THE THYROID GLAND

Chapter 22

1

OBJECTIVES:

Upon completion of this presentation, students will be able to:

- Identify the embryology of the thyroid gland.
- Describe the normal anatomy and physiology of the thyroid gland, as well as relational anatomy.
- Discuss laboratory values and clinical findings .
- Describe the indications and sonographic examination of the thyroid.
- Identify lymph node levels and the significance of lymph node mapping.
- Recognize thyroid pathologic conditions and their sonographic appearances.

2

EMBRYOLOGY

- First endocrine gland to develop
- Develops at the floor of the primitive larynx at the same location as the base of the tongue and migrates inferiorly along the anterior neck to the lower neck anterior to the trachea.
- Migration may leave behind embryonic remnants or ectopic thyroid tissue that should atrophy but can form developmental cysts

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ANATOMY OF THE THYROID GLAND

- Located in anteroinferior neck at level of thyroid cartilage (Adam's apple area)
- "H" or "U" shape
- Right and left lobe
- Connected by isthmus-straddles trachea anteriorly
- Rt and lt lobes bounded laterally by carotid arteries and jugular veins

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ANATOMIC VARIATIONS

- Pyramidal lobe- arises from caudal portion of thyroglossal tract, small and usually cephalic extension of isthmus
  - arising from lt >rt lobe
  - seen in 15-30% of patients
  - most commonly seen in peds patients and atrophies with age
- Absence of thyroid
- Absence of an isthmus
- Absence of 1 lobe
- Continuation from 1 lobe to the other, obliterating the isthmus

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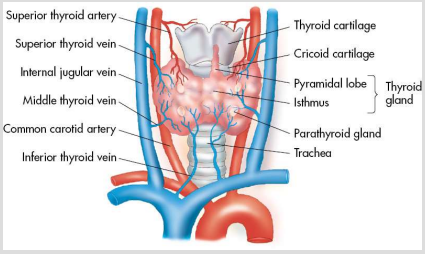
ANATOMY OF THE THYROID GLAND



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SIZE

*Largest endocrine gland

- Females have slightly larger gland than males
- Lobes normally equal in size
- Children- 20-30mm (SAG) x 12-15mm (AP) x 10-15mm (TRV)
- Adults- 40-60mm (SAG) x 20-30mm (AP) x 15- 20mm (TRV)
- Isthmus- 4-6mm (AP)

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VOLUME

- Common method to calculate the thyroid volume is based on the ellipsoid formula with a correction factor (length x width x thickness x 0.52 for each lobe)
- Normal mean thyroid volume is 18.6 ± 4.5 ml
- Volume in males is slightly larger than in females

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RELATIONAL ANATOMY

ANTERIOR

- Anterior surface: Strap muscles, including sternothyroid, omohyoid, sternohyoid, and sternocleidomastoid muscles
- Sternohyoid and omohyoid muscles: Thin, hypoechoic bands anterior to gland
- Sternocleidomastoid muscle: Larger oval band that lies anterior and lateral to gland

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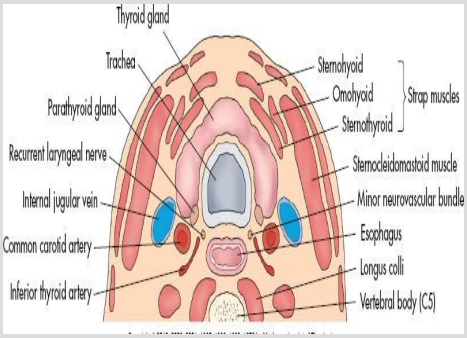

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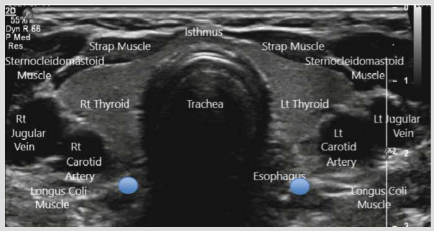
RELATIONAL ANATOMY



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RELATIONAL ANATOMY (CONT'D)

POSTERIOR

- Posterolateral anatomy: Common carotid artery, internal jugular vein, vagus nerve
- Longus colli muscle: Posterior and lateral to lobes, hypoechoic triangular structure adjacent to cervical vertebrae

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RELATIONAL ANATOMY (CONT'D)

MEDIAL

- Medial anatomy: larynx, trachea, inferior constrictor of pharynx, esophagus
- Esophagus found to left of trachea-identified by target appearance in transverse plane and by its peristaltic movements when patient swallows.
- Posterior border of each lobe related to superior and inferior parathyroid glands and anastomosis between superior and inferior thyroid arteries

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BLOOD SUPPLY

- Two superior thyroid arteries (rt and lt) arise from external carotids and descend to upper poles
- Two inferior thyroid arteries (rt and lt) arise from thyrocervical trunk of subclavian artery and ascend to lower poles
- Doppler peak systolic velocities reach 20 to 40 cm/sec in major thyroid arteries and 15 to 30 cm/sec in intraparenchymal arteries
- Corresponding superior thyroid veins drain into internal jugular veins
- Inferior thyroid veins drain into innominate vein

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PHYSIOLOGY AND LABS

- Maintains normal body metabolism, growth, and development by synthesis, storage, and secretion of thyroid hormones
- Mechanism for producing thyroid hormones is iodine metabolism

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PHYSIOLOGY AND LABS (CONT'D)

