



Year 2 Peer Based Learning 2020

Endocrine System

Please note – this learning resource has been produced by the GUMS Academic Team. It is possible that there are some minor errors in the questions/answers, and other possible answers that are not included below. Make sure to check with other resources.

Scenario 1

1. A 65-year old male comes to your GP clinic complaining of chronic headaches, lower back pain and right hip pain. This all started approximately 6 months ago and seems to be getting worse. History and physical examination are unremarkable except for the patient noting that his hat seems to not fit anymore. A skull x-ray shows a “cotton wool” pattern. A pelvic x-ray shows a thickening of the cortex, accentuation of the trabecular pattern and an increased density of the bone. What is the most likely diagnosis?
 - a) Bone metastasis from prostatic cancer
 - b) Hypervitaminosis D
 - c) Vitamin D deficiency
 - d) Paget Disease of the Bone**
 - e) Acromegaly
2. What would you expect to find on blood tests?
 - A) Normal labs
 - B) Decreased serum phosphate and calcium levels + increased PTH
 - C) Increased alkaline phosphate + normal serum calcium and phosphate**
 - D) Increased parathyroid hormone and serum calcium + decreased phosphate
 - E) Increased serum phosphate and calcium + decreased PTH

Explanation: Paget’s disease of the bone is a disorder of bone remodeling where there is excessive bone resorption followed by increased bone formation. It commonly occurs in multiple sites but can affect only a single bone.

While Paget’s can be completely asymptomatic, the most common symptoms include nerve root compression, spinal stenosis, pathological fractures, secondary osteoarthritis, osteosarcoma and high-output heart failure.

Radiological findings: cotton wool appearance on skull x-ray, and classically accentuation of the trabecular pattern, increased density of bone and thickening of the cortex.

Lab results: Increased alkaline phosphate (ALP) with **normal** serum calcium, phosphate and parathyroid hormone. ALP is a marker of bone turnover.



Scenario 2

A 65 year-old woman comes to your GP clinic complaining of fatigue and weakness. She has a history of **type 2 diabetes mellitus** that is poorly controlled. You take her blood pressure and she is **hypertensive**. You also note **lower extremity edema**. (3) What would be at the top of your differential for her symptoms?

Answer: Diabetic Nephropathy

Long standing poorly-controlled diabetes puts a patient at risk of diabetic nephropathy amongst other serious sequelae. This manifests in its early stages as microalbuminuria.

Scenario 3

A 14-year-old girl presents to ED with complaints of progressive weakness, fatigue and headaches persisting for several months. The headaches seem to be increasing in severity and frequency and on examination her blood pressure is 180/90.

Laboratory tests reveal:

Very high morning renin activity
High morning aldosterone concentration
Low serum potassium level.

(4) What diagnosis would you be suspecting?

- A) Primary hyperaldosteronism (Conn's syndrome)
- B) Cushing's Disease
- C) Paget's Disease
- D) Secondary hyperaldosteronism**
- E) Excessive licorice ingestion

Explanation: In a patient presenting with fatigue, weakness, and headache who also has high morning renin, and aldosterone, you should suspect **secondary hyperaldosteronism**. In primary aldosteronism (Conn's syndrome), there would be low renin activity.



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(5) Which of the following would be consistent with this diagnosis?

- A) High levels of ACTH from a pituitary adenoma
- B) High levels of metanephrines excreted in urine
- C) Increased 17-hydroxyprogesterone levels
- D) Involution of zona glomerulosa of adrenal gland
- E) **CT showing a subcapsular renal mass (juxtaglomerular tumour)**

Explanation: Pleomorphic smooth cells in renal cortex, in combination with elevated renin and aldosterone, indicates the presence of a juxtaglomerular tumor. This is a very difficult question, but you should understand that excessive renin production leads to secondary hyperaldosteronism which leads to the symptoms described above.

Scenario 4

A 65-year-old man presents to his GP complaining of fatigue and muscle cramps for the last two months. He is on atorvastatin, ramipril and sertraline.

