, that is palpably and/or radiologically distinct from the surrounding thyroid parenchyma.



- **Thyroid nodules are common, with up to 8% of the adult population having palpable nodules. With the use of ultrasound, up to 10 times more nodules are likely to be detected.**
- They are found in **4%– 8%** of adults by **palpation** and in **13%– 67%** when **ultrasound** detection is used. In **autopsy** studies, they have a prevalence of approximately 50% .(so thyroid nodules are common problem).
- The prevalence of thyroid nodules increases with age and women have a higher prevalence than men.
- **The primary aim in investigating a thyroid nodule is to exclude the possibility of malignancy, which occurs in about 5%of nodules.**
- **Thyroid nodule is considered as cold, warm, or hot. Cold thyroid nodule does not produce any hormone. Similarly thyroid nodule is considered warm or hot depending on amount of thyroid hormone secreted by thyroid tissue forming adenoma.**

CLINICAL EVALUATION:

- As with all assessments, **a thorough history and examination is required in patients who present with a thyroid nodule.**
- Most nodules are **asymptomatic** and are often discovered **incidentally** by the patient or their primary medical practitioner when being examined for another problem.
- With the increasing use of diagnostic imaging, thyroid nodules are not infrequently detected as an incidental finding on ultrasounds and computed tomography (CT) scanning.

History and Examination

- Regardless of the way in which thyroid nodules are discovered, a detailed patient history is requisite.

Information that needs to be ascertained includes:

- the presence of symptoms,
- a change in nodule size,
- previous head/neck radiation exposure,
- a family history of thyroid or endocrine diseases.

History and Examination

- The patient may report a history of **pain**, which may follow **hemorrhage** into a colloid nodule, or a sudden increase in the size of a neck lump, which would raise concern of malignancy.
- **Voice change or hoarseness** may also be a progressive symptom associated with an invasive tumor. Symptoms of **dysphagia**, **coughing**, **choking**, and **dyspnea** should be asked about.
- Exposure of the thyroid gland to ionizing radiation is known to contribute to a higher incidence of both benign and malignant thyroid nodules, with malignancy rates in a palpable nodule in a previously irradiated thyroid in the range of 20%–50%..

History and Examination

- Clinical examination of the thyroid should focus on whether the nodule is **solitary** or dominant in a multinodular goiter.
- The characteristics of the nodule, including **size**, **consistency** (e.g., soft, firm, woody, or hard), and **involvement with adjacent structures**, should also be defined.
- Examination of the cervical lymph nodes, should also be performed.

Common solitary thyroid condition:

- Simple goiter
- Nodular goiter
- Diffuse hyper plastic goiter
- Thyroid cyst
- Autonomous toxic nodule
- Granulomatous thyroiditis
- Follicular adenoma
- Malignant solitary nodule

simple goiter (nontoxic): is an anatomical enlargement of the thyroid gland. It can be related with thyroid dysfunction or have normal thyroid function.

Etiology of simple goiter:

1. THEY MAY ARISE AS A RESULT OF TSH STIMULATION OF THE THYROID GLAND, WHICH OCCURS AS A RESULT OF:

- ✓ INAPPROPRIATE SECRETION FROM A MICROADENOMA IN ANT PITUITARY (RARE)
- ✓ A CHRONIC LOW LEVEL OF THYROID HORMONES

2. ENDEMIC GOITER CAN DEVELOP AS A RESULT OF A LACK OF IODINE IN THE DIET.

3. SPORADIC GOITERS ARE COMMONLY CAUSED BY DEFECTIVE HORMONE SYNTHESIS

Nodular goiter:

- **Only one macroscopic nodule is occasionally found, but microscopic changes are present throughout the gland; this is one type of clinically solitary nodule.**
  - **Nodules can be colloid or cellular, and cystic degeneration and hemorrhage, as well as subsequent calcification, are common.**
  - **Nodules appear early in endemic goiter and later (between 20 and 30 years) in sporadic goiter, although the patient may be unaware of the goiter until his or her late 40s or 50s.**
- **More common in female than in the male**

Symptoms

1. Cosmetic deformity: the patient's main complaint is usually the cosmetic deformity or some respiratory obstruction.

2. Sudden enlargement: with the appearance of pain and tenderness usually results from hemorrhage into a nodule.

Complication

1. Tracheal obstruction by compression
2. Secondary thyrotoxicosis: may occur in up to 30% of cases.
3. Malignancy: Occasionally follicular carcinoma may develop 3%.
4. Cyst formation.
5. Calcification; may occur in longstanding cases.

