Corewell Health™

Thyroid Disease

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MICHIGAN OSTEOPATHIC ASSOCIATION SPRING 2023

Conflict

- My wife works for Bayer
- I've been a hired consultant with Insulet, Bayer, and Novo Nordisk Corporations

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Resources

American Thyroid Association guidelines for:

- Hyperthyroidism(2016)
- Hypothyroidism(2014)
- Thyroid cancer(2015)

Question 52 of 84

A 24-year-old woman is evaluated for a 1-week history of neck discomfort that radiates to the jaw, palpitations, a fast heart rate, anxiety, and fever. The patient reports having a sore throat 4 weeks ago that resolved after a few days. She has no other symptoms and no personal history of thyroid or endocrine disorders. Her only medication is an oral contraceptive.

Physical examination shows an anxious-appearing woman. Temperature is 37.5 °C (99.5 °F), blood pressure is 140/60 mm Hg, pulse rate is 110/min, and respiration rate is 16/min; BMI is 23. Cardiopulmonary examination reveals tachycardia, but other findings are normal. The thyroid gland is slightly enlarged and tender with no nodules. No thyroid bruit is heard, and no cervical lymphadenopathy is palpated. No eye findings or pretibial myxedema is noted. The patient has a fine bilateral hand tremor.

Laboratory studies:	
Erythrocyte sedimentation rate	45 mm/h
Thyroid-stimulating hormone	<0.01 μU/mL (0.01 mU/L)
Thyroxine (T_4), free	4.1 ng/dL (53 pmol/L)
Triiodothyronine (T_3)	300 ng/dL (4.6 nmol/L)

A Doppler thyroid ultrasound shows an enlarged thyroid gland with heterogeneous echotexture without cervical lymphadenopathy; no significant vascular flow is evident.

Which of the following is the most appropriate next step in management?

(A) Bilateral fine-needle aspiration biopsy

(B) Methimazole

(C) Serum thyroglobulin measurement

(D) 24-Hour radioactive iodine uptake test

Question 56 *of 84*

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An 88-year-old man is evaluated during a routine physical examination. He reports occasional tiredness but has no other symptoms, such as nervousness, weight gain or loss, joint discomfort, constipation, palpitations, or dyspnea. The patient has a history of hypertension. Medications are daily lisinopril and daily low-dose aspirin.

Physical examination shows an alert and oriented older man. Blood pressure is 140/85 mm Hg; all other vital signs are normal. Cardiac examination shows a grade 1/6 crescendo-decrescendo systolic murmur, and pulmonary examination findings are normal. The thyroid gland is not palpable; no cervical lymphadenopathy is noted. Results of examination of the extremities, including pulses, are normal.

Laboratory studies:	
Complete blood count	Normal
Comprehensive metabolic profile	Normal
Thyroid function tests (repeated and confirmed)	
Thyroid-stimulating hormone	6.8 μU/mL (6.8 mU/L)
Thyroxine (T_4), free	1.1 ng/dL (14 pmol/L)
Thyroid peroxidase antibody titer	Normal

Which of the following is the most appropriate management?

(A) Levothyroxine

(B) Liothyronine

(C) Radioactive iodine test

(D) Observation

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Objectives

- Understand thyroid labs, studies for function, and test for anatomy
- Consider hypothyroidism, when to treat and not treat
- Know clinically when and when not treat hyperthyroidism
- Discuss goiter, thyroid nodules and thyroid caner

Thyroid Physiology

- Thyroid hormone production is under the control of the hypothalamic-pituitary axis
  - Occurs via a balance between thyrotropin-releasing hormone (TRH) and thyroid-stimulating hormone (TSH) secretion through a negative feedback loop involving thyroxine (T4) and triiodothyronine (T3)

Thyroid Physiology

Thyroid hormone

- The thyroid gland primarily produces T4 (80-100 µg/d) and only a small amount of T3 (4-8 µg/d)
- Most T3 (8-22 µg/d) comes from peripheral conversion by 5'-deiodinase enzymes
- The physiologic hormone replacement is:
  - **Ideal body weight kilograms (based on a person's height) multiplied by 1.5 - 1.6 mcg**

Thyroid Physiology

Iodine

- Iodide (ionic form of iodine) is an essential component of thyroid hormone, adequate dietary iodine intake is essential for adequate thyroid hormone production
- Although iodine deficiency is a worldwide health problem, data from the National Health and Nutrition Examination Survey (NHANES) study indicate generally adequate iodine intake in the United States
- Pregnant and lactating women, require approximately 50% or 100%, respectively, more daily iodine than the general population

Thyroid Disorders

Primary versus secondary thyroid disorders:

- Primary – Thyroid gland dysfunction
  - low TSH levels reflective of thyrotoxicosis
  - elevated TSH levels indicative of hypothyroidism

- Secondary – Central causes of thyroid dysfunction

Clinical Hypothyroid Disease

- Symptoms:
  - Fatigue, reduced endurance, weight gain, cold intolerance, constipation, impaired concentration and short-term memory, dry skin, edema, mood changes, depression, psychomotor retardation, muscle cramps, myalgia, and menstrual changes, such as menorrhagia
- Signs:
  - Reduced basal temperature, diastolic hypertension, a possibly enlarged thyroid gland, bradycardia, pallor, dry and cold skin, brittle hair, hoarseness, and a delayed recovery phase of deep tendon reflexes

