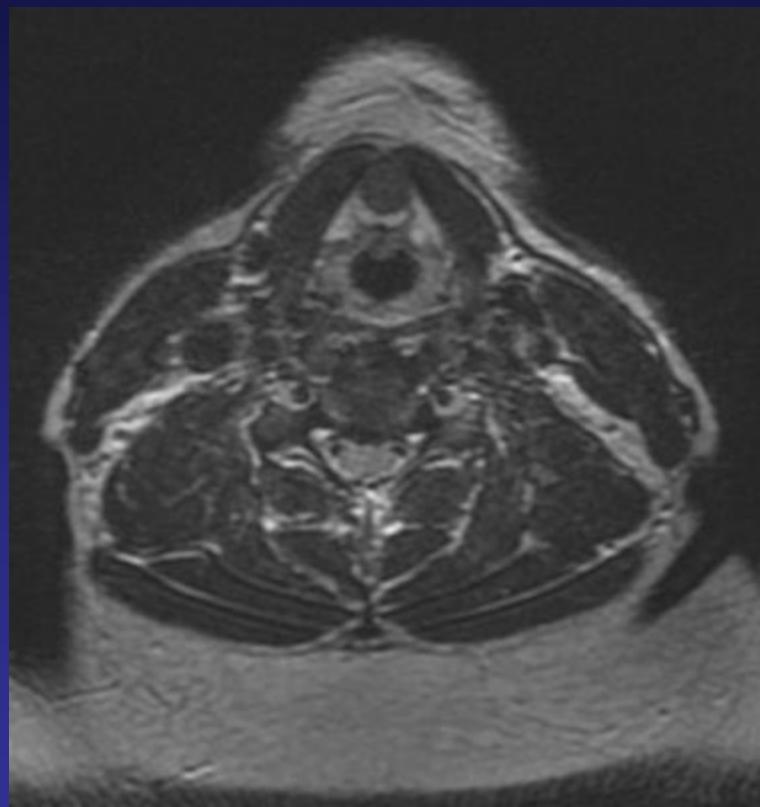
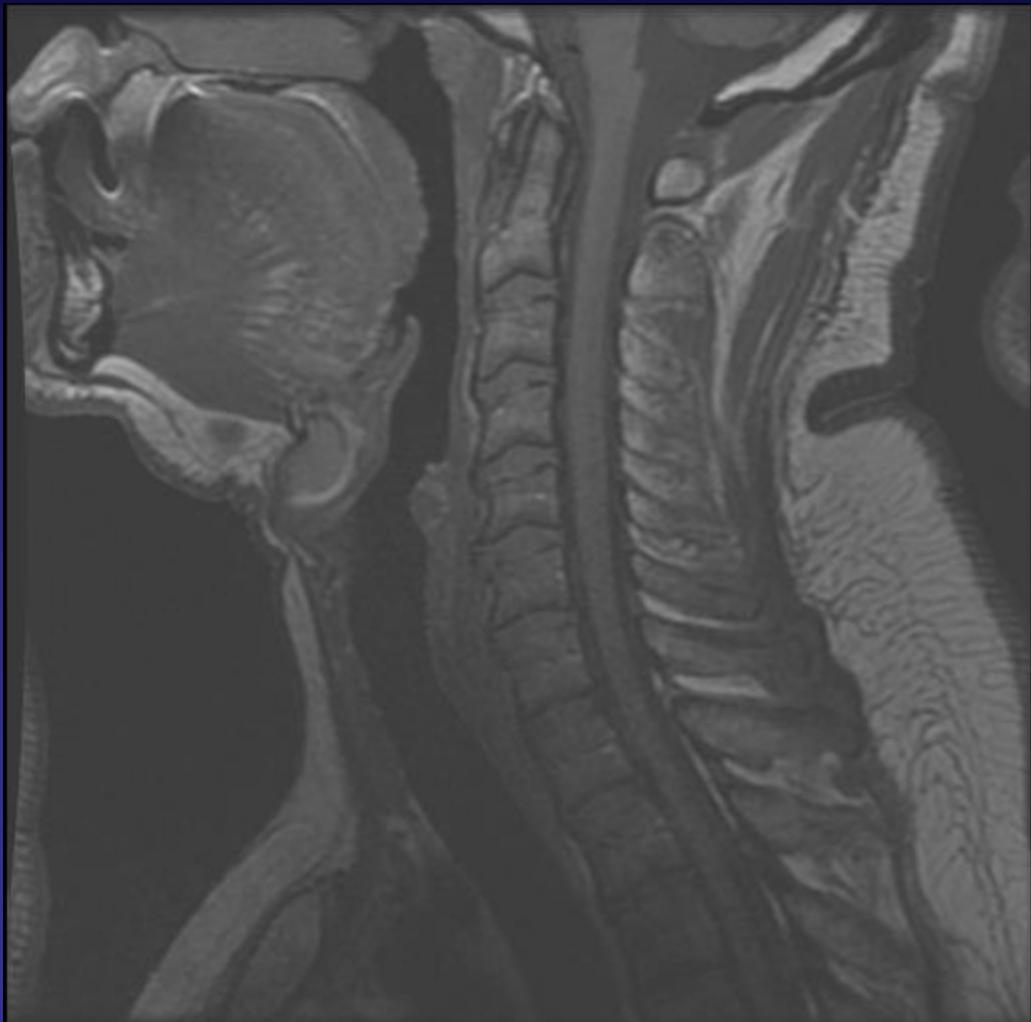