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Autonomous toxic nodule

Toxicity is due to **a solitary, hyperactive, autonomous nodule**. results in excessive thyroid hormone production from a single nodule in the thyroid gland. The excess thyroid hormone production can no longer be controlled by the body thereby resulting in hyperthyroidism.

Pathology:

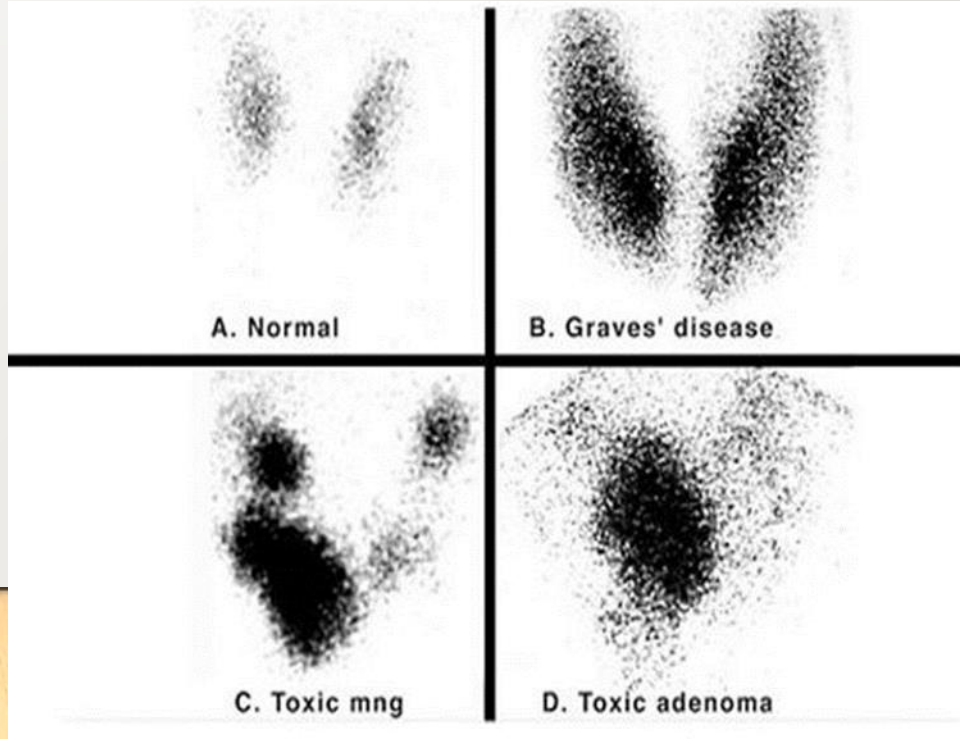
Hyperplasia of the acini with high columnar epithelium.

History:

Hyperthyroid symptoms.

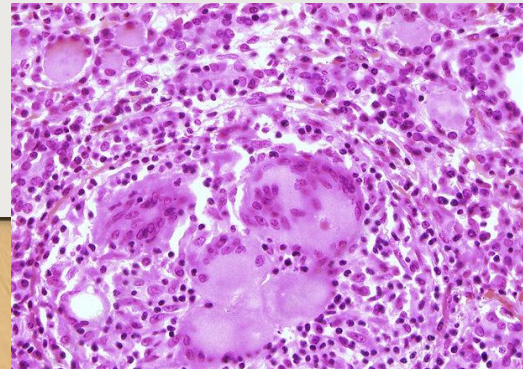
Physical examination:

Soft to firm, painless and bruit might be heard.



Granulomatous thyroiditis

- Also called "Subacute thyroiditis"
- Subacute granulomatous thyroiditis is a self-limited inflammation of the thyroid gland. It is associated with a triphasic clinical course that lasts for a few weeks to many months, characterized by transient thyrotoxicosis, hypothyroidism, and then a return to normal thyroid function in >90% of patients. The initial thyrotoxic phase is associated with thyroid pain, high serum thyroid hormone levels with a low radioiodine uptake, elevated ESR, elevated CRP, and a systemic illness similar to influenza, with fever, myalgia, and malaise.