- Thyroid traps iodine from blood and through series of chemical reactions; thyroidglobulin is a protein made by the thyroid that produces thyroid hormones triiodothyronine (T_3) and thyroxine (T_4)
- Thyroid hormone released into bloodstream by action of thyrotropin, or thyroid-stimulating hormone (TSH), produced by pituitary gland
- Secretion of TSH regulated by thyrotropin-releasing hormone (TRH), produced by the hypothalamus

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PHYSIOLOGY AND LABS (CONT'D)

- Calcitonin decreases concentration of calcium in blood by first acting on bone to inhibit its breakdown
- Calcitonin helps to maintain homeostasis of blood calcium
- When thyroid is producing correct amount of thyroid hormone, considered to be normal, or euthyroid

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HYPOTHYROIDISM

- Undersecretion of thyroid hormones
- May be caused by:
  - low intake of iodine (goiter) in body
  - inability of thyroid to produce proper amount of thyroid hormone
  - problem in pituitary gland that doesn't control thyroid production
  - Hashimoto's thyroiditis (75%)
  - medications
  - radiation exposure to head or neck
- Signs and symptoms of hypothyroidism include:
  - myxedema
  - weight gain
  - hair loss
  - increased subcutaneous tissue around eyes
  - lethargy
  - intellectual and motor slowing
  - cold intolerance
  - constipation
  - deep, husky voice

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HYPERTHYROIDISM

Caused by:

- over secretion of thyroid hormones
- when entire gland is out of control or if localized neoplasm (such as adenoma) causes overproduction of thyroid hormone
- Grave's disease
- Clinical signs include:
  - increased metabolic rate
  - weight loss
  - increased appetite
  - nervous energy
  - irritability
  - tremors
  - excessive sweating
  - heat intolerance
  - palpitations
  - exophthalmos (protruding eyes)

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THYROID FUNCTION TESTS

- Nuclear medicine used to determine function of thyroid: iodine uptake scan and thyroid scan
- Laboratory tests for thyroid measure amount of:
  - $-T_3$ or T_4
  - -TSH

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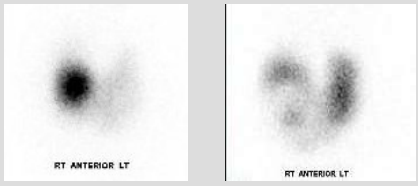
THYROID FUNCTION TESTS



Nuclear medicine used to determine function of thyroid: iodine uptake scan and thyroid scan

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INDICATIONS FOR A THYROID ULTRASOUND

- Palpable enlargement
- Abnormal labs (T3, T4, TSH)
- Palpable mass in neck/thyroid
- Swelling/asymmetry in neck
- Redness or tenderness in neck
- Hypercalcemia
- Post-thyroidectomy

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SONOGRAPHIC EVALUATION OF THE THYROID GLAND

- Patient placed in supine position with pillow under both shoulders to provide moderate hyperextension of neck.
- High-frequency (7.5- to 15-MHz) linear-array transducer should be used.

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SONOGRAPHIC EVALUATION OF THE THYROID: SAGITTAL

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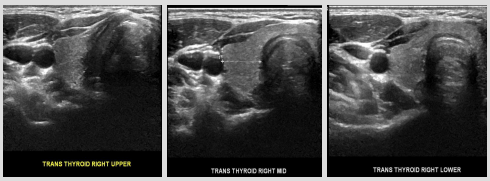
SONOGRAPHIC EVALUATION OF THE THYROID: TRANSVERSE



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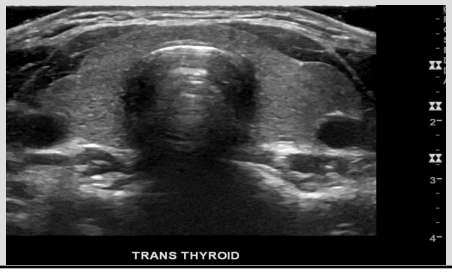
Sonographic Evaluation of the Thyroid



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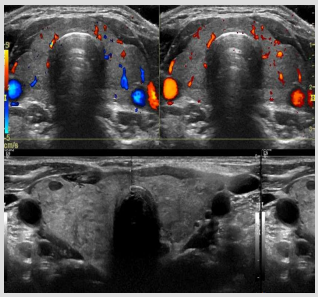
Sonographic Evaluation of the Thyroid



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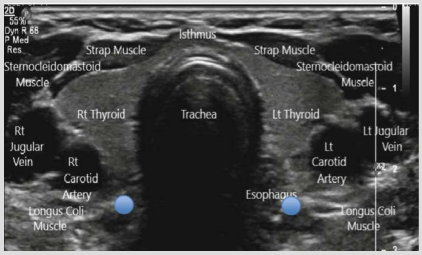
Sonographic Evaluation of the Thyroid



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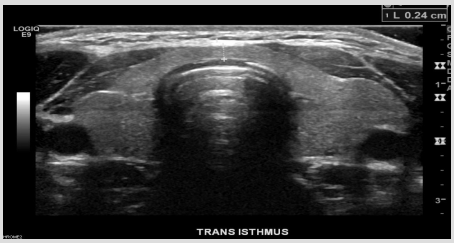
Sonographic Evaluation of the Isthmus



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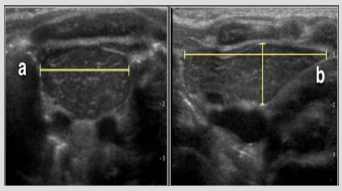
Thyroid Measurements



https://radiologyassistant.nl/pediatrics/normal-values/normal-values-ultrasound

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THYROID PROTOCOL

https://youtu.be/53IyqKhlu_Q?si=0XxJI3VT_SSnklBf

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THYROID PATHOLOGY

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ROLE OF ULTRASOUND

- Detect presence of nodules
- Characterize nodules
  - -cystic, solid, mixed
  - -size
  - -location
- Aspiration or biopsy guidance