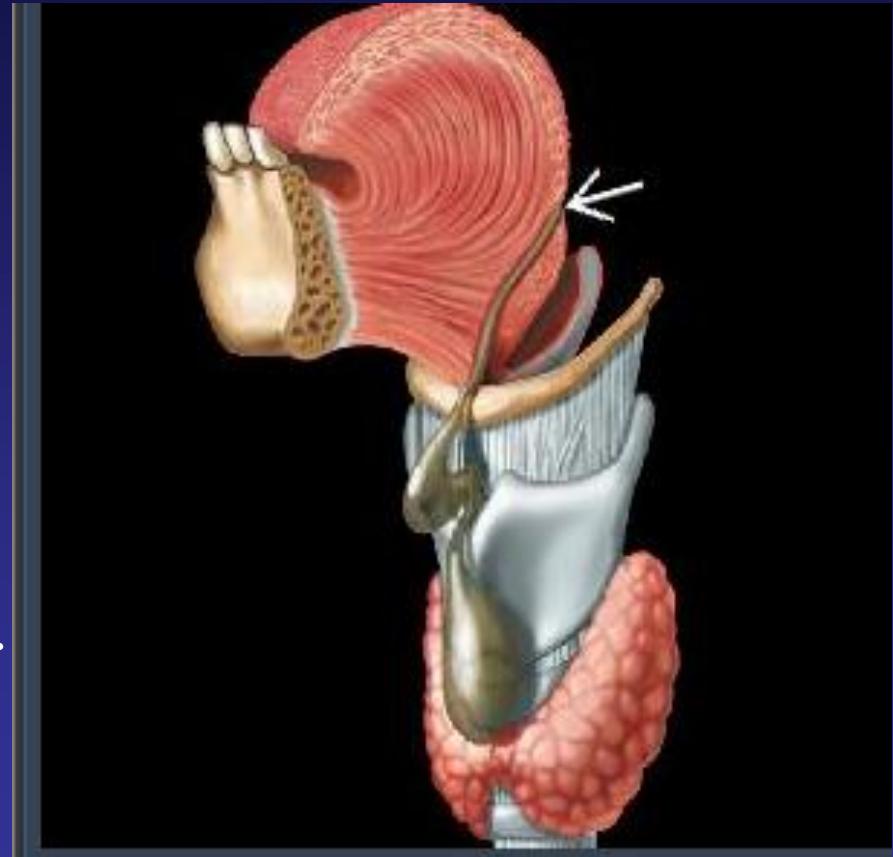
Thyroid

Thyroglossal duct Remnant

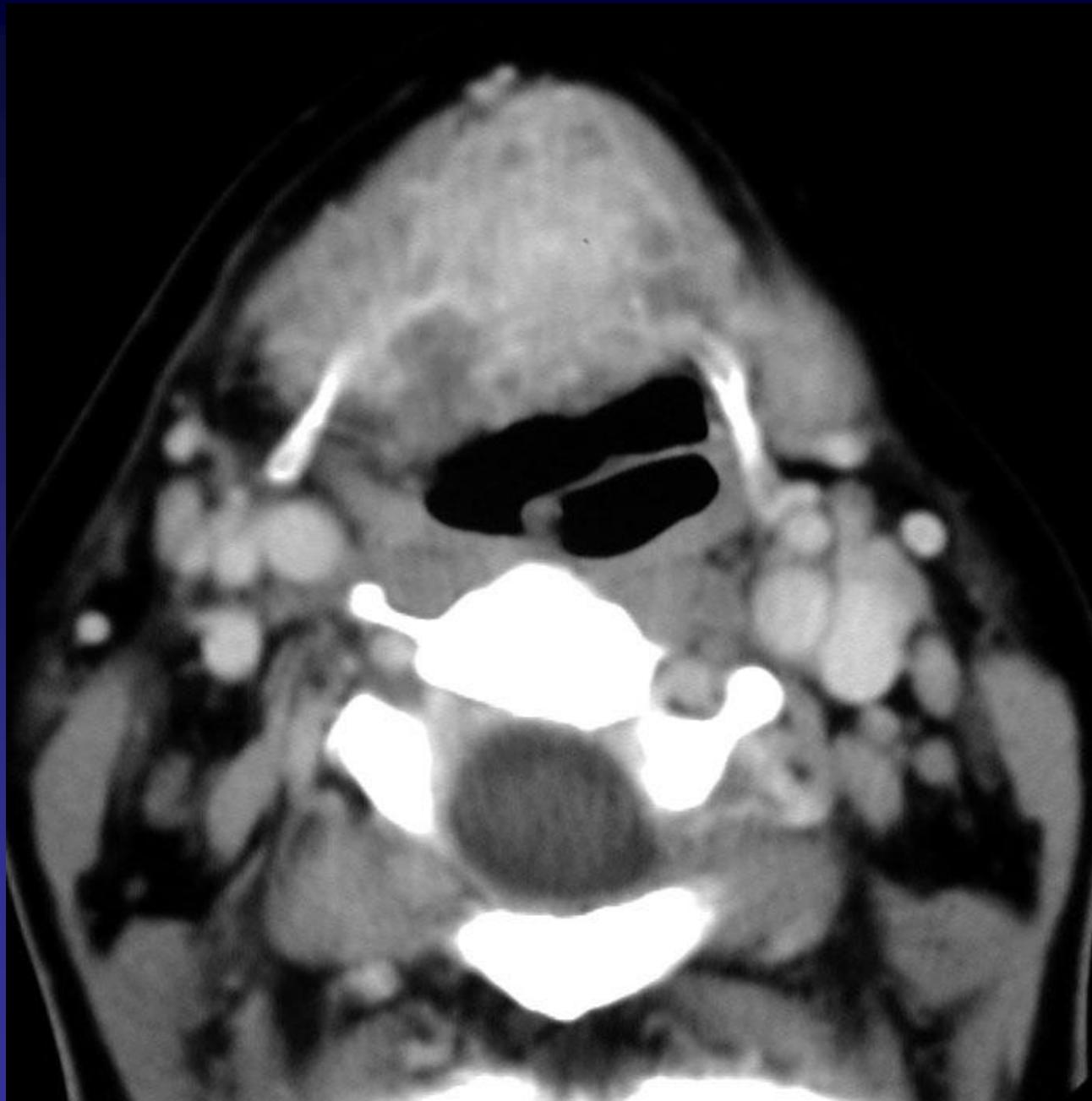


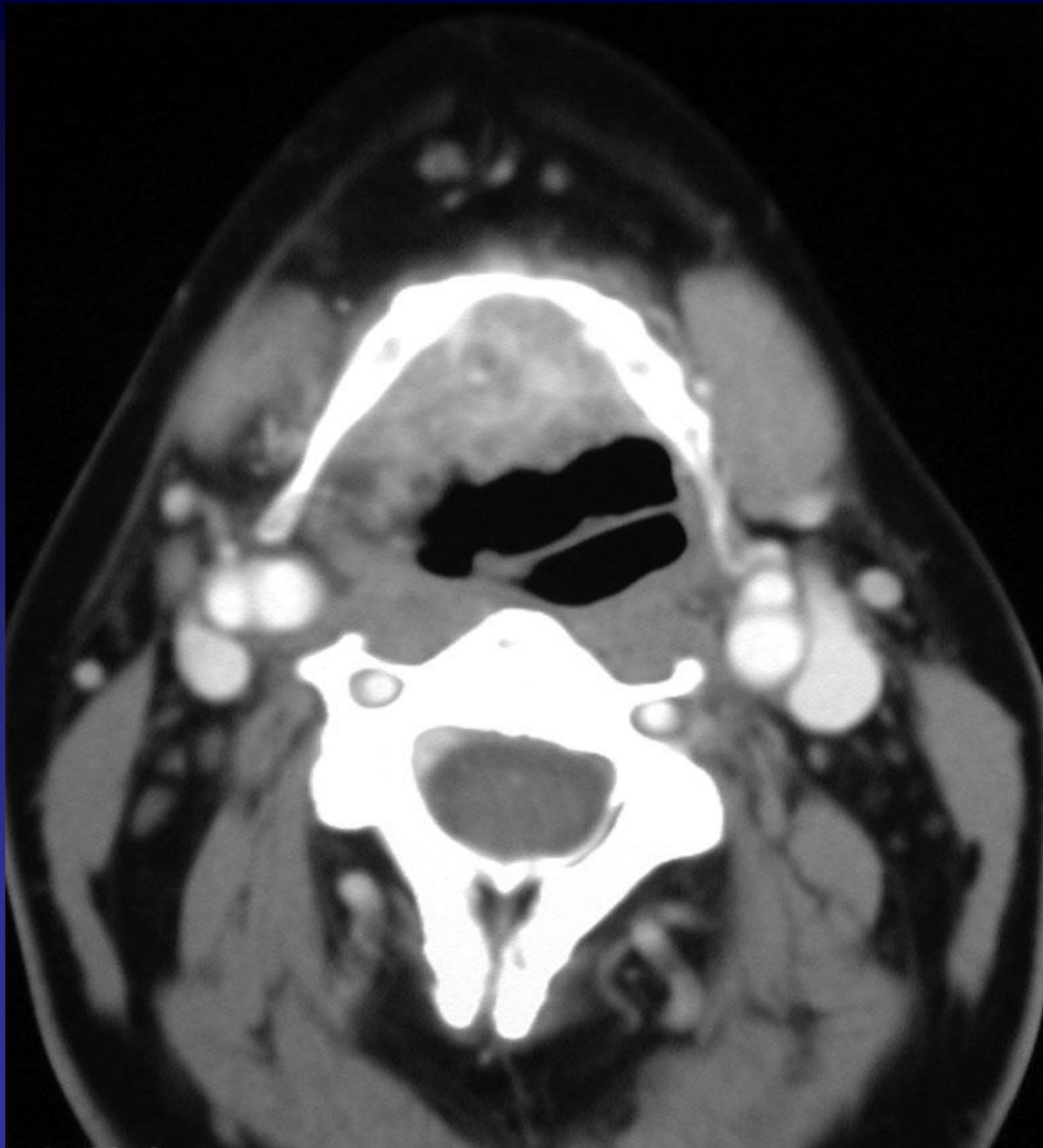
Thyroglossal duct cyst

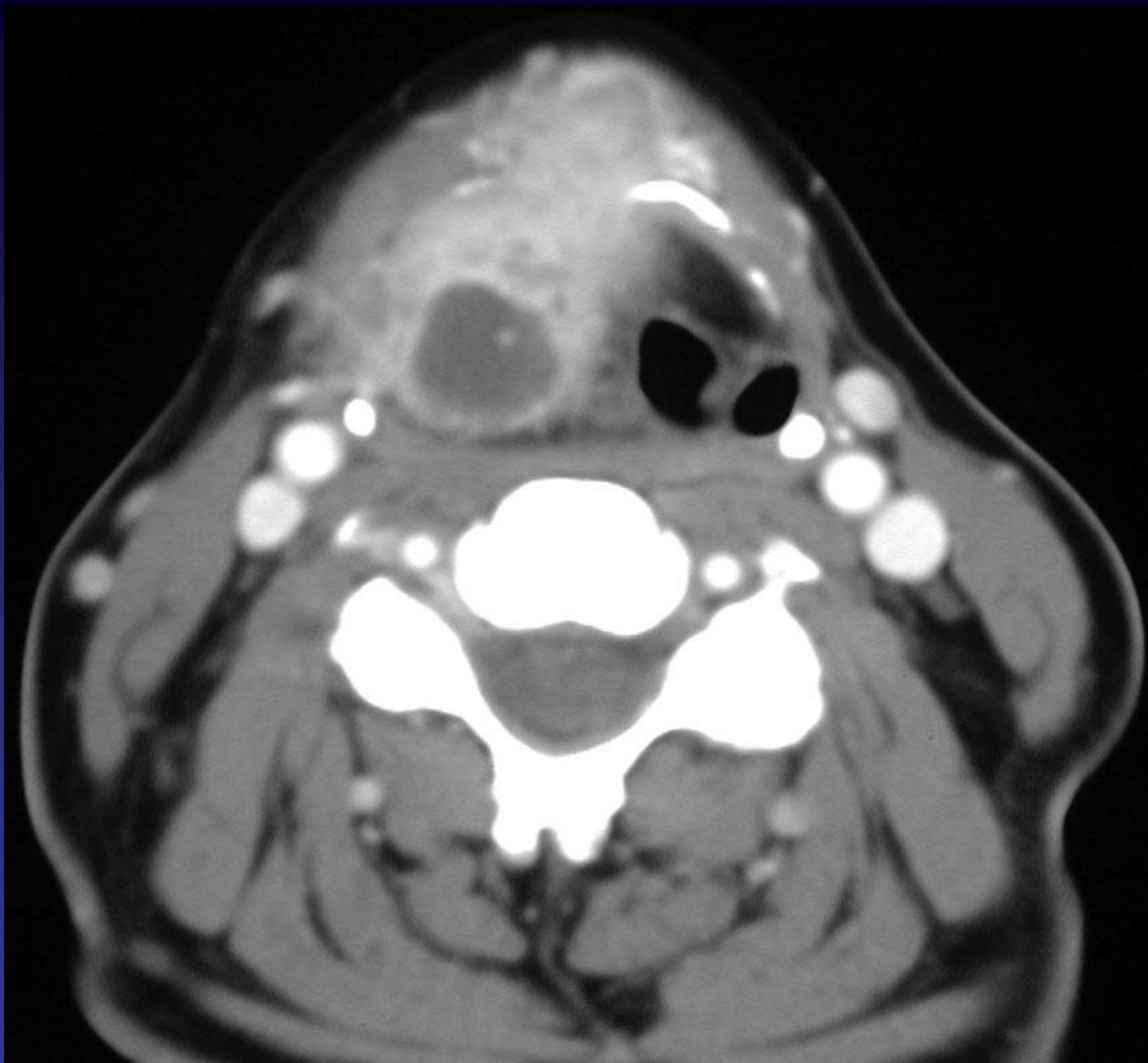
- Best diagnostic clue: Midline cystic neck mass embedded in infrahyoid strap muscles ("claw sign")
- 20-25% in suprathyroid neck
- Almost 50% at hyoid bone
- About 25% in infrahyoid neck
- Wall may enhance if infected.

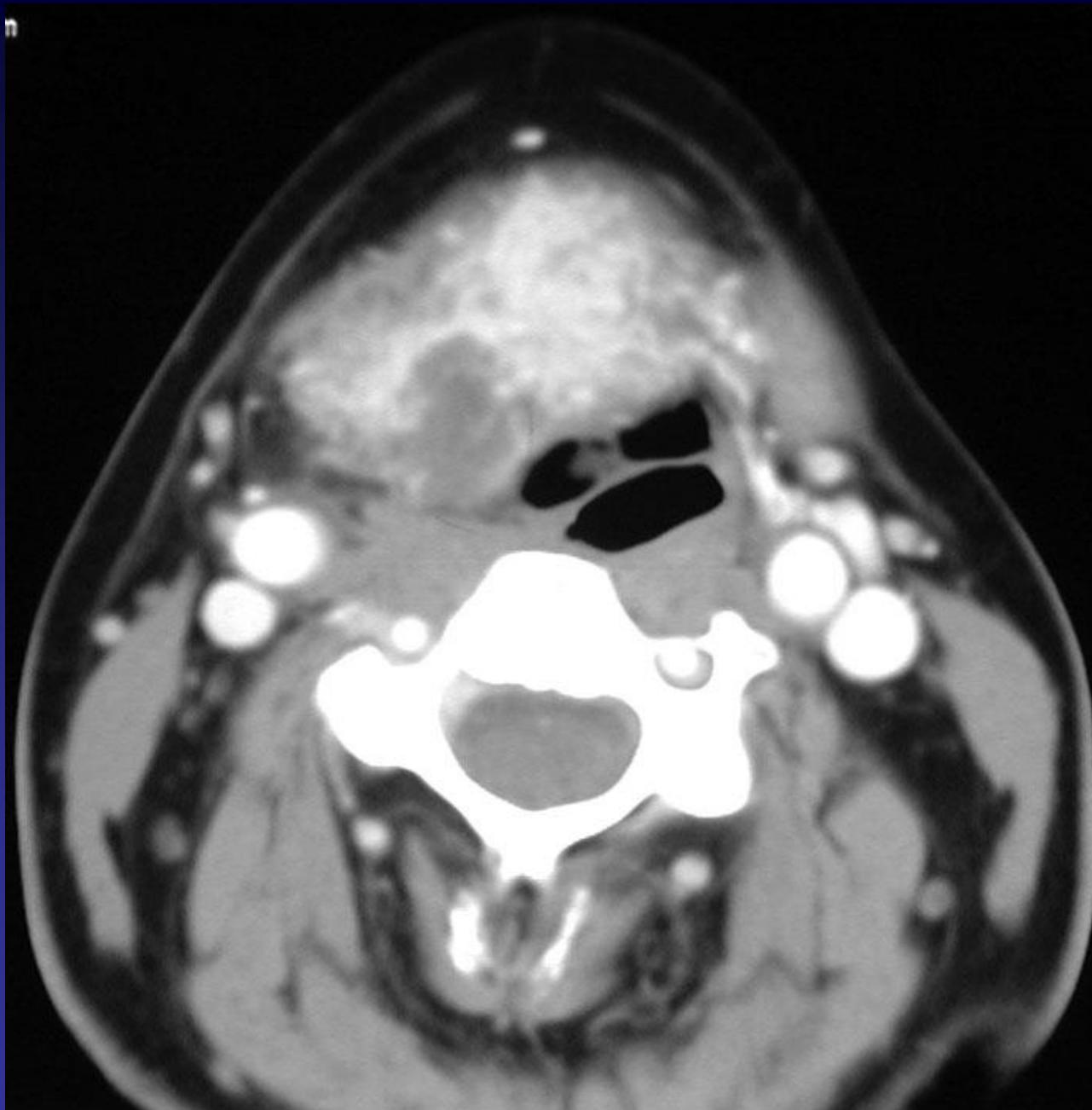


Papillary Carcinoma, in a thyroglossal remnant









End

Prevalence of Thyroid Nodules

- By age 60 yrs 50% US/Autopsy of people have thyroid nodule(s)
- 90% benign
- 10% cancers
- 95% of all nodules COLD
- Most sonographic nodules = thyroid hyperplasia (70%)

Etiology of Thyroid Nodules

- Benign hyperplastic nodules (> 70%)
- Benign adenoma (10%)
- Thyroid carcinoma (5 - 12%) – Papillary (70 - 80%)
 - Follicular (10 - 15%)
 - Medullary (5 - 10%)
- – Anaplastic (<1%)
- Focal thyroiditis (1-5%)
- Uncommon lesions: intra thyroidal parathyroid, true cyst, metastatic disease

Reporting of incidental thyroid nodules on CT and MRI

- Only 1.6% of patients with one or more thyroid nodules will actually have thyroid cancer.
- More than 96% of thyroid cancers are papillary and follicular cancers (well-differentiated) and have an excellent prognosis.