Clinical Hyperthyroid Disease

- Symptoms:
  - Fatigue, anxiety, insomnia, weight loss (despite increased appetite), tremulousness, heat intolerance, irregular menses, hyperdefecation, palpitations, shortness of breath or dyspnea on exertion, muscle weakness, and decrease menstrual bleeding or cessation of menses
- Signs:
  - Increased basal temperature, a possibly enlarged thyroid gland, thyroid gland bruit, tachycardia, palpitations, dry skin, fine tremor, and in the case of Graves' disease (autoimmune hyperthyroidism) may note proptosis, sclera irritation, dry eyes, tearing, double or blurred vision, photophobia, and pretibial myxedma

Clinical Goiter Disease

- Symptoms:
  - Neck fullness, difficulty swallowing, difficulty with breathing (particularly with lying down), cosmetically unappealing
- Signs:
  - Grossly enlarged neck, pulmonary function test can show intra or extra thoracic obstruction

Clinical Thyroid Malignancy

- Symptoms:
  - Neck fullness, difficulty swallowing, difficulty with breathing, sudden change in neck size, tender nodule, warm nodule, and neck, axillary and clavicle lymphadenopathy, or asymptomatic
- Signs:
  - Neck, lymph node or thyroid tenderness with palpation, weight loss (rarely), or asymptomatic

Thyroid Laboratory Assessment

- There is no screening regimen recommended by the United States Preventative Task Force

- In other words, tests for thyroid disease only need to be performed if there are symptoms, signs, or clinical suspicions for disease

Thyroid Laboratory Assessment

Outpatient

- Thyroid Stimulating Hormone – TSH

Inpatient

- Attempt avoid ordering thyroid hormone studies unless there is a clinical suspicion of a thyroid disorder as the etiology for the hospitalization

Thyroid Laboratory Assessment

TSH

- Excellent test to determine thyroid function
- Reference range generally 0.5-5 µU/mL
- Is only misleading in rare conditions
  - Secondary thyroid diseases (hypopituitarism or TSHoma)
  - Thyroid hormone resistance

Thyroid Laboratory Assessment

TSH – What's too high or too low

- Hyperthyroidism
  - **Less than 0.1 µU/mL** is detrimental (particulatly in patient greater than 65 years old)
    - Increased risk of atrial fibrillation
    - Osteoporosis

- Hypothyroidism
  - **Greater than 10 µU/mL**
    - Treatment to improve lipids

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Thyroid Laboratory Assessment

- Total T3, total T4, free T3 and free T4
  - Not useful - Total T3 and Total T4 are not used as they are influenced by variation in binding proteins (Thyroxine-binding globulin, transthyretin, and albumin)
  - Free T4 useful - Rarely:
    - secondary thyroid dysfunction is suspected
  - Free T3 generally never ordered
    - maybe supportive if T3 thyrotoxicosis is suspected

Thyroid Laboratory Assessment

Supportive only - Antibodies and Immunoglobulins

Anti-thyroid peroxidase antibodies

Antithyroglobulin antibodies

- Generally elevated in Hashimotos (autoimmune hypothyroidism)
- If positive patient has increased risk for hypothyroidism

Thyroid-stimulating immunoglobulin (TSI)*

TSH receptor antibody (TRab)*

*May have utility in patients with orbitopathy or pregnancy to assess treatment

Thyroid Laboratory Assessment

- Serum Thyroglobulin – 2 clinical scenarios
  - Used to follow post radio ablative therapy for thyroid cancer
  - Helpful in diagnosing surreptitious use of thyroid hormone analogs when levels are very low or undetectable

Thyroid Nodule

- Epidemiology
  - The prevalence of a palpable thyroid nodule is 4% to 7% in the general population
  - Thyroid nodule detection on ultrasound is 20% to 65% in the general population
  - Increasing number of thyroid nodules are detected incidentally on imaging tests performed for unassociated reasons
  - Nodules are more common with aging and occur more frequently in women
  - The cancer risk for a thyroid nodule very low

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Thyroid Nodule

Cancerous Nodules	Benign Nodules
Microcalcifications	Comet tail
Increased central nodule vascularity	Increased peripheral nodule vascularity
Hypoechogenicity	Hyperechogenicity
Irregular border	Halo present
Taller than wide (transverse view)	Pure cyst

Thyroid Nodule

- When to Biopsy – in General
  - Biopsy of a nodule greater than 1 cm in diameter, with worrisome characteristics, in an appropriate person is reasonable

Thyroid Nodule

- Thyroid Imagine Reporting and Data System - AKA – TI-RADS
- This is a stratification system for thyroid lesions that is based on the previously established system for breast imaging, BI-RADS.
- There are several iterations of the TIRADS criteria that have undergone modifications since the original version in 2009.