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THYROID NODULES

- Variable gland enlargement
- Causes:
  - Thyroiditis (ill-defined nodular areas)
  - Nodular hyperplasia
  - Multinodular goiter
  - Adenomatous hyperplasia
  - Neoplasm (benign or malignant)
  - Hashimoto's thyroiditis (micronodules)

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SONOGRAPHIC FINDINGS

- Diffuse enlargement
- Hypoechoic, heterogeneous, without palpable nodules
- Markedly increased vascularity
  -increased PSV in inferior thyroidal artery

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HYPERPLASIA AND GOITER

- Nodular hyperplasia, multinodular goiter, and adenomatous hyperplasia are terms used to describe goiter

*Most common thyroid abnormality

- Caused by iodine deficiency

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MULTINODULAR GOITER (MNG)

- Enlargement of thyroid gland
- Due to compensatory hypertrophy and hyperplasia of follicular epithelium caused by derangement that hampers hormone secretion
- May become very large, compressing esophagus and interfering with swallowing, or cause pressure on trachea
- Other causes of goiter:
  - Graves' disease
  - thyroiditis
  - neoplasm
  - cyst

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MNG (CONT'D)

- Toxic goiter:
  -Hyperthyroid condition resulting from hyperactivity of thyroid gland
- Nontoxic (simple) goiter occurs as diffuse thyroid enlargement not resulting from neoplasm or inflammation
  - not initially associated with hypothyroidism or hyperthyroidism

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MNG (CONT'D)

- Clinical signs:
  - hypermetabolism
  - diffuse toxic goiter
  - exophthalmos
  - cutaneous formations
    - Periorbital
    - Dorsum of feet
- Cause:
  - autoimmune

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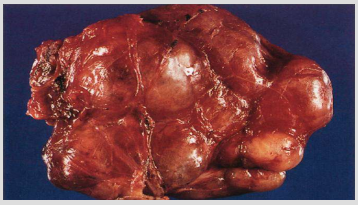
MULTINODULAR GOITER



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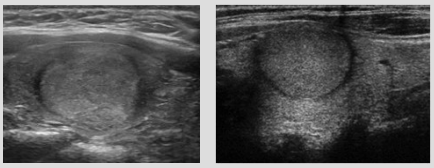
MNG



Nodules may present as poorly circumscribed or well defined and encapsulated by a thin, peripheral hypoechoic halo due to surrounding compressed tissue and should be documented.

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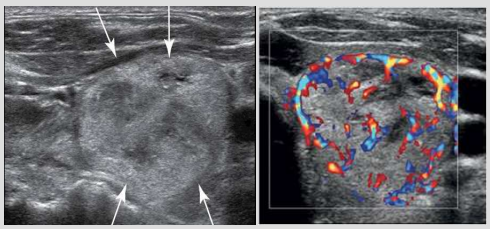
MNG



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MNG (CONT'D)

Sonographic Findings:

- Diffuse enlargement
- Most hyperplastic or adenomatous nodules isoechoic compared to normal thyroid tissue
- As gland enlarges, may become hyperechoic
- Focal scarring and ischemia, as well as necrosis and cyst formation
- Fibrosis or calcifications
- Increased vascularity- "thyroid inferno"
  - increased PSV in inferior thyroid artery

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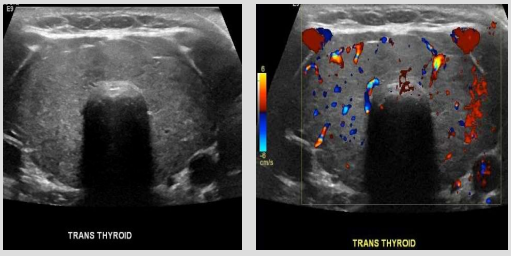
MULTINODULAR GOITER



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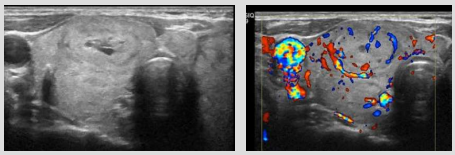
MNG



Multinodular goiter is seen as an inhomogeneous enlarged tissue mass within the thyroid gland. Increased vascularity is also seen.

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THYROID CYST

- Cystic degeneration of follicular adenoma

Sonographic Findings:
- Degenerative changes of nodules correspond to their sonographic appearance
- Purely anechoic areas - from serous or colloid fluid, echogenic fluid, or moving fluid, with posterior enhancement
  -if see fluid levels, corresponds to hemorrhage
- Approx. 20% of solitary nodules are cystic

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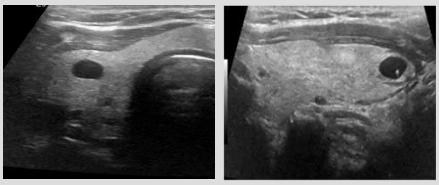
THYROID CYST



Left: Anechoic cyst within the thyroid gland. Right: Colloid cyst with echogenic focus.