Duke 3- Tiered System

CT/MR Pet CT features	Recommendation
Category 1: Nodule Pet avid or locally invasive or suspicious lymph node	Strongly Consider US for any Size
Category 2: Solitary nodule < 35	Consider US if > 1 cm in adults Any size in Pediatrics
Category 3: Solitary nodule > 35	Consider if > 1.5 cm
Multiple nodules	Consider based on solitary criteria

Nuclear Medicine

¹³¹I Conventional Nuclear Medicine

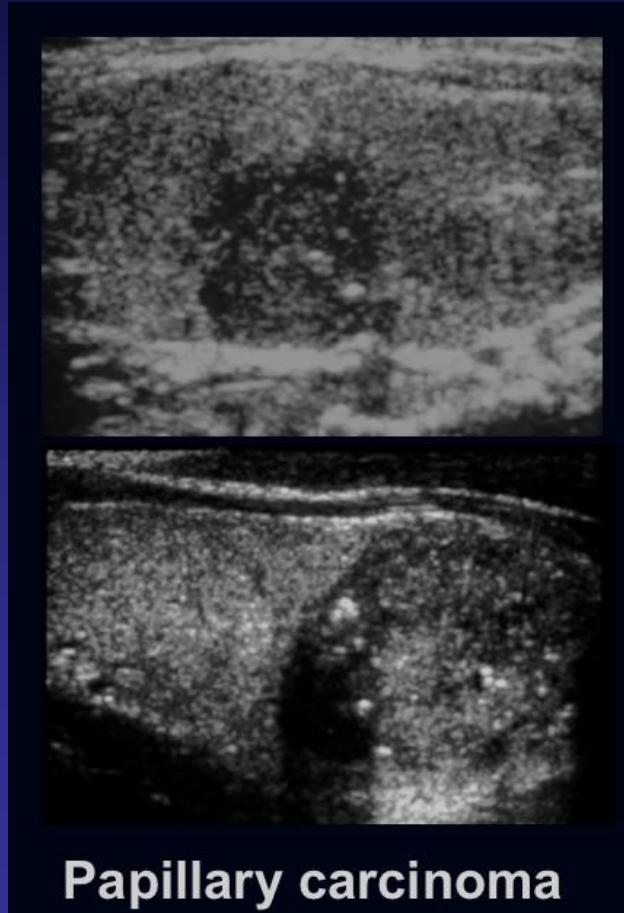
- A thyroid scan is useless unless there is a low TSH¹
- Radionuclide studies are essentially useless in the vast majority of patients because such studies are rarely definitive and they do not alter the therapy or the follow-up plan; furthermore, these studies add considerable cost²
- Unhelpful in differentiating benign from malignant and utility for routine evaluation is limited³

Sonographic features associated with malignancy

- Cervical adenopathy
- Micro-calcifications
- Coarse, interrupted calcifications
- Markedly hypoechoic (like muscle), solid consistency
- Taller than wide
- Irregular, infiltrating margins
- Intra nodular flow *in association with* hypoechoogenicity and/or irregular margins

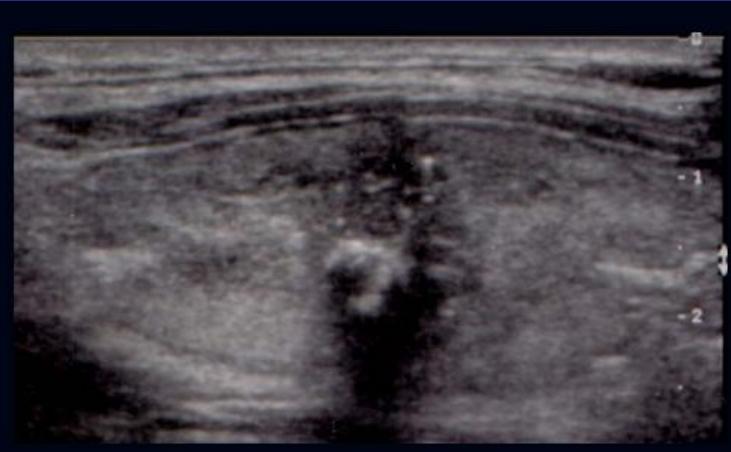
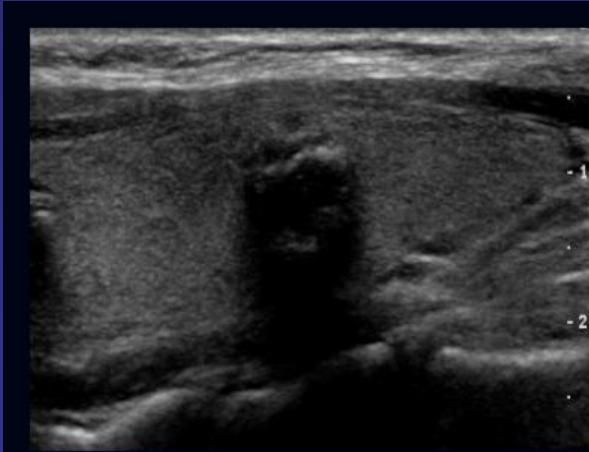
Micro calcifications

- Multiple punctate (< 1 mm) echoes without shadowing
- Most specific sign of malignancy
- 85-95% of thyroid cancers
- Will not see on CT.
- May not be reliable predictor of malignancy in nodule size < 10 mm



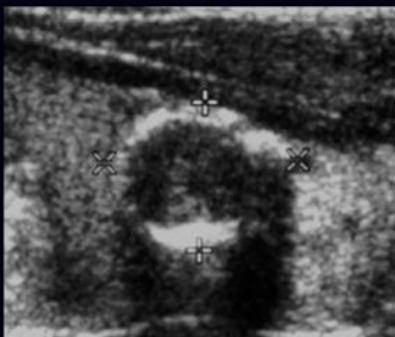
Coarse calcifications

- Common in multinodular goiters = dystrophic calcifications in chronic benign nodules
- When present in solitary nodule malignancy rate approaches 75%



Peripheral calcification

Complete, regular
or “eggshell”



Usually benign

Interrupted



Papillary ca



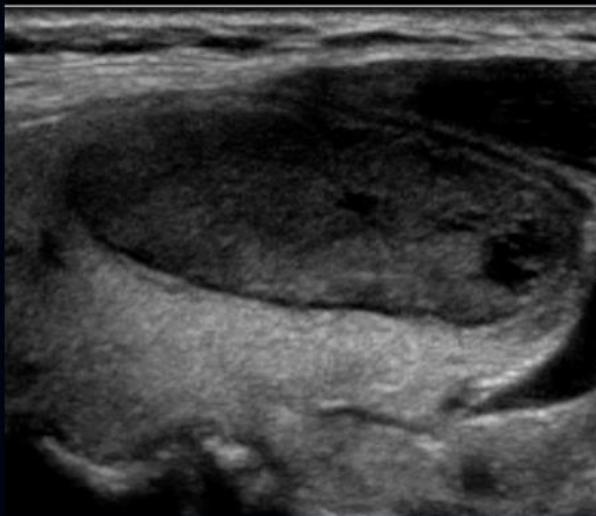
Follicular ca

"Eggshell" calcification most often found in benign nodules; if calcified rim is interrupted, it is suspicious of malignancy

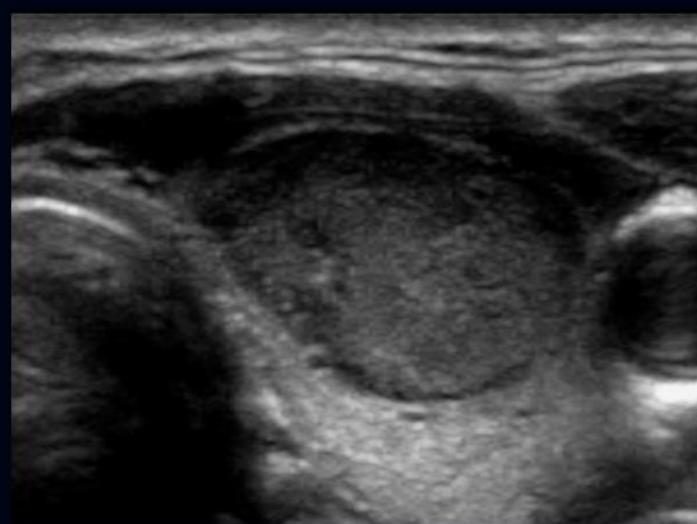
Hypoechoic Nodules

- Most papillary cancers are hypoechoic
- Since benign nodules more common, most hypoechoic nodules are benign
- Incidence of cancer increases if hypoechoogenicity is marked (as dark as strap muscles) and is combined with calcifications or intra-nodular flow