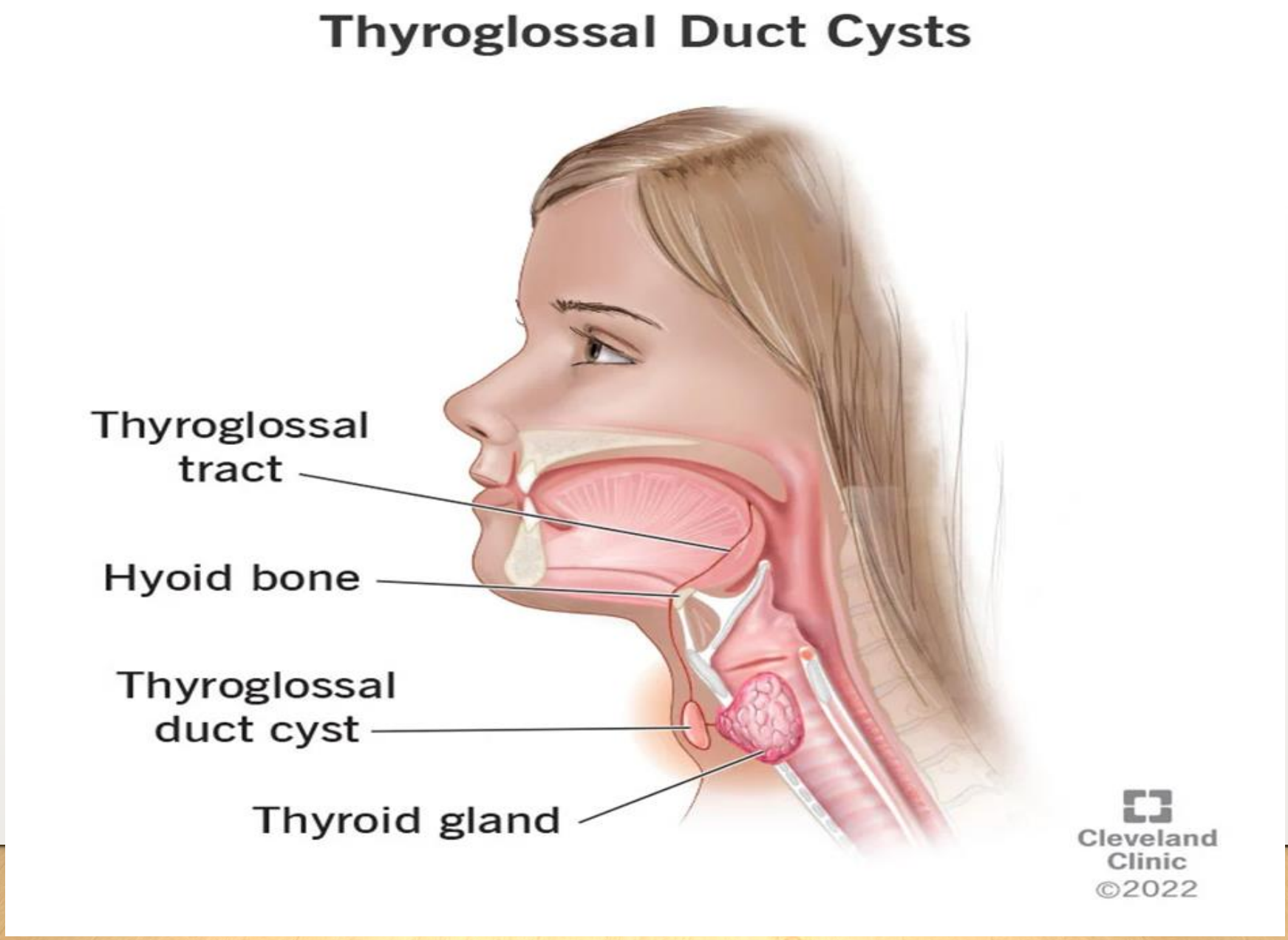


THYROGLOSSAL CYST:

IN THE EMBRYO, THE THYROID GLAND BEGINS DEVELOPMENT NEAR THE BASE OF THE TONGUE – IN AN AREA KNOWN AS THE **FORAMEN CECUM**. IT DESCENDS DURING DEVELOPMENT AND REACHES ITS DESTINATION IN THE ANTERIOR NECK BY WEEK 7.

THE DESCENT OF THE DEVELOPING THYROID GLAND FORMS THE **THYROGLOSSAL DUCT** – AN EPITHELIALIZED TRACT THAT CONNECTS THE GLAND TO ITS ORIGIN AT THE FORAMEN CECUM. IT USUALLY REGRESSES BY THE 10TH WEEK OF GESTATION BUT CAN PERSIST IN SOME INDIVIDUALS. IF IT FAILS TO REGRESS, THE DUCT CAN GIVE RISE TO CYSTS OR FISTULAE.