ACR – TI-RADS 2017 - Scoring

composition: (choose one)
- cystic or completely cystic *: 0 points
- spongiform *: 0 points
- mixed cystic and solid: 1 point
- solid or almost completely solid: 2 points

echogenicity: (choose one)
- anechoic: 0 points
- hyper- or isoechoic: 1 point
- hypoechoic: 2 points
- very hypoechoic: 3 points

shape: (choose one) (assessed on the transverse plane)
- wider than tall: 0 points
- taller than wide: 3 points

margin: (choose one)
- smooth: 0 points
- ill-defined: 0 points
- lobulated/irregular: 2 points
- extra-thyroidal extension: 3 points

echogenic foci: (choose one or more) none: 0 points
- large comet tail artifact: 0 points
- macrocalcifications: 1 point
- peripheral/rim calcifications: 2 points
- punctate echogenic foci: 3 points

ACR – TI-RADS 2017 - Scoring

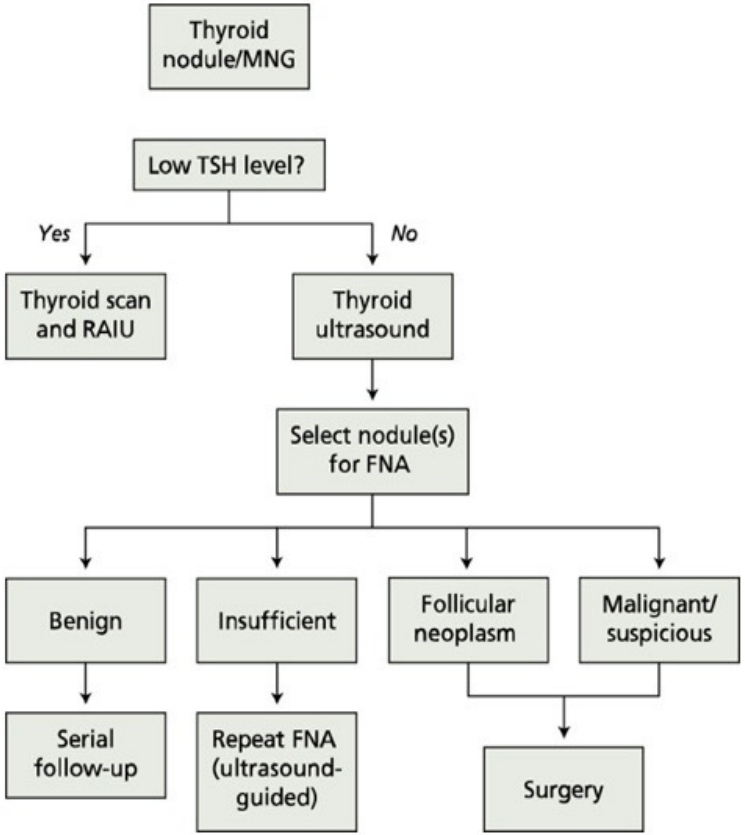
Classification:

TR1: 0 points
–Benign
TR2: 2 points
–not suspicious
TR3: 3 points
–mildly suspicious
TR4: 4-6 points
–moderately suspicious
TR5: ≥7 points
–highly suspicious

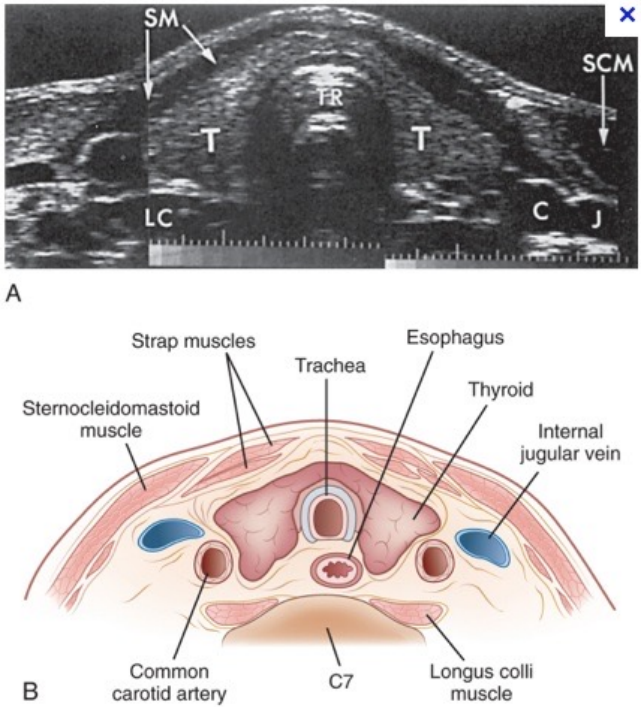
Recommendations:

- **TR1**: no FNA required
- **TR2**: no FNA required
- **TR3**: ≥1.5 cm follow up, ≥2.5 cm FNA
  - –follow up: 1, 3 and 5 years
- **TR4**: ≥1.0 cm follow up, ≥1.5 cm FNA
  - –follow up: 1, 2, 3 and 5 years
- **TR5**: ≥0.5 cm follow up, ≥1.0 cm FNA
  - –annual follow up for up to 5 years