Hypoechoic Nodules



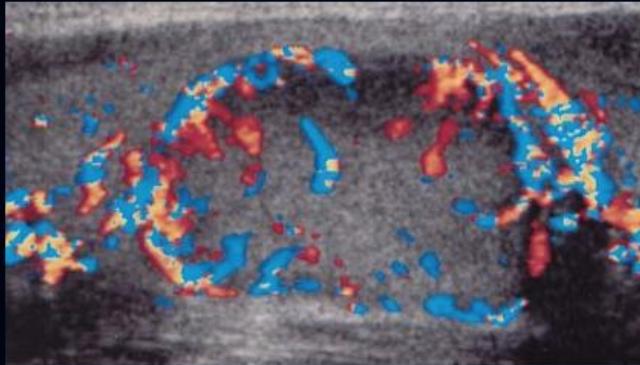
Benign hyperplastic nodule



Papillary carcinoma

Intranodular flow

- Solid, hypervascular nodules have 30 - 40% risk malignancy
- > 50% of hypervascular nodules benign



Adenoma



Hyperplastic nodule

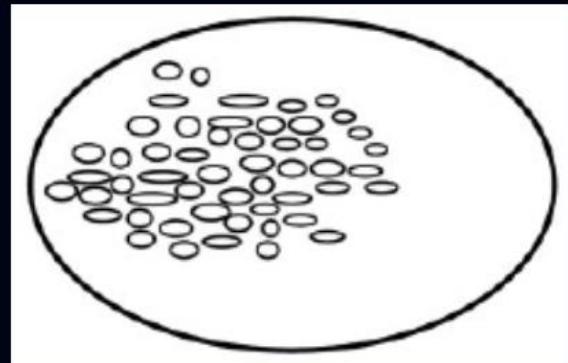
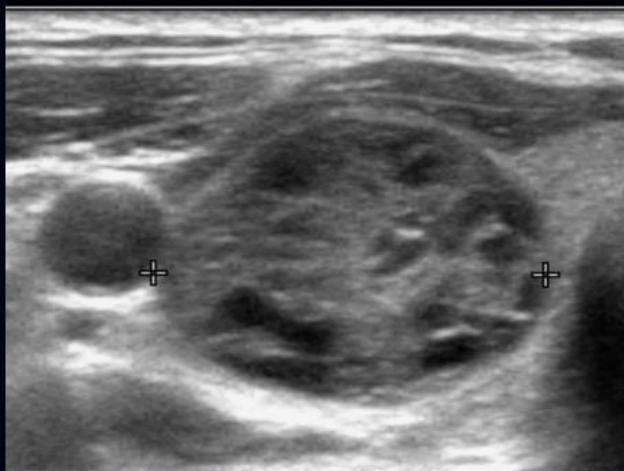
Nodules that are likely benign

- Entirely cystic
- Predominantly cystic with no flow or calcification in a solid part (< 2 cm)
- Honeycomb or spongiform nodule without calcifications (< 2 cm)
- “Pseudonodules” in autoimmune disease (chronic lymphocytic thyroiditis)
- Mixed cystic and solid nodules with a *functioning* solid component (any size)

“Spongiform” nodules

“Spongiform” nodules

- Aggregation of microcysts in > 50% of a nodule
- “Honeycomb of internal cystic spaces”
- < 1% risk of cancer



Moon Radiology 2008; 247:762- 70
Bonavita AJR 2009; 193:207- 13

SRU Consensus for Sonographically Detected Nodules

- Bx if microcalcifications & >10 mm
- Bx if solid and/or coarse calcifications &
- >15 mm
- *Consider* bx if mixed cystic/solid or cystic with a mural nodule & > 20 mm
- *Consider* bx if substantial growth
- Apply clinical judgment!

SRU Consensus Statement

- Multiple nodule BX recommendations:
- Bx one or more nodules using solitary nodule guidelines
- May not need to bx if gland diffusely enlarged with multiple sonographically similar nodules without suspicious features (multinodular goiter)

Multiple Nodules

- Cancer present in “non-dominant nodule” in at least one-third cases

**Multinodular goiter ≠
Multiple nodular gland**



Multinodular goiter

Enlarged thyroid with multiple sonographically similar nodules with little or no normal parenchyma



Multinodular gland

**Normal parenchyma
with more than one nodule**

Nodules

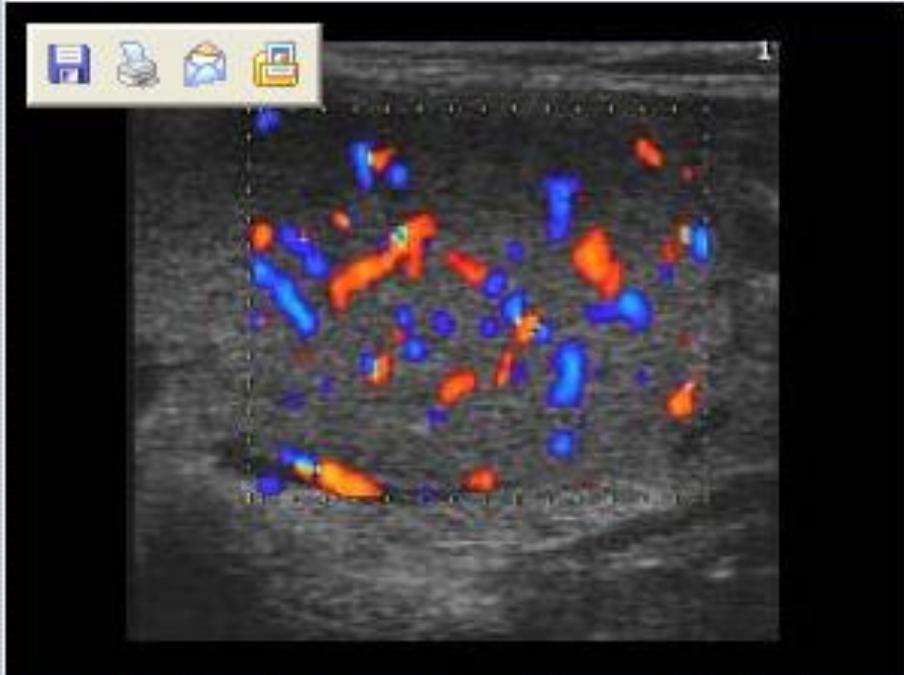
- If greater than 1.5 cm > biopsy
- If N 15 cm, then ok unless
 - It has microcalcifications then biopsy
- On CT if less than 2 cm and ECS, nodes or vocal cord paralysis, say no signs to suggest malignancy.