A **THYROGLOSSAL CYST** RESULTS FROM A BUILD-UP OF SECRETIONS WITHIN THE DUCT. IT TYPICALLY PRESENTS AS A MIDLINE LUMP IN THE ANTERIOR NECK WHICH RISES ON TONGUE PROTRUSION. IF LEFT UNTREATED, THIS CYST CAN BECOME INFECTED, AND FORM A CUTANEOUS FISTULA – DISCHARGING OUT ONTO THE SKIN OF THE ANTERIOR NECK.


Thyroglossal Duct Cysts
Thyroglossal tract
Hyoid bone
Thyroglossal duct cyst
Thyroid gland
Cleveland Clinic
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- Thyroglossal duct cysts can affect children and adults, but most cysts are found in children aged 10 and younger. These cysts are almost always benign — less than 1% of all thyroglossal duct cysts become cancerous. Adults are more likely than children to develop TDC cancer. Thyroglossal duct cysts are treated with surgery. Once removed, most thyroglossal cysts don't come back
- Most thyroglossal duct cysts don't cause serious medical problems. There are exceptions, though, including:
  - Very rarely, cysts become cancerous.
  - Some cysts cause dysphagia (problems swallowing food or liquid.)
  - Cysts can become infected. An infected cyst can hurt.
  - Thyroglossal cysts remain in place until they're removed with surgery.
- Treatment may include:
  - Antibiotic medication (to treat the infection)
  - Surgical removal of the cyst and the thyroglossal duct, called the Sistrunk procedure

- **Symptoms:**
- A small, soft, round mass in the center front of the neck
- Tenderness, redness, and swelling of the mass, if infected
- A small opening in the skin near the mass, with drainage of mucus from the cyst
- Difficulty swallowing or breathing
- Thyroglossal duct cysts can be felt through your skin. If you touch the cyst, it may feel soft, smooth and round, like a tiny ball of cookie dough.
- These cysts can swell and hurt if you or your child develops an upper respiratory tract infection that spreads to the cyst.
- Thyroglossal duct cysts can rupture, oozing fluid through your or your child's skin.
- These cysts can make it hard to swallow food or liquids.

Thyroglossal cyst

THYROID TUMORS:

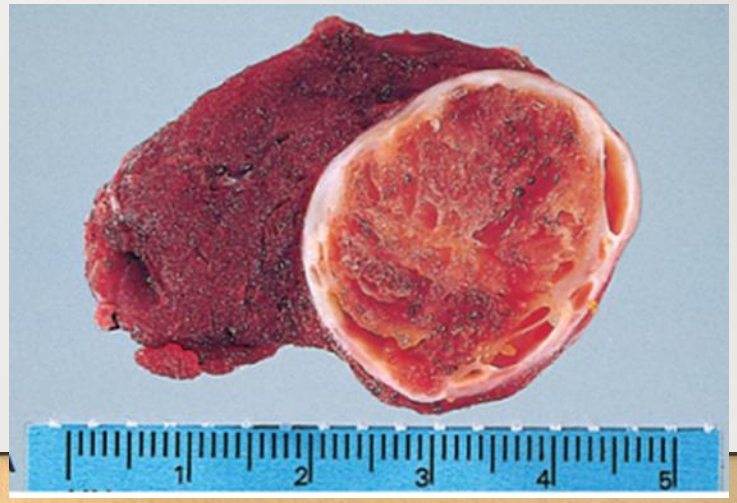
Benign	Malignant (from most common to least common)
1. Hashimoto's thyroiditis	1. Papillary thyroid carcinoma
2. Multinodular goiter (colloid adenoma)	2. Follicular thyroid carcinoma
3. Colloid cysts	3. Medullary thyroid carcinoma
4. Hemorrhagic cysts	4. Anaplastic thyroid cancer
5. Follicular adenoma	5. Primary lymphoma of thyroid
6. Hurthle cell adenoma	6. Metastases (melanoma, renal, colon, breast cancer)

- The thyroid gland gives rise to a variety of neoplasms, ranging from circumscribed, benign adenomas to highly aggressive, anaplastic carcinomas.
- Fortunately, most solitary nodules of the thyroid prove to be either **follicular adenomas** or **localized, non-neoplastic conditions** (e.g., a dominant nodule in multinodular goiter, simple cysts, or foci of thyroiditis).
- Carcinomas of the thyroid, by contrast, are **uncommon**, accounting for much less than 1% of solitary thyroid nodules.