Thyroid Nodule



Thyroid Ultrasound



Thyroid Ultrasound

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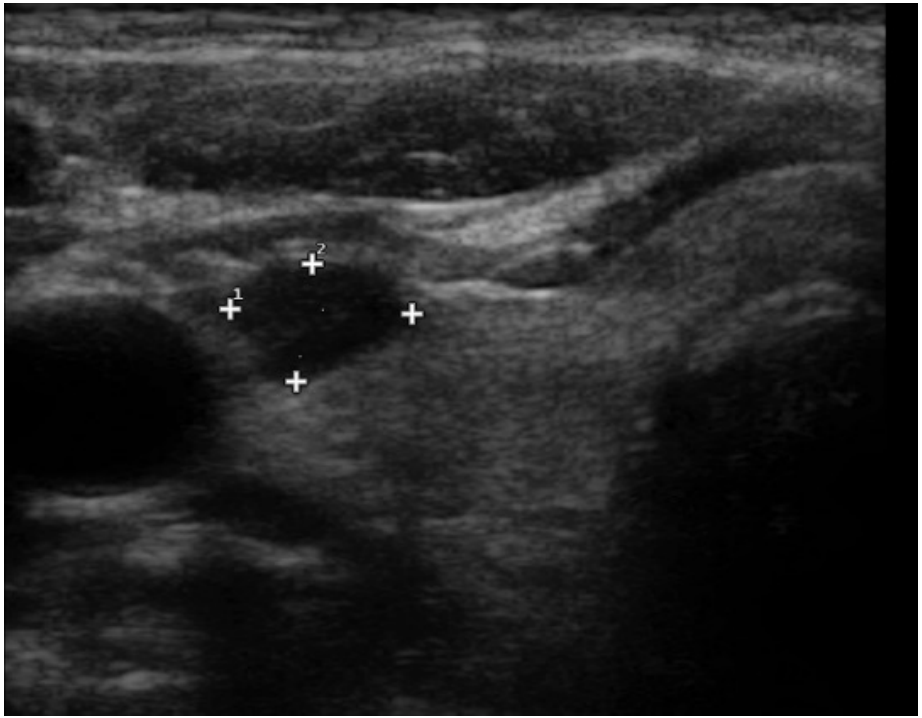
Thyroid Ultrasound



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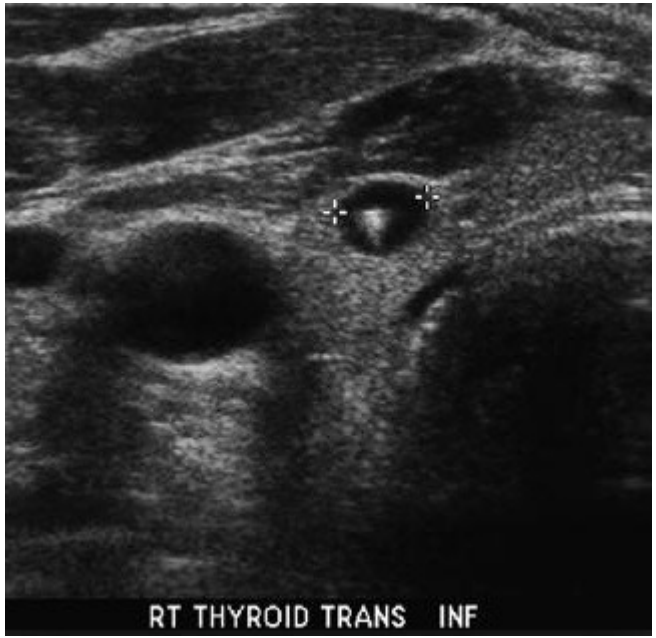
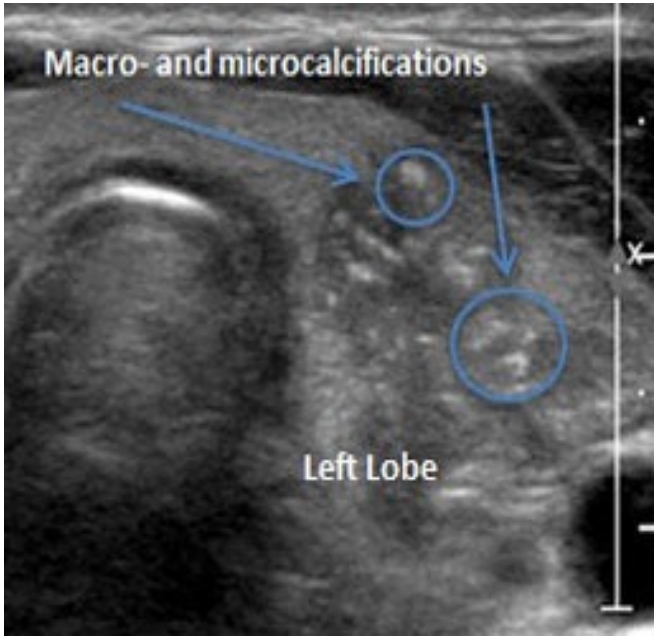
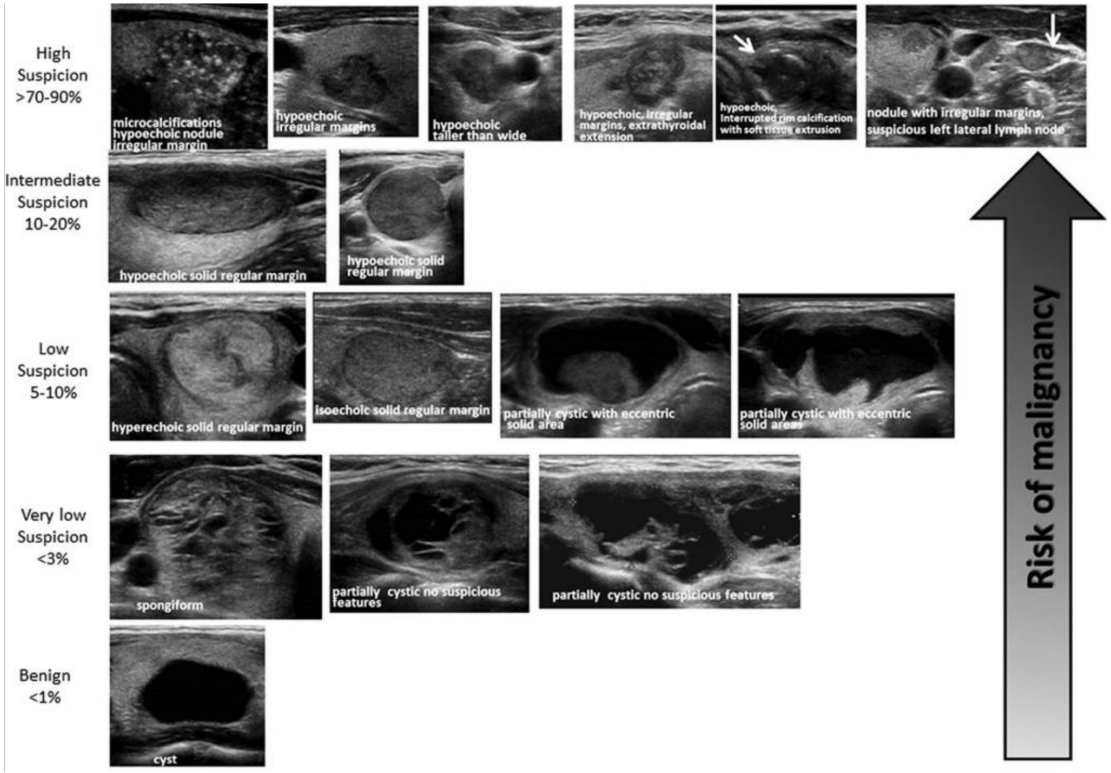
Thyroid Ultrasound