Hyperplastic adenomatous nodule



hyperplastic adenomatous nodule longitudinal

4.1.2/003.jpg



Hyperplastic adenomatous nodule vascularization
longitudinal

ID: 4.1.2/004.jpg

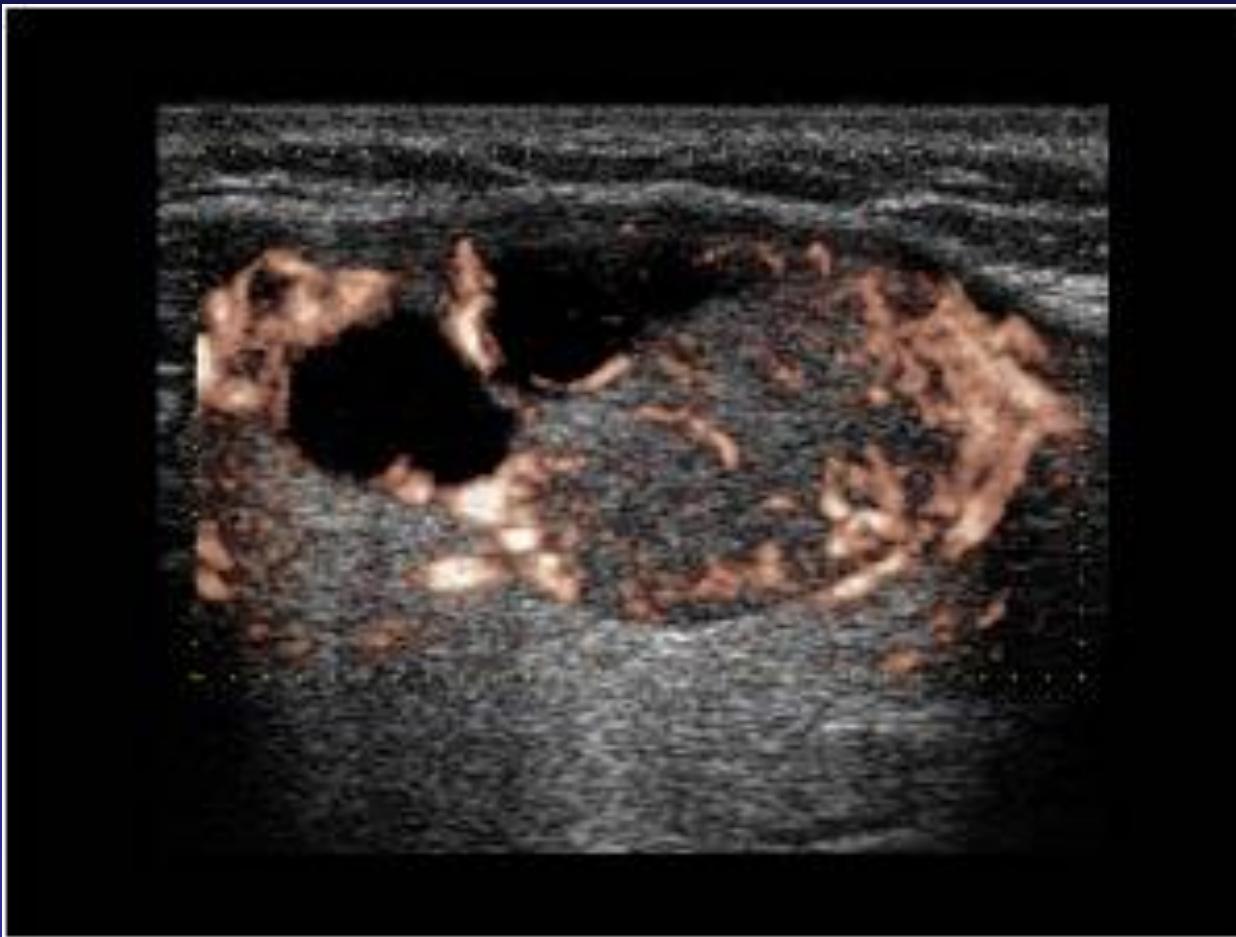
Dysplastic nodule with punctate calcifications



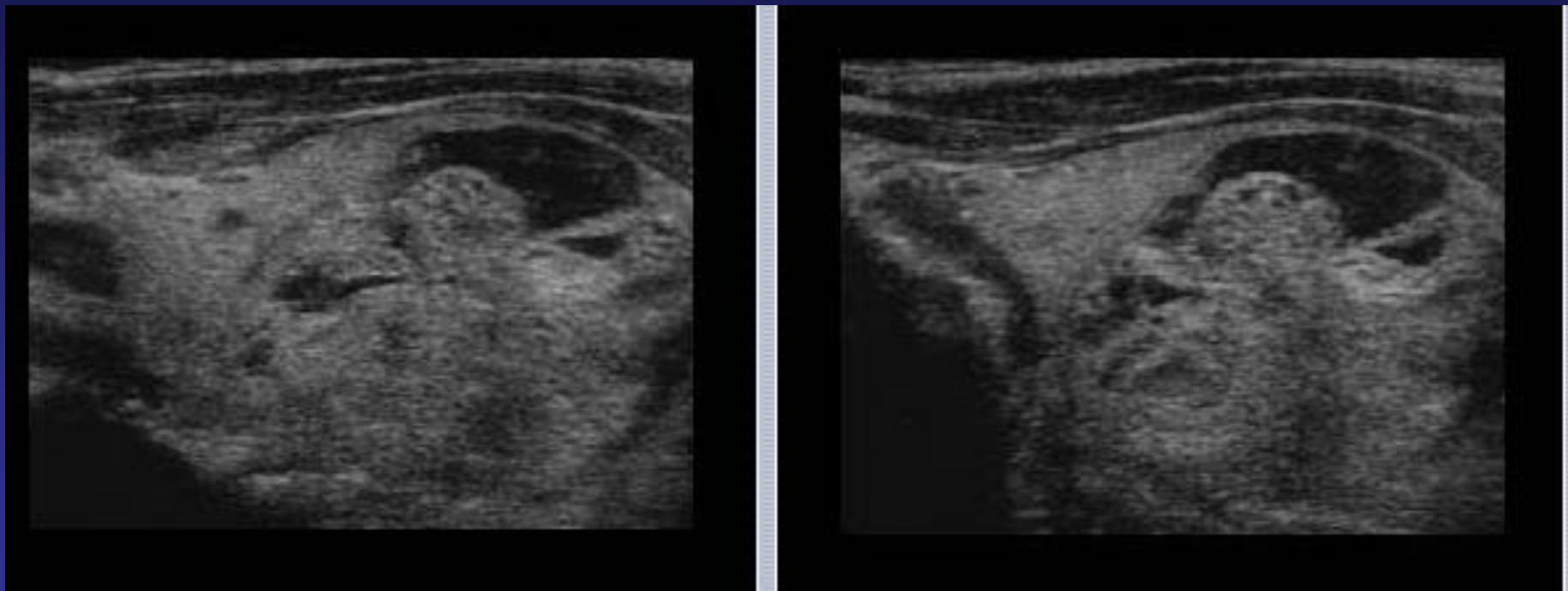
Thyroid adenoma with cystic degeneration and ring vascularization



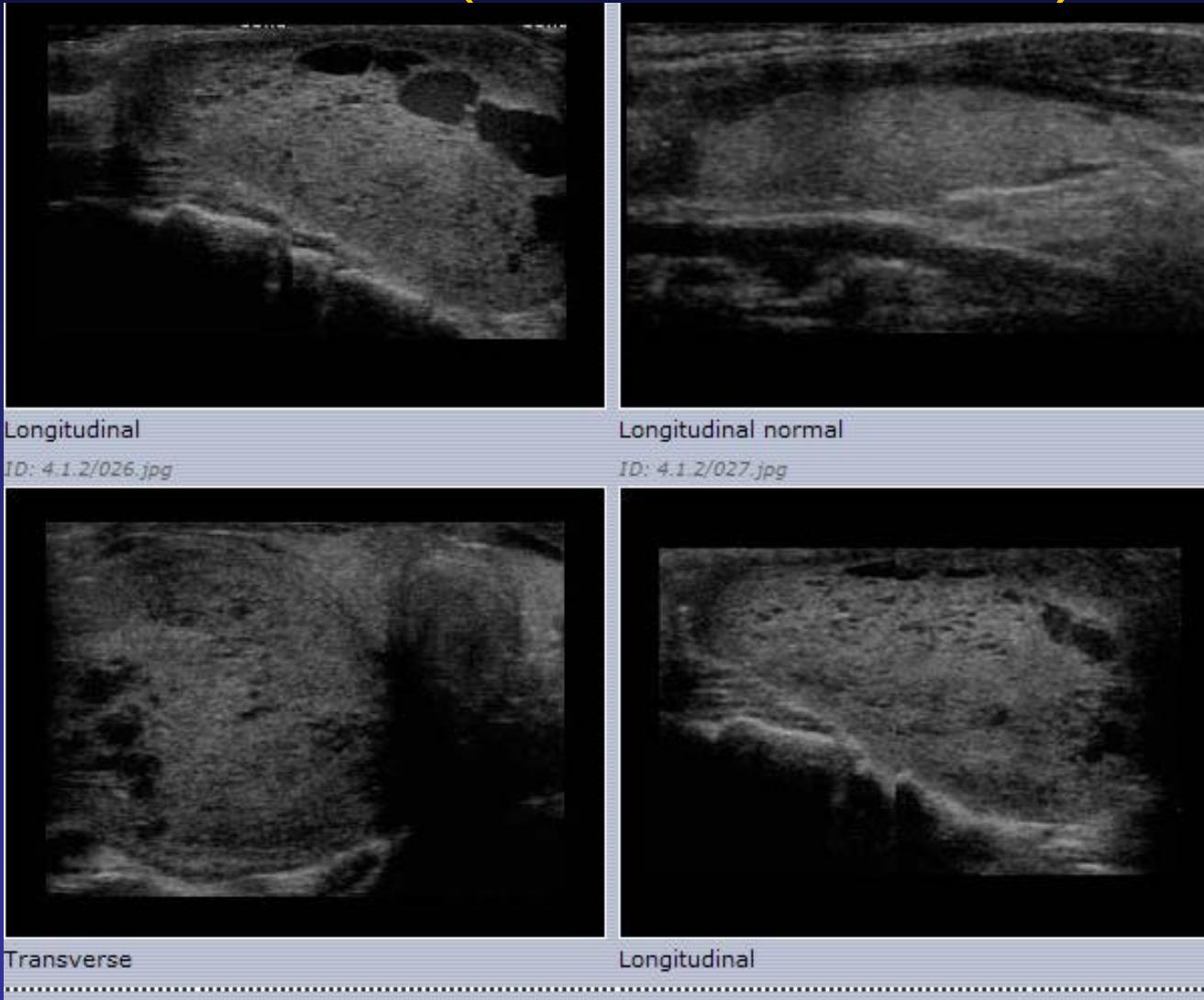
Hypervascularized partly cystic thyroid adenoma