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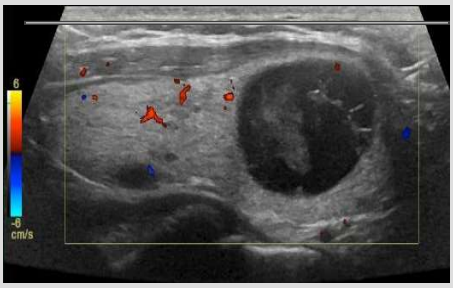

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ADENOMA

- Benign thyroid neoplasm characterized by complete fibrous encapsulation

*70% of solitary nodules

- More common in females (7:1)
- Characterized by compression of adjacent tissue and fibrous encapsulation
- Homogeneous with variable size
- Usually lesion solitary with areas of hemorrhage or necrosis

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ADENOMA

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ADENOMA (CONT'D)

Sonographic Findings:

- Anechoic to completely hyperechoic; commonly have peripheral halo
- Halo, or thin echolucent rim surrounding lesion, is edema of compressed normal thyroid tissue or capsule of adenoma
- Hyperfunction of adenoma can exhibit increased blood flow patterns as seen on Doppler along peripheral borders or within lesion

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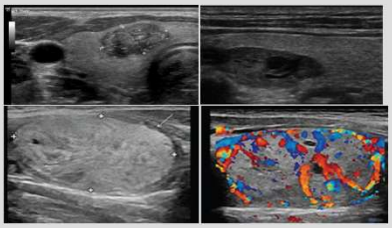
ADENOMA



Adenomas have a broad spectrum of sonographic appearances. They are most often solitary, homogeneous, and variable in size and range in echogenicity from anechoic, hypoechoic, isoechoic, to hyperechoic with the presence of a thin hypoechoic rim or halo.

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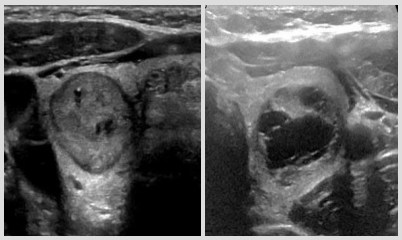
ADENOMA



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THYROID IMAGING REPORTING & DATA SYSTEM (TI-RADS)

- standardized reporting and description system of thyroid nodules created by American College of Radiology (ACR)
- Prevents:
  - Unnecessary follow-up
  - Further imaging
  - Biopsies
- Nodules are placed within 5 levels (TR1- TR5) based on 5 ultrasound features:
  - composition
  - echogenicity
  - shape
  - margin
  - punctate echogenic foci

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TI- RADS (CONT'D)

- Each feature is assigned a point, the more points assigned, the higher the risk of malignancy
- Sum of all points results in TI-RADS of 0-7 or more
- Highest level is TR5- considered highly suspicious for malignancy
- Most worrisome nodules contain punctate echogenic foci, are hypoechoic, taller than wide, irregular margins that may extend beyond normal thyroid margins

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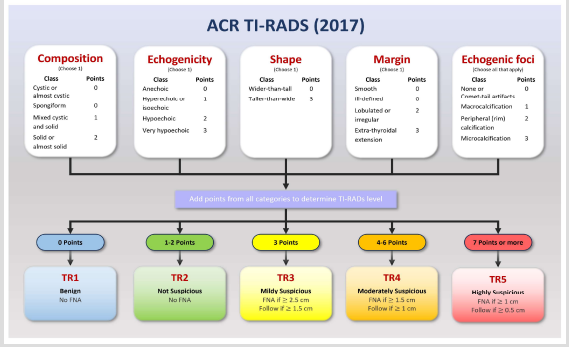

https://www.mdpi.com/1424-8220/23/16/7289

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MALIGNANT LESIONS

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MALIGNANT LESIONS

- Carcinoma of thyroid is rare
- Slow-growing, not a frequent cause of death
- Female to male ratio is 2:1
- Solitary nodule may be malignant in small percentage of cases, but risk of malignancy decreases with presence of multiple nodules

*Solitary thyroid nodule in presence of cervical adenopathy on same side suggests malignancy

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MALIGNANT LESIONS (CONT'D)

- Clinical findings:
  - Painless, palpable, hard, firm, solitary nodule
  - If more advanced- compression of adjacent structures may cause hoarseness, cough, dysphagia, or dyspnea

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MALIGNANT LESIONS (CONT'D)

Sonographic Findings:

- Neoplasm can be of any size, single or multiple
- Usually solid, but may be partially cystic, or largely cystic mass
- Usually hypoechoic relative to normal thyroid
- Irregular or microlobulated margins, taller than wide, may have shadowing

* Microcalcifications are present in 50% to 80% of all types of thyroid carcinoma

- Increased vascularity may be present

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PAPILLARY CARCINOMA

*Most common thyroid malignancy

- Females more than males
- Round, laminated, tiny calcifications seen in 25% of cases, called psammoma bodies
- May have macrocalcifications
- Major route of spread of papillary carcinoma is through lymphatics to nearby cervical lymph nodes
- Approx. 20% of patients with papillary thyroid cancer have metastatic cervical adenopathy

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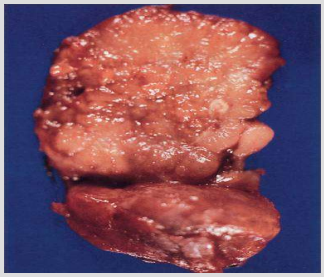
PAPILLARY CARCINOMA



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PAPILLARY CARCINOMA (CONT'D)

Sonographic Findings:

- Hypoechoic (90% of cases), predominantly soild
- Microcalcifications that appear as tiny, punctate hyperechoic foci (with or without acoustic shadowing)
- Taller than wide
- Hypervascularity (90% of cases)
- Cervical lymph node metastasis (approx. 20% of cases)