Benign thyroid nodules

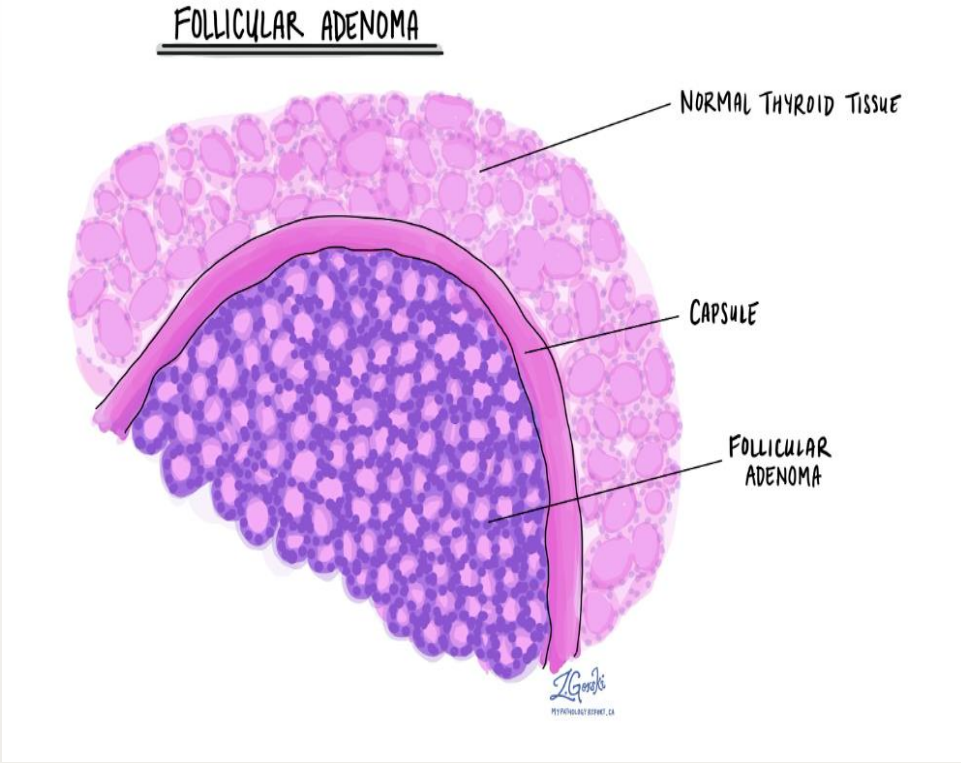
A follicular adenoma: is a non-cancerous thyroid tumor. The tumor is made up of the same kind of follicles found in the normal thyroid gland. The cells in a follicular adenoma are separated from the normal thyroid gland by a thine tissue barrier called a tumor capsule. Because the tumor is so well separated from the normal thyroid tissue, it usually forms a nodule that can be felt in the neck when the thyroid gland is examined. The nodule can also be seen when the thyroid gland is examined by ultrasound.

The typical thyroid adenoma is a solitary, spherical lesion that compresses the adjacent non-neoplastic thyroid.



The diagnosis of follicular adenoma can only be made after the entire tumor is removed and sent to a pathologist for examination. When viewed under the microscope, the cells in a follicular adenoma can look very similar to the cells in a type of thyroid cancer called follicular carcinoma. The only difference between a follicular adenoma and a follicular carcinoma is that all the abnormal cells in a follicular adenoma are separated from the normal thyroid gland by a thin tissue barrier called a tumor capsule.

Follicular adenoma :no infiltration of capsule and no infiltration of vascular and lymphatic vesseles unlike follicular carcinoma.



❖ Clinical presentation:

1. Are painless nodules, often discovered during a routine physical examination.
2. Larger masses may produce local symptoms such as difficulty in swallowing
3. As previously stated, persons with toxic adenomas can present with features of thyrotoxicosis.

❖Management:

Are removed surgically to exclude malignancy, are of an excellent prognosis as the neither recur nor metastasize

Malignant solitary nodules

- MOST THYROID CARCINOMAS (EXCEPT MEDULLARY CARCINOMAS) ARE DERIVED FROM THE THYROID FOLLICULAR EPITHELIUM, AND OF THESE, THE VAST MAJORITY ARE WELL-DIFFERENTIATED LESIONS
- FEMALE PREDOMINANCE IS HIGHER IN EARLY AND MIDDLE ADULT LIFE, HOWEVER, IN CHILDHOOD AND LATE ADULT LIFE THE PREDOMINANCE IS EQUALLY DISTRIBUTED BETWEEN BOTH GENDERS.
- METASTASES TO THE THYROID, MOST COMMONLY FROM KIDNEY AND BREAST, ARE RARE.
- LYMPH NODE AND BLOOD-BORNE METASTASES TO BONE AND LUNG OCCUR AND MAY BE THE MODE OF PRESENTATION

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Findings that raise suspicion for malignancy

1. Hx of previous irradiation
2. Young and elderly patients
3. Family hx of MEN2
4. Recent onset and rapid growth
5. Painless, hard, irregular nodule with limited mobility
6. Local invasion or lymphatic or blood-borne metastases

Investigations

Investigation of thyroid

1- THYROID FUNCTION TEST (TFT)

2- RADIOISOTOPS SCAN

3- ULTRASOUND

4- FINE NEEDLE ASPIRATION BIOPSY (FNA)

TFT

Thyroid function tests: will direct further approach and should precede consideration of imaging studies and FNA biopsy.

