MECHANISMS OF HUMAN DISEASE AND PHARMACOLOGY & THERAPEUTICS

CASE-BASED SMALL GROUP DISCUSSION

MHD II
Session IX

April 1, 2015

STUDENT COPY

CASE 1

History: A 57-year-old woman presents to a physician with the chief concern of progressive weight gain of 20 pounds in 1 year. Her appetite has been about the same but she has become less active because of constant fatigue. She has no known chronic medical problems. She takes a multivitamin daily, calcium citrate/Vitamin D3 315mg/200 IU – 2 tabs daily, and acetaminophen as needed for various aches and pains. About six months ago she began taking a laxative for constipation.

Review of systems:
General: no fevers, feels cold all the time
Pulmonary: mild dyspnea on exertion"ever since I gained all this weight", no cough
Cardiovascular: no chest pain, no paroxysmal nocturnal dyspnea, no orthopnea, occasional ankle swelling
Skin: using more lotions for dry skin. Nails are cracking
Neuro: no weakness, no parasthesias, kids commented recently that she seems more "spacey" and forgetful
Endo: no polyuria or polydypsia

Physical examination: Vital signs: temperature 96.8^{o}F, pulse 58/minute and regular, BP 140/100. She is moderately obese and speaks slowly. Her face appears puffy with pale, cool, dry, and thick skin. The thyroid gland is slightly enlarged, firm, not nodular, mobile, and not tender. There is no cervical lymphadenopathy. Lungs are clear to auscultation and percussion. On heart exam S1 and S2 are normal and there are no extra heart sounds. The abdomen is protuberant; there is no organomegaly. The deep tendon reflex relaxation time is delayed.

The physician formulates a differential diagnosis and orders the following:

Laboratory studies:

TSH	23.0 H	[0.20-5.00]	μu/ml
Free T4	0.1 L	[0.8-1.7]	ng/dl

EDUCATIONAL OBJECTIVES
CASE 1

1. What is the level of thyroid function in this patient? Correlate with the clinical findings.

2. Radioimmunoassays are widely available for measurement of serum total T4 (as well as total T3). Why did this physician order the unbound, or free, T4 level?

3. What are the most common causes of this patient's condition? What additional aspects of the history and physical examination could provide relevant information to help determine the etiology?

4. Are additional tests needed to confirm the diagnosis?

5. What are the treatment options? What instructions should she be given about taking the prescribed medication?

6. The patient's physician orders a lipid profile. Why?

Component Results

Component	Value	Flag	Low	High	Units	Stat
CHOLESTEROL	**271**	**H**	**<200**		**MG/DL**	**Fin**

Comment:
BASED ON CURRENT GUIDELINES, THIS LEVEL IS HIGH.
* * * *
COMPLETE NCEP RANGES, RISK LEVELS AND TREATMENT INFORMATION IS AVAILABLE AS A PRACTICE GUIDELINE IN THE PHYSICIAN ORDER ENTRY AND CLINICAL PROTOCOLS SECTION OF LUMC'S ELECTRONIC MEDICAL RECORD.

TRIGLYCERIDE	**225**		**<150**		**MG/DL**	**Fin**

Comment:
TRIGLYCERIDE REFERENCE RANGE APPLIES TO FASTING SAMPLE
* * * *
BASED ON CURRENT GUIDLELINES, THIS LEVEL IS HIGH.

HDL CHOLESTEROL	**34**	**L**	**>39**		**MG/DL**	**Fin**

Comment:
BASED ON CURRENT GUIDELINES, THIS LEVEL INDICATES HIGHER RISK.

LDL CHOLESTEROL	**218**	**H**	**<100**		**MG/DL**	**Fin**

Comment:
BASED ON CURRENT GUIDELINES, THIS LEVEL IS VERY HIGH.

7. What are the cardiac risk factors that are present in this patient? How does that affect therapy?

8. Review Case Image - **Endocrinology Set 1.**

CASE 2

History: A 57 year-old woman complains of progressive weight gain of 20 pounds in 1 year, fatigue, postural dizziness, loss of memory, dry skin, constipation, and cold intolerance.