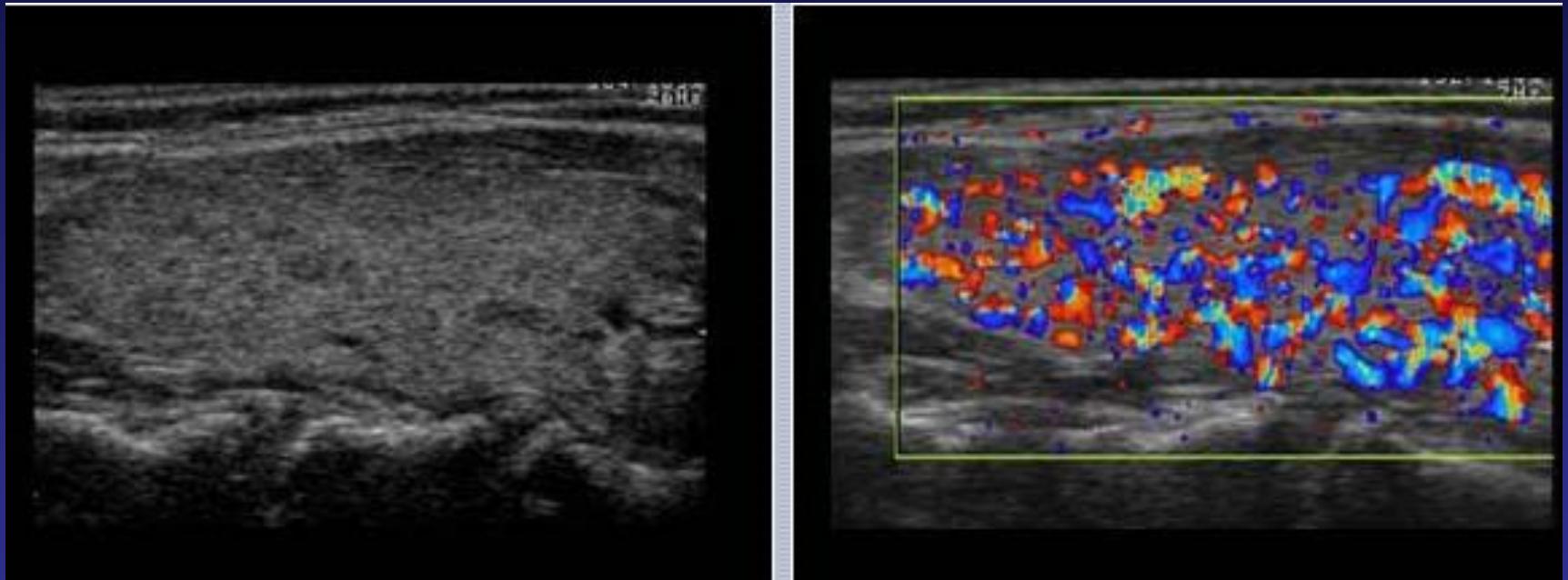
Cystic changes in an adenomatous nodule (colloid nodule)



Cystic changes in an adenomatous nodule (colloid nodule)

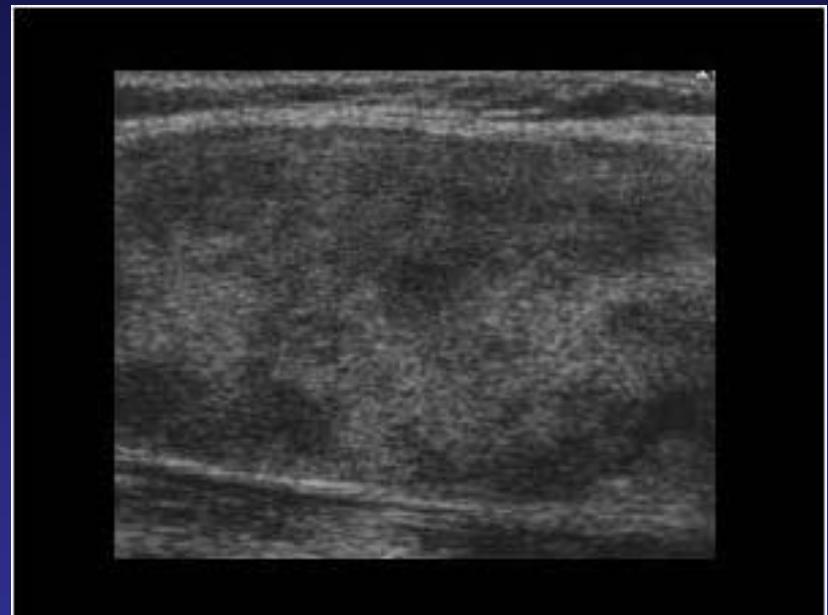
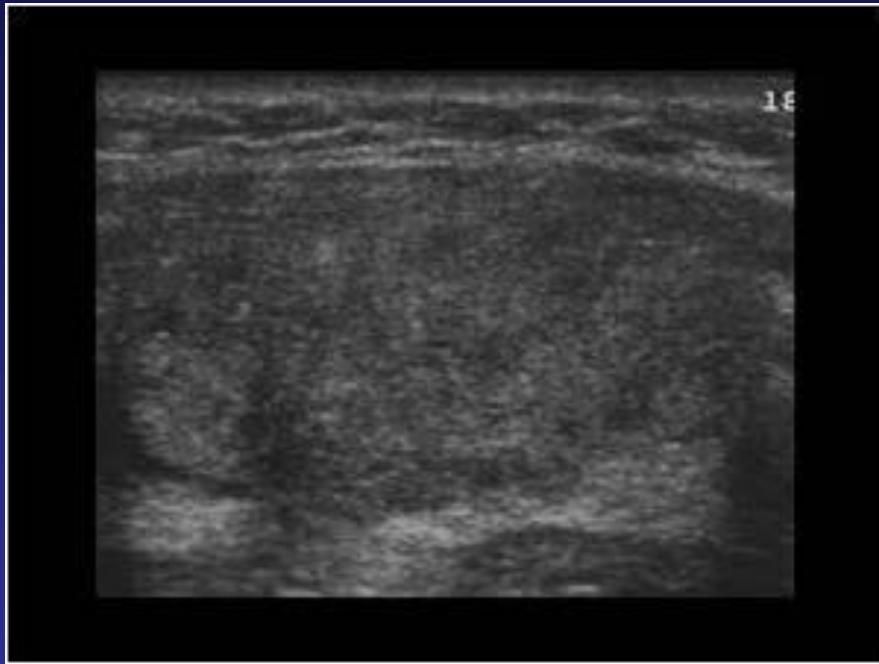