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PAPILLARY CARCINOMA (CONT'D)

- Clinical signs:
  - Asymptomatic
  - Painless lump in neck
  - Rapidly growing lump in neck
  - Hashimoto's thyroiditis (more than 90% of cases)

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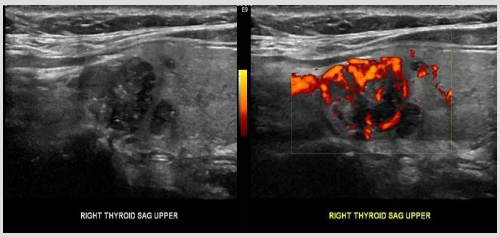
PAPILLARY CARCINOMA



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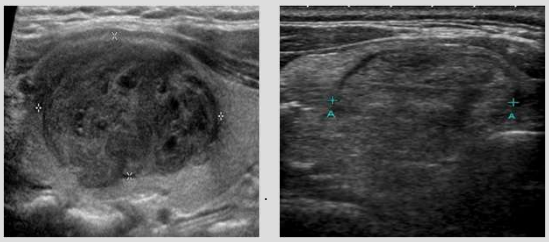
PAPILLARY CARCINOMA



Sonographic characteristics of papillary carcinoma include solid texture with marked hypoechogenicity when compared with strap muscles

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FOLLICULAR CARCINOMA

- Second most common type of thyroid cancer (10-20%)
- 2 types:
1. Minimally invasive- well encapsulated, demonstration of focal invasion of capsular blood vessels of fibrous capsule permits differentiation from follicular adenoma
2. Widely invasive type (not encapsulated)- will demonstrate invasion of tumor blood vessels into adjacent thyroid tissue
- Spreads through the bloodstream rather than lymphatic system to bone, lung, brain, and liver
- Lymph node involvement less common (10%)

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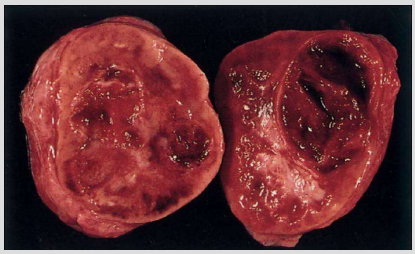
FOLLICULAR CARCINOMA



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FOLLICULAR CARCINOMA (CONT'D)

Sonographic Findings:

- Irregular margins with thick irregular halo
- Nodular enlargement and tortuous internal blood vessels characteristic, but not specific for follicular carcinoma

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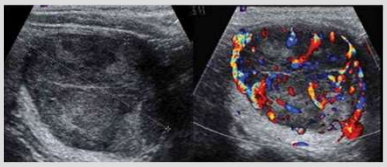
FOLLICULAR CARCINOMA



Sonographic features are similar to benign follicular adenoma, but malignancy should be suspected with presence of thick irregular halo and tortuous internal blood vessels with increased vascularity with color or power Doppler.

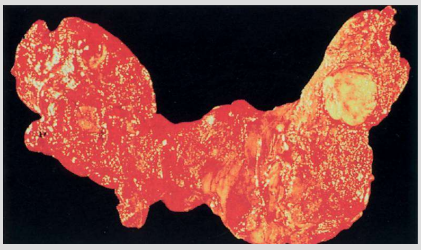
70

MEDULLARY CARCINOMA

- Accounts for 5% of thyroid cancers
- Often familial (20%) and essential component of multiple endocrine neoplasia (MEN) type II syndromes
- Multicenter and/or bilateral in familial cases
- High incidence of metastatic involvement of lymph nodes has been reported (80%) and liver metastasis- worse prognosis
- Female to male ratio is 3:2

71

MEDULLARY CARCINOMA



72

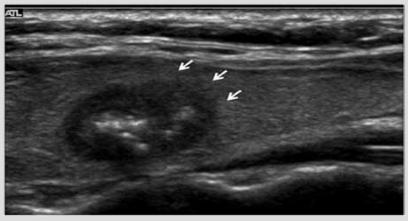
MEDULLARY CARCINOMA (CONT'D)

Sonographic Findings:

- Lesions appear similar to that of papillary carcinoma as hypoechoic mass
- Often calcium deposits
- Sonography highly sensitive in detecting metastatic lymphadenopathy in these patients

73

MEDULLARY CARCINOMA



74

ANAPLASTIC CARCINOMA

- Means undifferentiated; rare—accounts for less than 2% of thyroid cancers
- Most deadly form of thyroid cancer
- Usually occurs after age 60
- Presents as hard, fixed mass with rapid growth
- Growth locally invasive in surrounding neck structures

Sonographic Findings:

- Hypoechoic mass, with invasion of surrounding muscles and vessels of neck

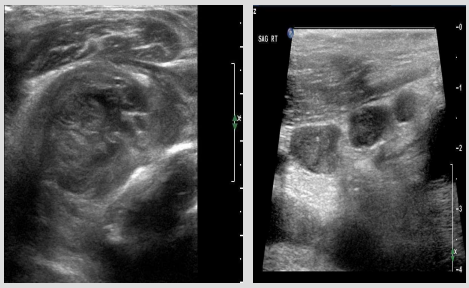
75

ANAPLASTIC CARCINOMA (CONT'D)

- Clinical findings:
  - Many years of radiation exposure to neck or upper chest
  - Rapidly enlarging, hard, fixed mass in neck
  - Dyspnea
  - Dysphagia
  - Hoarseness
  - Cough