Physical examination: Vital signs include a temperature 96.8ºF, pulse 58/minute and regular, BP 110/60. She is moderately obese and speaks slowly. Her voice is deep. She has a puffy face, with pale, cool, dry, and thick skin. The thyroid gland is not palpable. The deep tendon reflex relaxation time is delayed.

The physician formulates a differential diagnosis and orders the following:

Laboratory studies

TSH	1.0	[0.20-5.00]	μu/ml
Free T4	0.1 L	[0.8 -1.7]	ng/dl

EDUCATIONAL OBJECTIVES
CASE 2

1. What is the level of thyroid function in this patient?

2. What are possible etiologies of this patient's condition?

3. What additional aspects of the history and physical examination could provide relevant information to help in the determining the etiology?

4. What additional tests would help confirm the diagnosis?

5. What are the treatment options?

Case 3

History of Present Illness

Cc: I've had nausea and have been so tired x 5 months

A 54 year old woman presented to her primary care physician for unremitting nausea and fatigue for the past 5 months. She has no abdominal pain and has had rare emesis despite the nausea. She is having normal bowel movements. She skips meals occasionally because of the nausea but overall thinks her appetite is normal. She has lost ~5 pounds over the past 3-4 months. She has had no fevers. She has not traveled out of the state for greater than 1 year. With respect to her fatigue she feels "my get up and go has gotten up and left".

PMHx
No known chronic medical problems

Medications
None

Social History
Tobacco – never
ETOH seldom - last drink was 1 glass of wine at a wedding 4 months ago
Married; 1 son in college
Works as a hotel manager

Family history
Hypothyroidism in multiple family members

Physical exam
BP 110/78, pulse 90, respiratory rate 12, temp 37^0 Celsius
Neck – appears full, no focal nodules, no lymphadenopathy
Lung and heart exams normal.
Abdomen - normoactive bowel sounds, nondistended, no organomegaly, no masses
Skin – appears "tanned"

Laboratory Data:

TSH	7.25	[0.20-5.00]	μu/ml
Free T4	1.3	[0.8 -1.7]	ng/dl
Free T3	1.1	[0.9-2.4]	ng/L

Thyroid ultrasonography was performed to evaluate the neck fullness and showed an enlarged thyroid with a sonographic pattern of diffusely coarse echotexture with innumerable tiny

hypoechoic with echogenic fibrous bands – radiologic changes consistent with Hashimotos Thyroiditis

Symptomatic primary hypothyroidism was diagnosed and treatment with levothyroxine 50 mcg/day was initiated.
The patient's symptoms worsened. During follow-up with her physician, an alternative cause for her symptoms was not identified.

Educational Objectives:

1. Does the rendered diagnosis of hypothyroidism fully explain the patient's presentation?

Case continued:

Twelve months later, the patient presented to the emergency department with acutely worsening nausea, vomiting, fatigue, generalized weakness, lightheadedness and dizziness in addition to a cough for 10 days.
Review of her medical record was notable for a further unintentional weight loss of 12 pounds over preceding year.
She remained on levothyroxine and no other medications.

PE:
BP 65/48, pulse 62, respiratory rate 20, temperature 36.4^0 Celsius
She appeared generally uncomfortable and in mild distress
Pertinent positives: decreased skin turgor, dry mucous membranes, hyperpigmentation of face, neck, arms and palmar creases.

When asked about the hyperpigmentation, she noted having compliments for her "year round tan" as well as questions regarding whether she had "dye" on her palms that could not be washed off.