Thyroid Nodule



Thyroid Nodule

- Biopsy results
  - Generally take 3 to 5 business days to return results to the patient

  - Results will be:
    - Not Malignancy (95%)
    - Malignancy (1-2%)
    - Non diagnostic (2-4%)

Thyroid Malignancy

- Four types of thyroid cancer:

  - Papillary Carcinoma
  - Follicular Carcinoma
  - Medullary Carcinoma
  - Anaplastic Carcinoma

Thyroid Malignancy

- Papillary and Follicular Carcinoma (>95% of thyroid malignancy)
  - Hemi or Total thyroidectomy
  - If high risk - radioiodine
  - Thyroid hormone replacement (unless partial thyroidectomy)
  - Annual Surveillance
  - Good prognosis

Thyroid Malignancy

- Medullary carcinoma
  - –Check calcitonin, Carcinoembryonic antigen (CEA), calcium and plasma fractionated metanepherines
  - –Neck, chest, and abdomen imaging
  - –Total thyroidectomy
  - –Monitor calcitonin, and CEA
  - –If disease reoccurs consider radiation therapy or chemotherapy

Thyroid Malignancy

- Anaplastic Thyroid Cancer (highly aggressive)
  - –Thyroidectomy
  - –Adjuvant chemotherapy and radiation therapy
  - –Palliative care and support

Thyroid Emergencies

- Assess Clinically
  - TSH is frequently high and low in several cases, but the clinical status determines the urgency

Thyroid Emergencies

- Myxedama coma
  - The diagnosis of myxedema coma is initially based upon the history, physical examination, and exclusion of other causes of coma
  - Additional clues to the possible presence of myxedema coma in a poorly responsive patient are the presence of a thyroidectomy scar or a history of I-131 therapy or hypothyroidism

Thyroid Emergencies

Myxedama coma

- Severe hypothyroidism
- Generally, precipitated by an acute event such as infection, myocardial infarction, cold exposure, or the administration of sedative drugs, especially opioids
- It is a medical emergency with a high mortality rate (30-40%)
- Fortunately, it is now a rare presentation of hypothyroidism

Thyroid Emergencies

Myxedama coma

Hallmarks of myxedema coma:

- Decreased mental status
- Hypothermia
- Hypotension
- Bradycardia
- Hyponatremia
- Hypoglycemia
- Hypoventilation

Thyroid Emergencies

- Myxedema
  - Stabilize the patient (frequently require ventilator support)
  - Levothyroxine IV 300-500 mcg daily for one to five days (consider adrenal insufficiency)
  - Transition to IV maintenance dose daily (half the physiologic replacement dose)
  - Transition to PO dose (calculated physiologic dose)
  - Monitor Free T4 acutely and eventually TSH

Thyroid Emergencies

- Thyroid Storm
  - Rare, life-threatening condition characterized by severe clinical manifestations of thyrotoxicosis
  - Often precipitated by untreated hyperthyroidism, or an acute event such as thyroid or non-thyroidal surgery, trauma, infection, an acute iodine load, or peripartum period

Thyroid Emergencies

- Thyroid Storm
  - Diagnosis of thyroid storm is based upon clinical findings
  - In 1993, a scoring system was developed using precise clinical criteria for the identification of thyroid storm
  - A score of 45 or more is highly suggestive of thyroid storm, whereas a score below 25 makes thyroid storm unlikely
  - While this scoring system is likely sensitive, it is not very specific