76

ANAPLASTIC CARCINOMA



77

LYMPHOMA

- Lymphoma in thyroid primarily non-Hodgkin's type
- Older females (4X more than males)
- Accounts for 4% of all thyroid malignancies
- Clinically patient has rapidly growing mass in neck area
- Patient may have pre-existing chronic lymphocytic thyroiditis (Hashimoto's disease) with subclinical or overt hypothyroidism

78

LYMPHOMA (CONT'D)

Sonographic Findings:

- Nonvascular hypoechoic and lobulated mass
- May be large areas of cystic necrosis within tumor or encasement of adjacent neck vessels
- Adjacent thyroid parenchyma may be heterogeneous secondary to associated chronic thyroiditis

79

LYMPHOMA

Lymphoma is characterized by a large, nonvascular, hypoechoic, and lobulated solid mass.

80

METASTATIC

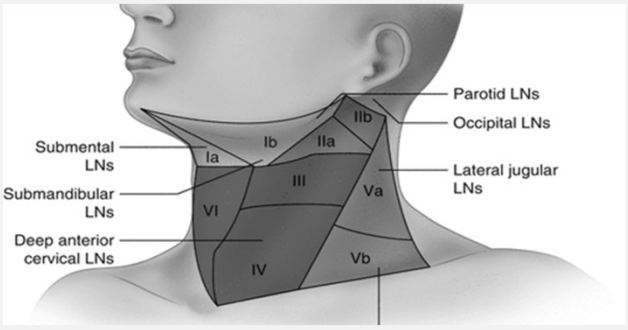
- Most common from breast CA
- Other primary sites:
  - melanoma
  - kidney

81

LYMPH NODE MAPPING

- Normal lymph nodes (LN) appear hypoechoic with an echogenic hilum
- Measure less than 1 cm
- Abnormal LN's are more rounded in shaped, lose their hilar feature, may contain calcifications, and may have abnormal vascular patterns
- Post surgical (thyroidectomy) because of thyroid ca requires an analysis of LN levels to check for lymphadenopathy (metastatic disease to the nodes)

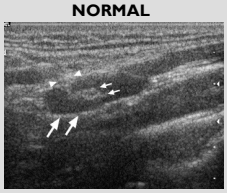
82



83

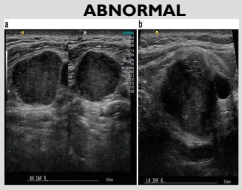
LYMPH NODES

NORMAL



https://www.sciencedirect.com/science/article/abs/pii/S1078817405000593

ABNORMAL



https://radiologykey.com/sonographic-appearance-of-abnormal-cervical-lymph-nodes-in-the-preoperative-and-reoperativeempty-neck-a-surgeons-perspective/

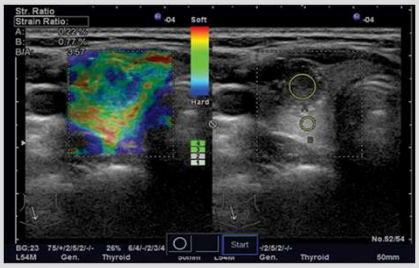
84

ADDITIONAL IMAGING

- Nuclear Medicine
  - Radioisotope scan- determines if nodules are benign or malignant
  - Hot nodules- increased thyroid activity (more concentration),
  - almost always benign
  - Cold nodules- decreased thyroid activity (less concentration),
  - -20% malignant
  - - 20% cystic
  - -remainder usually benign adenomas

85

ELASTOGRAPHY



Elastography images demonstrate soft areas as blue and hard areas as red within the thyroid gland.

86

DIFFUSE THYROID DISEASE

87

GRAVES' DISEASE

- Occurs more frequently in women over 30 years of age
- Autoimmune disorder
- Characterized by thyrotoxicosis

* Most common cause of hyperthyroidism (85%)

88

GRAVES' DISEASE (CONT'D)

Characterized by the following findings:

- Hypermetabolism
- Diffuse toxic goiter
- Exophthalmos
- Cutaneous manifestations
- Elevated T3 and T4 but low TSH

89

GRAVES' DISEASE

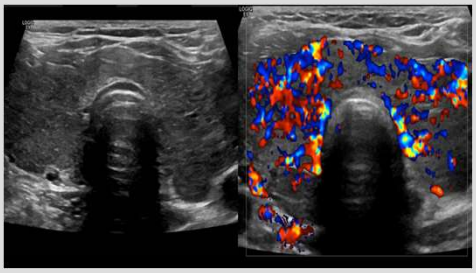
90

GRAVES' DISEASE (CONT'D)

- Hyperthyroidism associated with diffuse hyperplastic goiter present
- Gland diffusely homogeneous and enlarged
- Sonographic Findings:
  - Heterogeneous, diffuse goiter
  - Younger patients may be hypoechoic
  - Overactivity of Graves' disease manifested sonographically by increased vascularity on color Doppler imaging- "thyroid inferno"
  - Spectral Doppler- velocities over 70 cm/sec

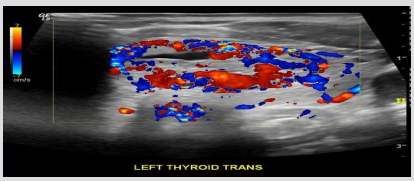
91

GRAVES' DISEASE



92

GRAVES' DISEASE



93

THYROIDITIS

- Inflammation of thyroid causing swelling and tenderness

Types:

- Acute suppurative thyroiditis
- Subacute granulomatous thyroiditis (de Quervain's disease)
- Chronic lymphocytic thyroiditis (Hashimoto's disease)

94

SUBACUTE THYROIDITIS (DE QUERVAIN'S)

- Caused by viral infection of thyroid
- Gradual or fairly abrupt onset, pain may be severe
- May cause transient hyperthyroidism, but in period of weeks or months swelling and pain subside and gland functions normally
- Gland may appear enlarged and hypoechoic with normal or decreased vascularity

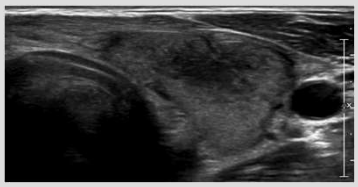
95

SUBACUTE THYROIDITIS (DE QUERVAIN'S) (CONT'D)

- Clinical findings:
  - Dysphagia
  - Fever
  - Neck pain (may be sudden and severe)
  - Tenderness
  - Enlargement
  - Malaise/fatigue
  - Increased sedimentation rate

96

SUBACUTE THYROIDITIS (DE QUERVAIN'S)



Subacute thyroiditis may demonstrate an enlarged and hypoechoic thyroid with normal or decreased vascularity secondary to diffuse edema of the gland. The process could also present as focal hypoechoic regions within the thyroid gland.

97

HASHIMOTO'S THYROIDITIS

*Most common form of thyroiditis

- Characterized by destructive autoimmune disorder, which leads to chronic inflammation of thyroid
- Entire gland involved with inflammatory reaction; enlargement not necessarily symmetric

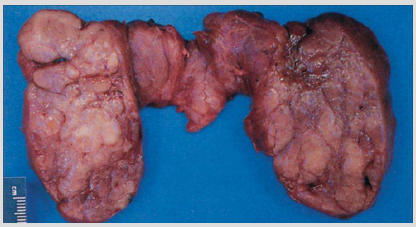
98

HASHIMOTO'S THYROIDITIS (CONT'D):

- Clinical findings:
  - Usually painless (may develop pain over time)
  - Diffusely enlarged gland in young or middle-aged female
  - Labs show low T3 and T4, but elevated TSH

99

HASHIMOTO'S THYROIDITIS



100

HASHIMOTO'S THYROIDITIS

Sonographic Findings:

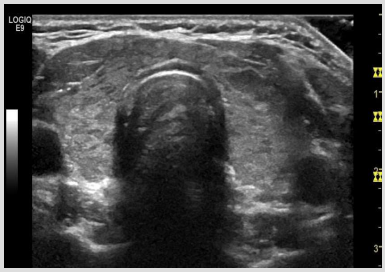
- Diffuse coarsened parenchymal texture slightly more hypoechoic than normal thyroid
- Homogeneous enlargement initially occurs with nodularity; as disease progresses, gland shows inhomogeneous enlargement (microlobulation)
- Thick, fibrous strands or echogenic septae
- Color Doppler shows normal to increased flow (acute phase) "thyroid inferno" when hypothyroidism develops, decreased flow velocity (chronic phase)
- May have adjacent cervical lymphadenopathy

101

HASHIMOTO'S THYROIDITIS

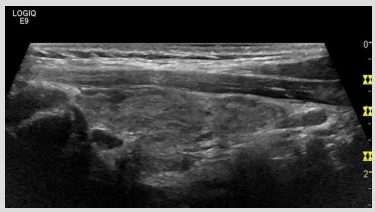
102

HASHIMOTO'S THYROIDITIS



103

HASHIMOTO'S THYROIDITIS



104

MISCELLANEOUS NECK MASSES

105

NECK MASSES

- https://radiologyassistant.nl/head-neck/neck-masses/neck-masses-in-children

106

THYROGLOSSAL DUCT CYST

- Benign congenital abnormality located midline near trachea
- Usually pediatric population (90% before age 10)
- Remnant of tubular development of thyroid gland may persist between base of tongue and hyoid bone
- Narrow, hollow tract, which connects thyroid lobes to floor of pharynx, normally atrophies in the adult
- Failure to atrophy creates potential for cystic masses to form anywhere along it
- Clinical signs:
  - Palpable, midline mass
  - Pain, associated with hemorrhage or infection

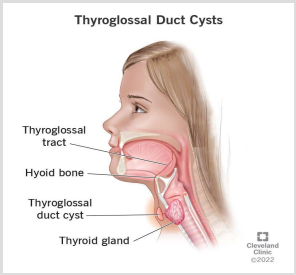
107

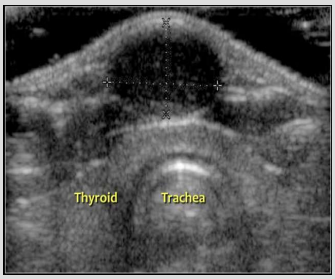
THYROGLOSSAL DUCT CYST(CONT'D)

- Sonographic findings:
  - Cystic midline mass anterior to trachea
  - May have internal echoes caused by hemorrhage or infection

108

THYROGLOSSAL DUCT CYST





https://radiologyassistant.nl/head-neck/neck-masses/neck-masses-in-children

109

THYROGLOSSAL DUCT CYST

- https://radiologyassistant.nl/assets/neck-masses-in-children/a57c91eaad60e0_1%20thyroglossal%20duct%20cyst.m4v