On further questioning, he also reports feeling tingling around his mouth and in his fingers and toes. An ECG is done which reveals prolonged QT interval. (6) Which of the following serum abnormalities would you expect to see on his lab results?

- A) Hyperkalaemia
- B) Hypokalaemia
- C) Hypercalcaemia
- D) **Hypocalcaemia**
- E) Hypermagnesaemia

Explanation: Hypocalcaemia includes the typical features described above: paraesthesias, muscle cramps, Chvostek sign and a prolonged QT interval.

(7) Which of the following hormone abnormalities could result in this patient's electrolyte imbalance?

- A) **Hypoparathyroidism**
- B) Hyperthyroidism
- C) Hypothyroidism
- D) 17-hydroxyprogesterone deficiency



E) Hyperaldosteronism

Explanation: Hypoparathyroidism is a common cause of hypocalcaemia. In response to low serum calcium, parathyroid hormone is secreted by parathyroid glands and increases serum calcium by increasing osteoclast activity.

(8) Which of the following is the most common cause of hypoparathyroidism?

- A) Kidney failure
- B) Steroid use
- C) Surgical destruction of parathyroid glands**
- D) DiGeorge Syndrome

Explanation: Surgical destruction of parathyroid glands (either intentionally or as an adverse effect during a thyroidectomy) is the most common cause of hypoparathyroidism. This is followed by autoimmune destruction of parathyroid cells and congenital causes such as DiGeorge syndrome.



Thyroid Disorders

(9) What is the most common cause of hyperthyroidism in the West?

Grave's disease

(10) What is the most common cause of hypothyroidism in the West?

Hashimoto's disease

Scenario 5

A 43 year old female presents to the GP clinic with 5kg of weight loss. She has a history of rheumatoid arthritis. Upon further questioning/examination, she is found to have sweaty palms, a HR of 110bpm, wearing thongs and shorts in winter, and has bulging eyes. Her lower legs have non-pitting oedema and plaques as shown below.



(11) Give some differentials for weight loss

Hyperthyroidism

T1DM

Malignancy

GIT stuff - coeliac, IBD etc.



Depression
Gastric ulcers
Chronic viral illness e.g. hep C, HIV

Etc.

(12) What is the most likely diagnosis?

Grave's disease

(13) What risk factors does she have for the disease above?

Middle aged female
Other autoimmune disease

(14) The presence of which clinical feature makes this diagnosis more likely than another cause of hyperthyroidism? Explain why by making reference to the pathophysiology.

Exophthalmos (bulging eyes) - this is NOT a sign of hyperthyroidism, but rather due to the TSH receptor autoantibodies directly stimulating fibroblasts in the eye. Pretibial myxedema has the same pathophysiology.

(15) What other clinical features would you ask about/examine for?

Diarrhoea
Amenorrhoea
Reflexes - brisk
Proximal myopathy
Mood symptoms - anxiety etc.

Many more

(16) What investigations would you consider in this patient?

Bedside:
ECG (for AF!)

Bloods:
FBC
Lipid profile - low lipids
TFT - low TSH, high T3 and T4



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Antibodies - TRAb, TPOAb, TgAb - even though TRAb are most specific for Graves', you order all three and they can all be elevated in Grave's

If antibodies aren't confirming the diagnosis but still have a high suspicion, consider **radioactive iodine uptake scan**

(17) What is the first line management in a pregnant vs non-pregnant lady? What to consider if first line management does not work?

Carbimazole (all the time) PTU (only in first trimester pregnancy because carbimazole is teratogenic). If these fail, consider a radioactive iodine ablation or thyroidectomy!

(18) What is the most serious side effect of antithyroid medications?

Agranulocytosis - advise patient to go to ED if they develop fever, sore throat! (something you usually wouldn't go in for)

(19) What are the next 2 most common causes of hyperthyroidism? What are some others?

Grave's > TMNG > toxic adenoma. Others = thyroiditis, early Hashimoto's etc.

(20) What if - someone presented with hyperthyroidism, but no exophthalmos and rather a headache and peripheral vision loss. What would be seen in the TFT?

Pituitary adenoma, high T3, T4 AND high TSH (secondary hyperthyroidism)