Thyroid Strom Score

Thermoregulatory dysfunction	
Temperature (°F | °C)	
99 to 99.9 | 37.2 to 37.7	5
100 to 100.9 | 37.8 to 38.2	10
101 to 101.9 | 38.3 to 38.8	15
102 to 102.9 | 38.9 to 39.4	20
103 to 103.9 | 39.4 to 39.9	25
≥104.0 | >40.0	30
Central nervous system effects	
Mild	10
Agitation	
Moderate	20
Delirium	
Psychosis	
Extreme lethargy	
Severe	30
Seizure	
Coma	
Gastrointestinal-hepatic dysfunction	
Moderate	10
Diarrhea	
Nausea/vomiting	
Abdominal pain	
Severe	20
Unexplained jaundice	

Cardiovascular dysfunction	
Tachycardia	
99 to 109	5
110 to 119	10
120 to 129	15
130 to 139	20
≥140	25
Atrial fibrillation	10
Heart failure	
Mild	5
Pedal edema	
Moderate	10
Bibasilar rales	
Severe	15
Pulmonary edema	
Precipitant history	
Negative	0
Positive	10

Thyroid Emergencies

Hyperthyroid - storm

- Stabilize the patient (frequently require ventilator support)
- High dose Methimazole or PTU
- Glucocorticoid
- In Graves' disease only - Super saturated potassium iodine (SSKI)

Autoimmune Thyroid Disease

- Autoimmune thyroid disease is a spectrum
  - Patients can be hypothyroid (Hashimoto's)
    - Rare disease – only present in 0.3% of US population.
  - Patients can be hyperthyroid (Graves')
  - Patients' disease can traverse the spectrum clinically through out their lifetime
- Diagnosis always starts with a TSH

Subclinical Disease

Subclinical Hypothyroidism

TSH above reference range, free T4 within the reference range

TSH greater than the reference range

- **If consistently found, generally warrants treatment if TSH greater than 10µU/mL**

Subclinical Hyperthyroidism

TSH below reference range, Free T4 within the reference range

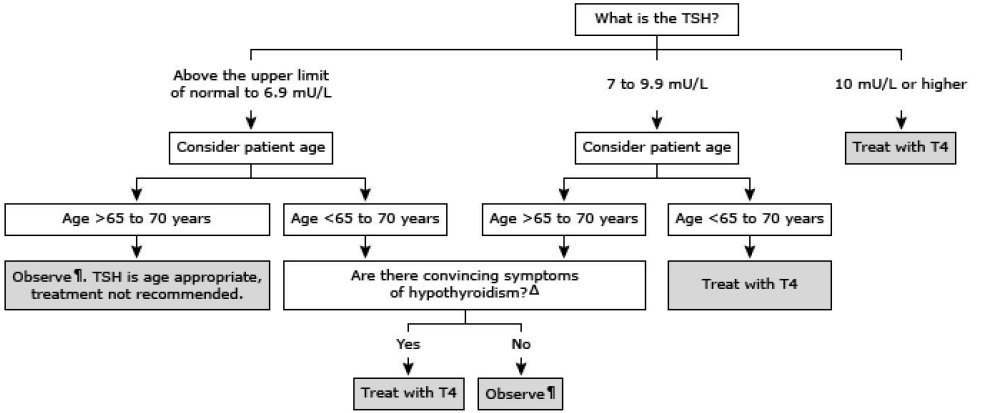
TSH less then the reference range

- **If consistently found, warrants treatment if TSH less than 0.1µU/mL, and greater then 65 years old**

Subclinical Disease

Subclinical Hypothyroidism

Indications for thyroid hormone replacement in nonpregnant adults with subclinical hypothyroidism*



TSH: thyroid-stimulating hormone; T4: levothyroxine; free T4: free thyroxine.
* Subclinical hypothyroidism is defined by a TSH above the normal reference range with a normal free T4, confirmed with repeat measurement.
¶ For patients not treated with T4, monitor TSH and free T4 initially at six months and, if stable, yearly thereafter.
Δ Convincing symptoms of hypothyroidism (new or worsening fatigue, constipation, cold intolerance) or growing goiter.

Hypothyroidism – When to treat

- Treatment generally occurs when TSH>10 micro international units/ml (microIU/ml), even if free T4 is normal
- Treatment of TSH values 5-10 microIU/ml are judged on other factors such as lipids or clinical judgment
- In non-pregnant patients, there are minimal adverse outcomes from TSH values between 5-10microIU/ml
- There is no known advantage to treatment, except occasionally there are reports of decreased CHF, improved lipid profile and subjective improvement

Hypothyroid Treatment

- Outpatient Hypothyroid
  - First decide if young/old, and cardiac risk vs. no risk
  - The physiologic hormone replacement is:
    - **Ideal body weight (in kg) multiplied by 1.5 - 1.6 mcg**
  - In the elderly or cardiac arrhythmia prone, you may titrate up starting at 25-50 mcg
  - Monitor TSH every 6-8 weeks

Hypothyroid Treatment

- Outpatient hypothyroid treatment
  - Levothyroxine and Synthroid are equally as effective in treating hypothyroid disease
    - The dose may be different but titrate the TSH to the desired level

Amour thyroid is not preferred as it is a variable dose and contains T3

To attain stability of TSH the medication should be given on an empty stomach, with water, with nothing PO for 30-40 minutes

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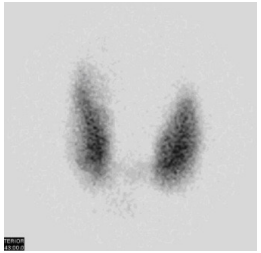
Hyperthyroidism outpatient