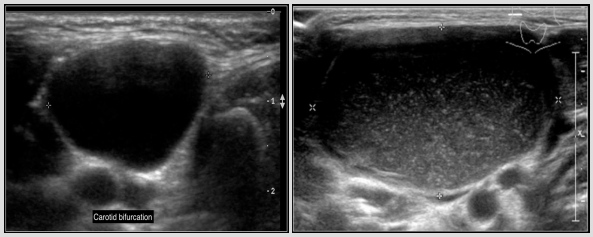
110

BRANCHIAL CLEFT CYST

- During embryonic development, branchial cleft is slender tract extending from pharyngeal cavity to opening near auricle or into neck
- Diverticulum extends either laterally from pharynx or medially from neck
- Most often found near angle of the mandible (submandibular) or lateral to the thyroid
- Sonographic findings:
  - Primarily cystic with posterior enhancement
  - May have some low-level echoes or solid components

111

BRANCHIAL CLEFT CYST



https://radiologyassistant.nl/head-neck/neck-masses/neck-masses-in-children

112

CYSTIC HYGROMA

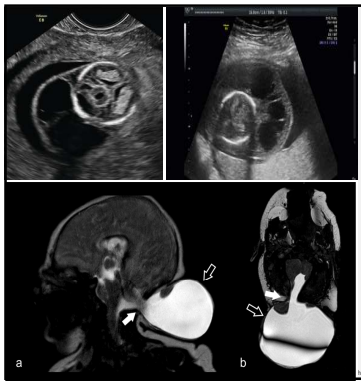
- Congenital lymphatic malformation found on posterior neck
- Aka. lymphangioma
- Usually seen in utero (OB ultrasound)
- Associated with syndromes and chromosomal abnormalities such as Turner's syndrome, trisomy 13, 18, and 21, and fetal hydrops
- Webbed neck

113

CYSTIC HYGROMA (CONT'D)

- Sonographic Findings:
  - Thin-walled, fluid-filled sac posterior to fetal neck
  - Varies in size
  - May have septations or internal echoes

114



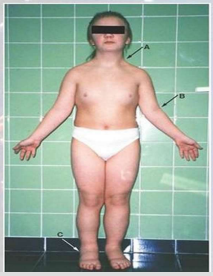
CYSTIC HYGROMA (CONT'D)

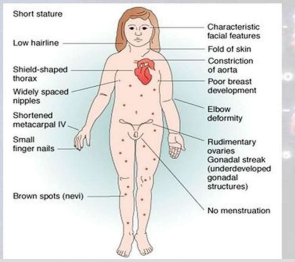
https://www.mdpi.com/2227-9059/10/11/2997

115

Turner's Syndrome (X-)

- Missing an X chromosome on 23rd Pair.





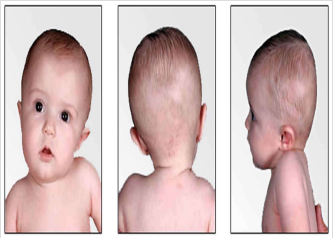
116

FIBROMATOSIS COLLI

- Rare, pediatric fibrous tumor of the inferior sternocleidomastoid muscle
- Results in twisting of the chin towards nonaffected side (torticollis)

117

FIBROMATOSIS COLLI



https://journals.sagepub.com/doi/pdf/10.1177/8756479306294249

https://districtspeech.com/infant-torticollis/

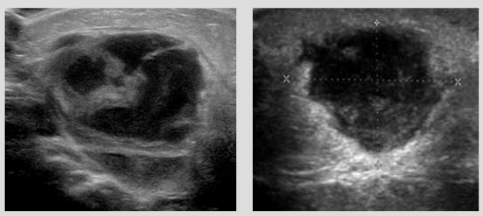
118

ABSCESS

- Can arise in any location in the neck
- Sonographic Findings:
  - Primarily fluid-filled to completely echogenic
  - Most commonly low-level echogenicity with irregular walls
  - Chronic abscesses may be difficult to distinguish because blends in with surrounding tissue
- Localization for percutaneous needle aspiration and follow-up examination during and after treatment

119

ABSCESS



An abscess can range in its sonographic appearance from primarily fluid filled to completely echogenic. Most commonly, an abscess will appear as a complex cystic mass with low-level echogenicity and irregular walls.

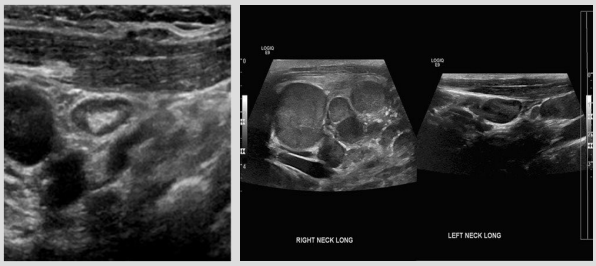
120

LYMPHADENOPATHY

- Normal lymph node oval in shape with homogeneous texture with central core echo complex
- More rounded the node, the more likely node is malignant
- Sonographic appearance:
  - Low-level, well-circumscribed masses is classic appearance
  - Inflammatory process may appear more cystic
- Differentiation of inflammation from neoplastic processes
- Fine-needle biopsy

121

LYMPHADENOPATHY



Normal **Lymphadenopathy**

https://www.researchgate.net/figure/Ultrasound-image-shows-bilateral-cervical-lymphadenopathy-right-more-extensive-than-left_fig1_325475855

122

CORRELATIVE IMAGING

- Nuclear Medicine
- CT
- MRI
- X-ray
- Extracranial duplex Doppler

123

REVIEW TIME!!!

https://www.bmj.com/content/347/bmj.f6182

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