Graves disease



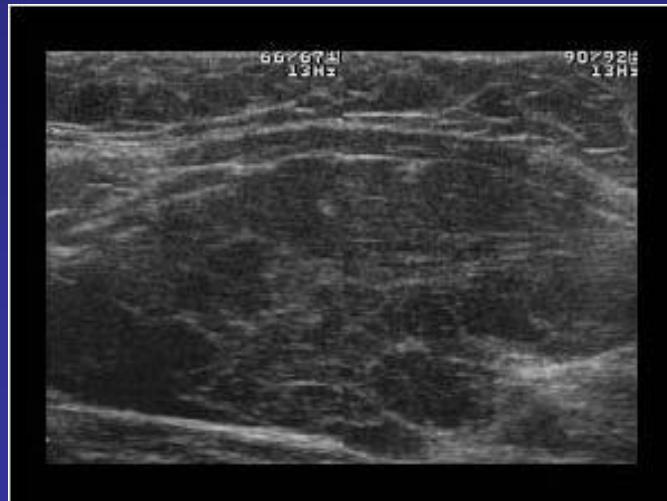
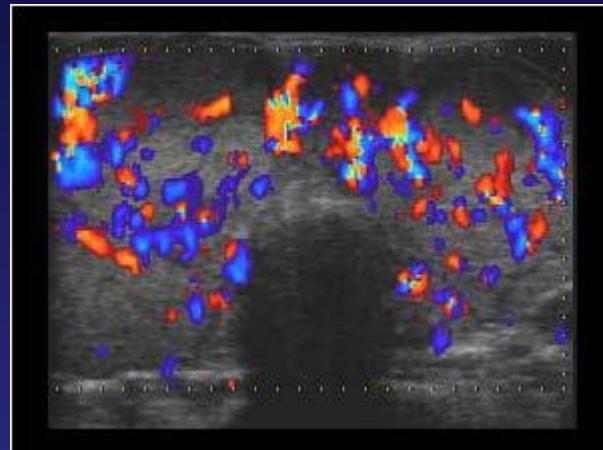
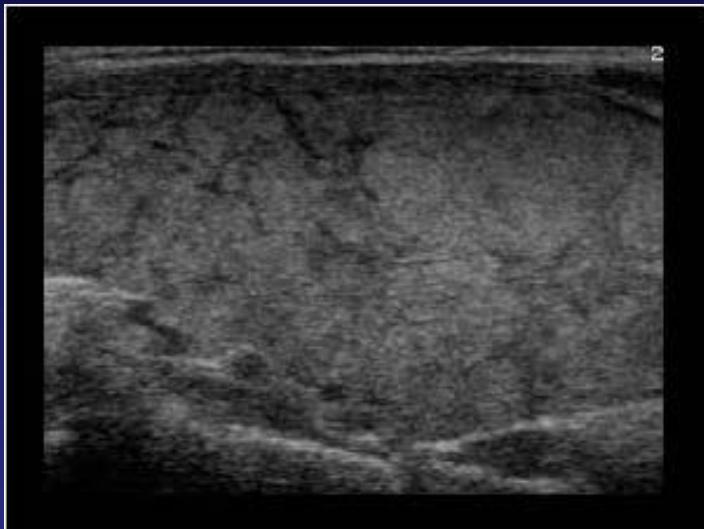
with a hypervascularized diffuse inhomogeneous thyroid gland

De Quervain's thyroiditis



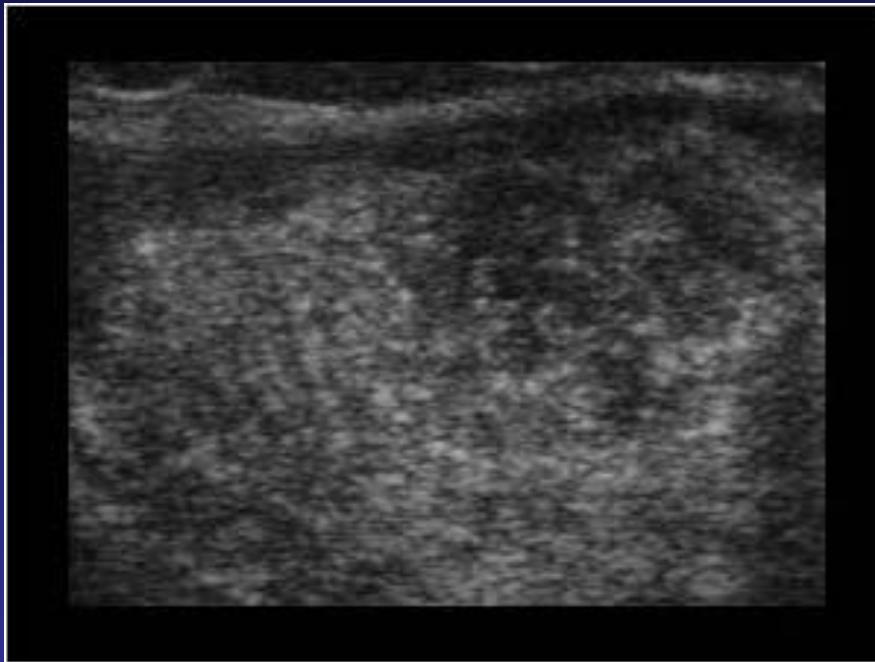
with an enlarged diffuse inhomogeneous thyroid gland

Chronic autoimmune (Hashimoto) thyroiditis

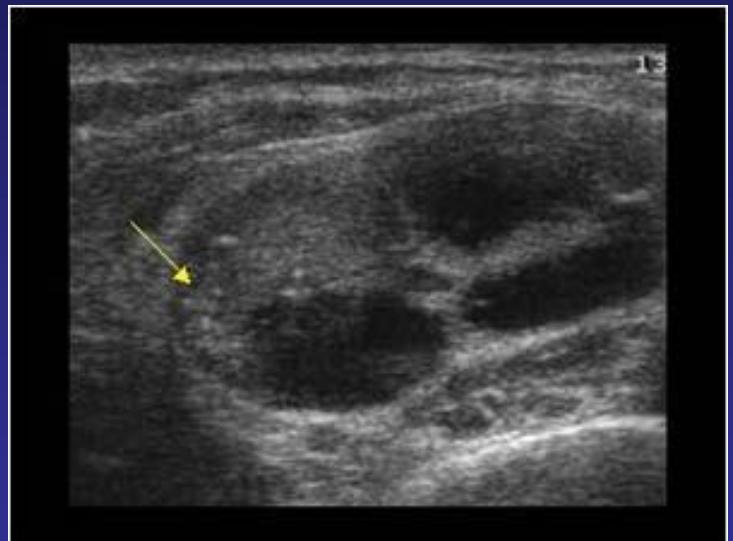


Different patient

Thyroid carcinoma



hypoechoic mass with
punctate calcifications

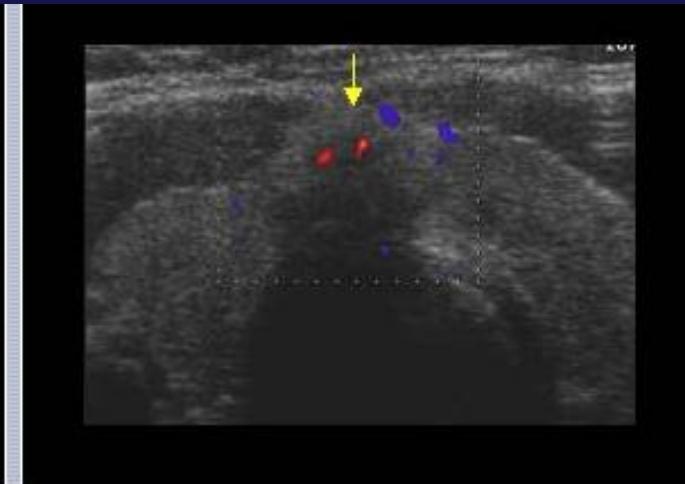


Lymph node metastasis
with punctate
calcifications

Small papillary carcinoma in the isthmus



4/065.jpg



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with a hypoechoic ill defined mass with calcifications