Most patients with thyroid nodules are euthyroid.

Patients with a low TSH level (toxic nodules) should be considered for radioisotope scan.

Patient with high TSH level check for Hashimoto's disease antibodies (anti TPO)

Ultrasonography:

is helpful for detecting non-palpable thyroid nodules, differentiating solid from cystic nodules, identifying adjacent lymphadenopathy and differentiating single from multiple nodule

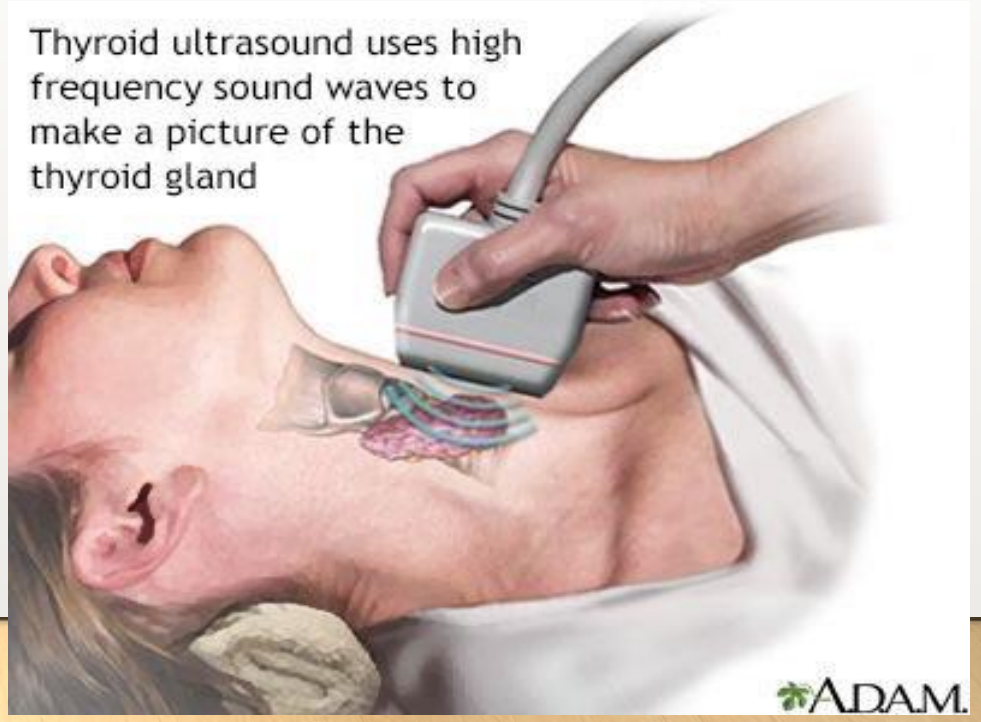
- All patients who present with a thyroid nodule should undergo ultrasound evaluation.

Advantages :

- Unexpansive
- Available
- Noninvasive

We determine:

- Nodular size
- If there is any suggestive of malignancy



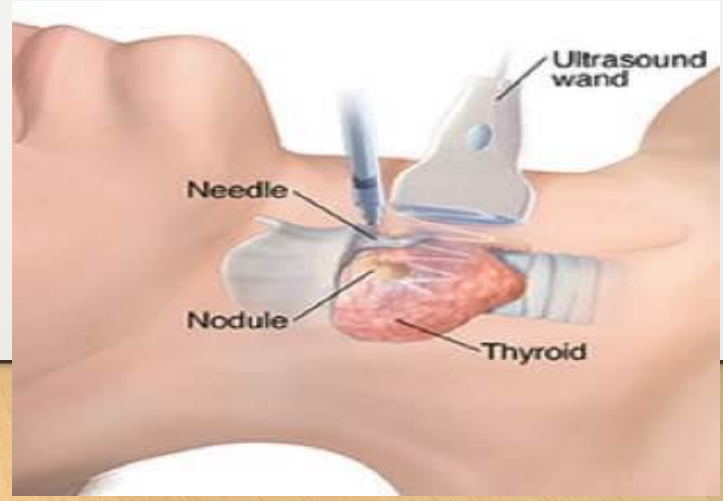
Fine needle aspiration biopsy :