- Outpatient hypothyroidism is clinically concerning when TSH is consistently <0.1 micro international units per milliliter
- Need images to help determine treatment

Hyperthyroid Assessment TSH<0.1

- Nuclear Medicine technetium or I-123 uptake and scan:
  - Uptake – assesses FUNCTION – read out as a percentage. Depends on hour of read Normal is somewhere between 5-30%
  - Scan – assesses ANATOMY – read out as an image. Normal is a nice homogeneous thyroid gland



Hyperthyroid Assessment TSH<0.1

Nuclear Medicine technetium or I-123 uptake and scan:

Uptake

- In surreptitious use of thyroid hormone and thyroiditis uptake is low (estimate 0-30%)
- Autonomously functioning thyroid nodule, toxic multinodular goiter uptake is low to medium/high (estimate 5-65%)
- Graves' disease uptake is medium high (estimate 30-90%)

Hyperthyroid Assessment TSH<0.3

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Match:

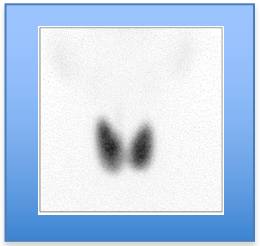
A) Graves’

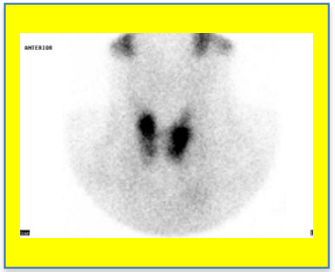
B) Toxic multinodular goiter

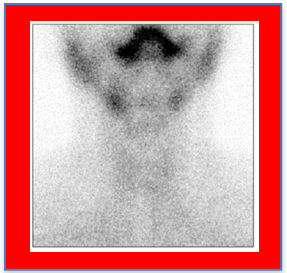
C) Autonomous functioning nodule

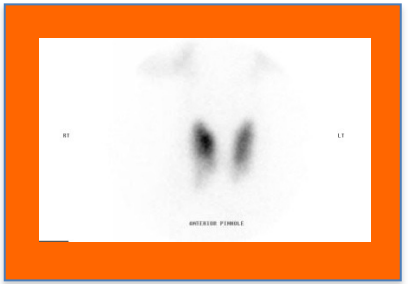
D) Thyroiditis

E) Surreptitious use of thyroid hormone









Hyperthyroid Treatment

- Hyperthyroid outpatient – Treatment depending on disease state:
  - Beta blocker to control heart rate
  - Treatment options include*:
    - Methimazole 5-30mg starting dose
    - Propylthiouracil (PTU) 100-300mg BID or TID
    - Radioiodine uptake followed by treatment
    - Thyroidectomy
  - Monitor TSH and free T4

*In pregnant woman or women who desire to become pregnant, the options are limited

Thyroid Treatment for Goiter

- Goiter
  - Surgery - If structurally obstructive or cosmetically unappealing
  - Be mindful of iodine loads

Question 52 of 84

A 24-year-old woman is evaluated for a 1-week history of neck discomfort that radiates to the jaw, palpitations, a fast heart rate, anxiety, and fever. The patient reports having a sore throat 4 weeks ago that resolved after a few days. She has no other symptoms and no personal history of thyroid or endocrine disorders. Her only medication is an oral contraceptive.

Physical examination shows an anxious-appearing woman. Temperature is 37.5 °C (99.5 °F), blood pressure is 140/60 mm Hg, pulse rate is 110/min, and respiration rate is 16/min; BMI is 23. Cardiopulmonary examination reveals tachycardia, but other findings are normal. The thyroid gland is slightly enlarged and tender with no nodules. No thyroid bruit is heard, and no cervical lymphadenopathy is palpated. No eye findings or pretibial myxedema is noted. The patient has a fine bilateral hand tremor.

Laboratory studies:	
Erythrocyte sedimentation rate	45 mm/h
Thyroid-stimulating hormone	<0.01 μU/mL (0.01 mU/L)
Thyroxine (T_4), free	4.1 ng/dL (53 pmol/L)
Triiodothyronine (T_3)	300 ng/dL (4.6 nmol/L)

A Doppler thyroid ultrasound shows an enlarged thyroid gland with heterogeneous echotexture without cervical lymphadenopathy; no significant vascular flow is evident.

Which of the following is the most appropriate next step in management?

(A) Bilateral fine-needle aspiration biopsy

(B) Methimazole

(C) Serum thyroglobulin measurement

(D) 24-Hour radioactive iodine uptake test

Peer Comparison

This data is from pre-publication test-takers who did not have access to the content of MKSAP 16.

Which of the following is the most appropriate next step in management?

(A) Bilateral fine-needle aspiration biopsy

(B) Methimazole

(C) Serum thyroglobulin measurement

(D) 24-Hour radioactive iodine uptake test

Related Text

Endocrinology and Metabolism

Disorders of the Thyroid Gland

Evaluation of Thyroid Function

Answer & Critique *(Correct Answer: D)*

Educational Objective: Diagnose subacute thyroiditis.