Laboratory Data

Basic Metabolic Panel

Glucose	68	[70 - 100]	mg/dl
Blood Urea Nitrogen	8	[7 - 22]	mg/dl
Creatinine	1.2	[0.7 - 1.5]	mg/dl
Calcium	8.9	[8.5 - 10.5]	mg/dl
Sodium	128	[136 - 146]	mmol/L
Potassium	5.6	[3.5 - 5.3]	mmol/L
Chloride	101	[98 - 108]	mmol/L
Carbon Dioxide	20	[20 - 32]	mmol/L

CBC w/ DIFF

WBC	4.2	[4.0-10.0]	k/ul
RBC	3.42	[3.60-5.50]	m/ul
Hgb	10.0	[12.0-16.0]	gm/dl
Hct	30.3	[34.0-51.0]	%
MCV	82	[85-95]	fl
MCH	30.3	[28.0-32.0	pg
MCHC	33.3	[32.0-36.0	gm/dl
RDW	15	[11.0-15.0]	%
Plt Count	200	[150-400]	k/ul

TSH	3.25	[0.20-5.00]	mn/ml

CHEST RADIOGRAPH

Interpret the findings:

2. Given the available clinical and diagnostic data, which one of the following is the most likely etiology of the patient's symptoms? Discuss your rationale.

A. Carcinoid syndrome
B. Cushing syndrome
C. Hyporeninemic hypoaldosteronism
D. Primary adrenal insufficiency
E. Secondary adrenal insufficiency

The patient was admitted to the intensive care unit, and during the first 2 hours she

received 8 liters of fluid resuscitation with intravenous normal saline. A recheck of her vital signs revealed a blood pressure of 72/50 mm Hg and pulse rate of 78 beats/min. She continued to be in mild generalized distress.

3. Which one of the following is the next most appropriate next step in management? Explain your rationale.

A. Administer IV Hydrocortisone or IV Dexamethasone
B. Administer Fludrocortisone
C. Administer more intravenous fluids
D. Administer Moxifloxacin
E. Administer IV fluids and azithromycin but wait for results of pending tests confirm your diagnosis before administering IVcorticosteroids

With appropriate management as discussed above, the patient's blood pressure improved to 96/62 mm Hg, and she had rapid clinical improvement.

Random cortisol level 4.2 μg/dL (reference range 7-25 μg/dl)

4. Interpret the above test result.

Additional Diagnostic Data

Corticotropin 738 pg/ml (reference range 10-60 pg/ml)

3:00pm
Cortisol <1.0 μg/dL — Blood drawn between 7-9am: 4-22 ug/dL Blood drawn between 3-5pm: 3-17 ug/dL

250mcg of cosyntropin is administered intravenously.

3:30pm
Cortisol 1.3 μg/dL

4:00pm
Cortisol 1.7 μg/dL

5. Interpret the above test result.

6. Which one of the following is the most likely cause of this patient's disease?

A. Autoimmune adrenalitis
B. Congenital adrenal hyperplasia
C. Exogenous corticosteroid use
D. Pituitary tumor
E. Tuberculosis

7. Discuss the long-term management of this disease process

Before discharge, her nausea had resolved. The patient was followed up clinic 3 months after discharge from the hospital and had complete resolution of her nausea, fatigue, anemia, and electrolyte. abnormalities. She continued to have hyperpigmentation, although less marked than before.

8. Why do you think the patient's symptoms worsened when she was started on levothyroxine therapy?

9. Why did the patient's hyperpigmentation improve?

Case 4 - Unknown - Students will not have case data until session meets

"Case 5" - Beyond multiple choice exercise

- Students are asked to each develop 1 question before the small group session which they will direct to the student sitting to the left or right of them (facilitator choice for the session).
- Questions are to be related to small group material (ie the organ system) from year 1 (anatomy, physiology, cell/molecular biology, immunology).
- So that questions have "relevance", students are asked to derive the idea for their question from First Aid for USMLE Step 1, but further research/verify the question & answer via a text from their MS-1 year or another published text available through the LUHS library. Students should cite the resource(s) that they use and pages (when able from the online text).
- After the student answers the question, the author of the question should provide a **brief** explanation for the answer.
- The student who answered the question will then ask their question to the next student.

- You are encouraged to post your questions/answers/references on Sakai for the class to share/review, particularly for USMLE preparation.