A test of choice for initial evaluation of a thyroid nodule – often combined with ultrasound guidance for better diagnostic utility

This is the only test that can reliably differentiate between benign and malignant nodule and has a sensitivity of 95% and a specificity of 95%

Reliability depend on: Operator, Cytopathologist, and the specimen should be enough . have 5% false negative , and should follow up with periodic FNA if thyroid nodularity persists

FNA IS RELIABLE for all cancer except follicular



Complications : Local discomfort, Hematomas, Infection

Surgery

Indication for surgery

1- As therapy for patients with thyrotoxicosis .

2- To treat benign and malignant thyroid tumors .

3- for suspicious cyst and toxic adenoma

3- To relive pressure symptoms such as (dyspnea , Dysphagia) .

4- Cosmetic purpose.

5- To establish a definitive diagnosis of a mass in the thyroid gland , especially when cytological results are indeterminate

Procedures

- Total thyroidectomy: complete removal of all visible thyroid tissue.
- Hemithyroidectomy: remove one lobe + isthmus.
- Dunhill procedure or Near-total thyroidectomy: complete dissection on one side leaving a remnant of thyroid tissue laterally on the contralateral side. (2 grams)
- Subtotal thyroidectomy: leaves a rim of thyroid tissue bilaterally.

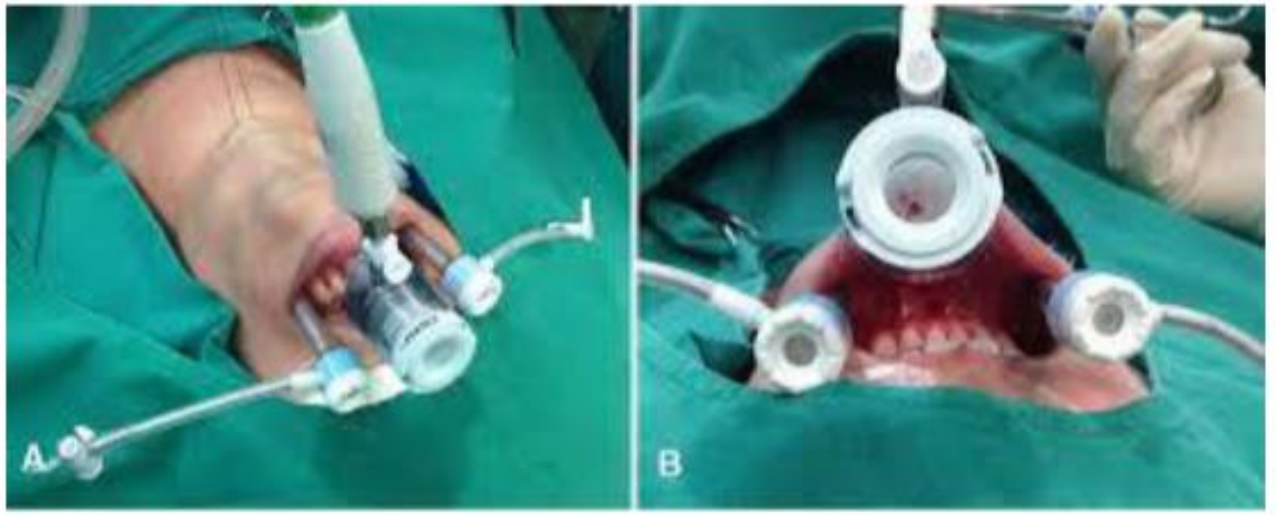
(4 grams each side)

- Trans-oral Endoscopic thyroidectomy :

-It is a recent scarless thyroidectomy .

-Under general anesthesia with the patient supine & the neck hyper-extended .

-Through incisions in the lower lip , the instruments are introduced deep to the platysma .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- In patients with low risk factors & Benign nodules :
  - Hemithyroidectomy .

- In patients with high risk factors & Benign nodules :
  - Near-total or Total thyroidectomy .

- In Patients with Malignant nodules :
  - Near-total or Total thyroidectomy .

- In Patients with Medullary thyroid Carcinoma :
  - Total thyroidectomy + cervical clearance (central and bilateral LNs).

- **In Patients with anaplastic carcinoma :**
- Resection is rarely possible but surgery can relieve tracheal compression.
- Radiotherapy and chemotherapy are of marginal value
- Tracheostomy.

- **In Patients with Malignant lymphoma :**
- -if it is confined to the thyroid alone, it may be treated by thyroid lobectomy with subsequent adjuvant radiotherapy and chemotherapy; otherwise it is treated by chemoradiation alone.