This patient should have a 24-hour radioactive iodine uptake (RAIU) test. She most likely has subacute thyroiditis, a form of destructive thyroiditis, given her neck discomfort, history of a transient possible viral infection 4 weeks ago, fever, elevated erythrocyte sedimentation rate (ESR), and biochemical findings (elevated serum free thyroxine [T_4] and triiodothyronine [T_3] levels and low serum thyroid-stimulating hormone level). The RAIU test measures thyroid gland iodine uptake over a timed period, usually 24 hours. In patients with destructive thyroiditis (or exposure to exogenous thyroid hormones), results of the RAIU test will be less than normal (<5% at 24 hours). In contrast to destructive thyroiditis, Graves disease will show an elevated (or sometimes normal) RAIU, which indicates endogenous excess synthesis and production of thyroid hormones.

Key Point

- In patients with destructive thyroiditis, results of the 24-hour radioactive iodine uptake test will be less than normal (<5% at 24 hours).

Fine-needle aspiration biopsy can be useful in the evaluation of thyroid nodules, which this patient does not have.

Antithyroid agents, such as methimazole or propylthiouracil, have no role in the treatment of destructive thyroiditis because endogenous production of thyroid hormones is very low. Although many patients can be treated expectantly with only β-blocker therapy, prednisone is indicated in patients with significant hormone elevation or pain.

Measurement of the serum thyroglobulin level can help distinguish exogenous levothyroxine ingestion from subacute thyroiditis. However, this patient's history and laboratory findings (tender thyromegaly, fever, elevated ESR) are not compatible with exogenous levothyroxine use.

Question 56 *of 84*

An 88-year-old man is evaluated during a routine physical examination. He reports occasional tiredness but has no other symptoms, such as nervousness, weight gain or loss, joint discomfort, constipation, palpitations, or dyspnea. The patient has a history of hypertension. Medications are daily lisinopril and daily low-dose aspirin.

Physical examination shows an alert and oriented older man. Blood pressure is 140/85 mm Hg; all other vital signs are normal. Cardiac examination shows a grade 1/6 crescendo-decrescendo systolic murmur, and pulmonary examination findings are normal. The thyroid gland is not palpable; no cervical lymphadenopathy is noted. Results of examination of the extremities, including pulses, are normal.

Laboratory studies:	
Complete blood count	Normal
Comprehensive metabolic profile	Normal
Thyroid function tests (repeated and confirmed)	
Thyroid-stimulating hormone	6.8 μU/mL (6.8 mU/L)
Thyroxine (T_4), free	1.1 ng/dL (14 pmol/L)
Thyroid peroxidase antibody titer	Normal

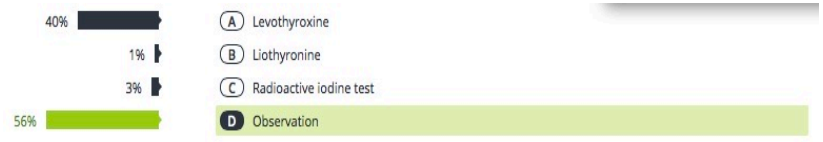
Which of the following is the most appropriate management?

(A) Levothyroxine

(B) Liothyronine

(C) Radioactive iodine test

(D) Observation



Answer & Critique *(Correct Answer: D)*

Metabolism
Thyroid Gland
oid Disorders
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Educational Objective: Interpret thyroid function studies in an older patient.

This patient should be monitored for evidence of hypothyroidism and should receive no pharmacologic therapy at present. In older persons with abnormal results on thyroid function testing, such as are seen in this patient, the tests should be repeated several times over a period of months to ensure the stability and accuracy of the results. The normal thyroid-stimulating hormone (TSH) range for most ambulatory outpatients is 0.5-5.0 microunits/mL (0.5-5.0 milliunits/L). However, the normal range is different during pregnancy and in patients older than 80 years. Several studies have shown that an elevated serum TSH level in older patients is not associated with detrimental medical outcomes (such as depressive symptoms and impaired cognitive function) but, in fact, is associated with a lower mortality rate. Although the precise numbers are somewhat controversial, the normal reference range most likely is approximately 1 to 7 microunits/mL (1-7 milliunits/L). It is now recognized that older patients generally should not be given levothyroxine solely for an elevated TSH level. A full consideration of the patient and the clinical context is necessary.

Key Point

- Older patients generally should not be given levothyroxine solely for an elevated thyroid-stimulating hormone level.

This patient is basically asymptomatic (except for mild fatigue) and in good health. His thyroid peroxidase antibody level and clinical examination findings are basically normal and thus support the concept that he does not require exogenous levothyroxine.

Most evidence to date has shown no clinical advantage of liothyronine over levothyroxine in patients requiring thyroid replacement therapy. Additionally, liothyronine and other triiodothyronine (T_3) preparations have a short half-life and have been associated with acute spikes in serum T_3 levels, which are of particular concern in older adult patients or patients with cardiac abnormalities.

A radioactive iodine test is not useful in establishing the diagnosis of hypothyroidism and thus is inappropriate in this patient.

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Conclusion

- Clinical assessment is key to determining thyroid disease
- Generally thyroid nodules with high TI-RADS (>4) that are large (>1cm), can consider biopsy
- Physiologic replacement dose of thyroid hormone is equal to the ideal body weight (in kg) multiplied by 1.6mcg
- To have clinical and TSH stability, the medication should be given on an empty stomach (meaning nothing to eat for the preceding 4 hours), with water, with nothing PO for 30-40 minutes

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Thanks!

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