- Cyst : aspirate and follow up every 3 months .

- Recurrent cyst after 3 attempts of aspiration ,

Large cyst >3-4cm and complex cysts with solid and cystic components : unilateral thyroid lobectomy.

Complication of surgery

1- Hemorrhage

2- Damage to the external branch of the superior laryngeal nerve.

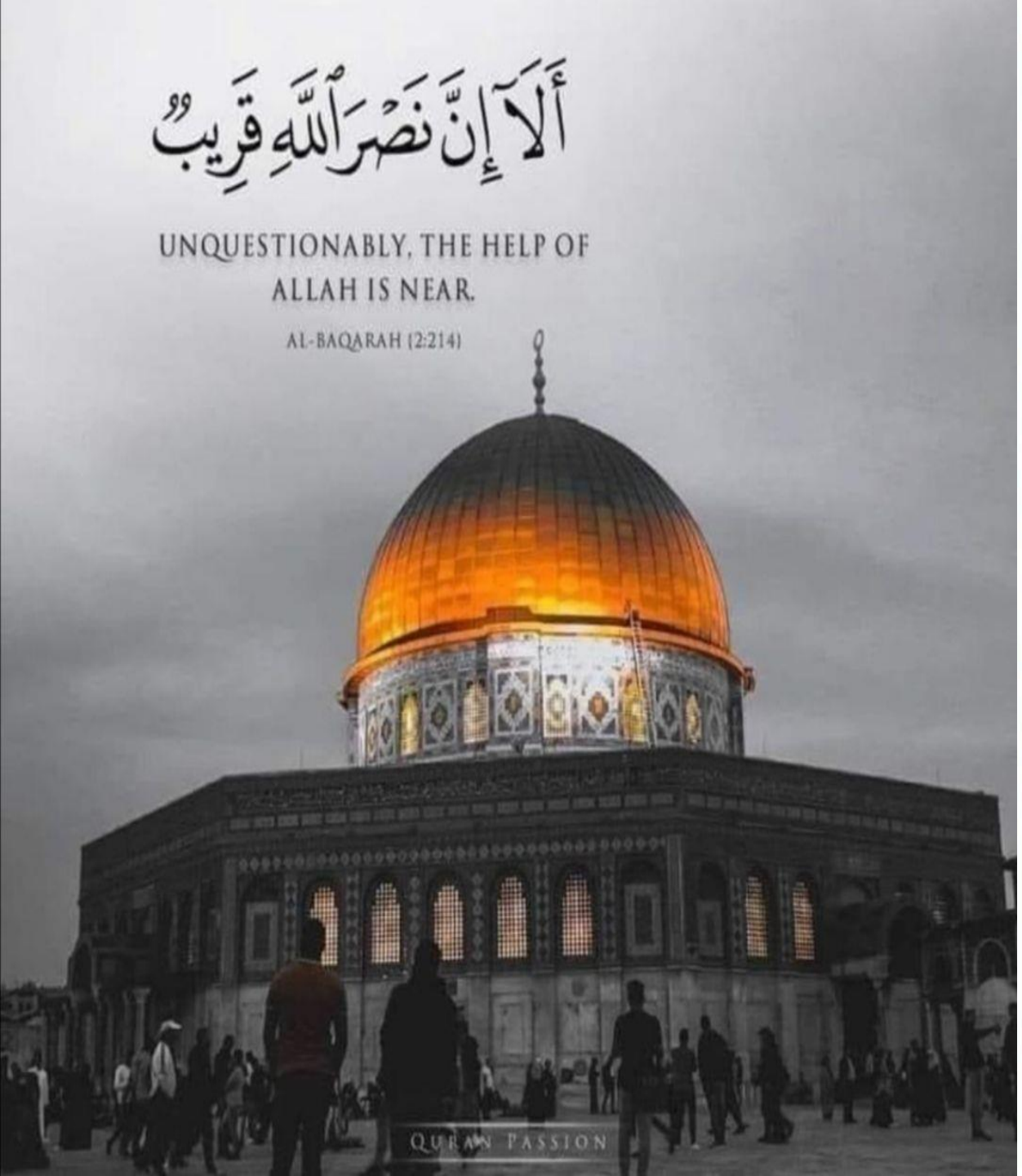
3- Damage to the recurrent laryngeal nerve.

4- Hypothyroidism. (within 2-3 weeks)

5- Hypoparathyroidism.

6- Respiratory obstruction

7- Thyroid crisis (in surgery or immediately after it)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