Case 1: Acromegaly

Leaders:

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Members:

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Summary of the case:

* Saad Bulbul, 47-year-old Male
* Family history: No history of diabetes mellitus.

Presenting problems	Clinical examination	Investigation
• Tiredness • Infrequent headaches • Didn't see cars on his side • Facial changes • Other symptoms: Passing urine at night, Feels thirsty, Excessive sweating, Changed voice	• Vital signs: normal, except blood pressure is increased • Visual field examination: bilateral hemianopia • Hands and feet are spade like	• Full blood count: normal • Increase blood glucose in OGTT. • Increase GH level • Urine dipstick test: Glucose ++

*** Final diagnosis: Acromegaly**

Definition of Acromegaly:

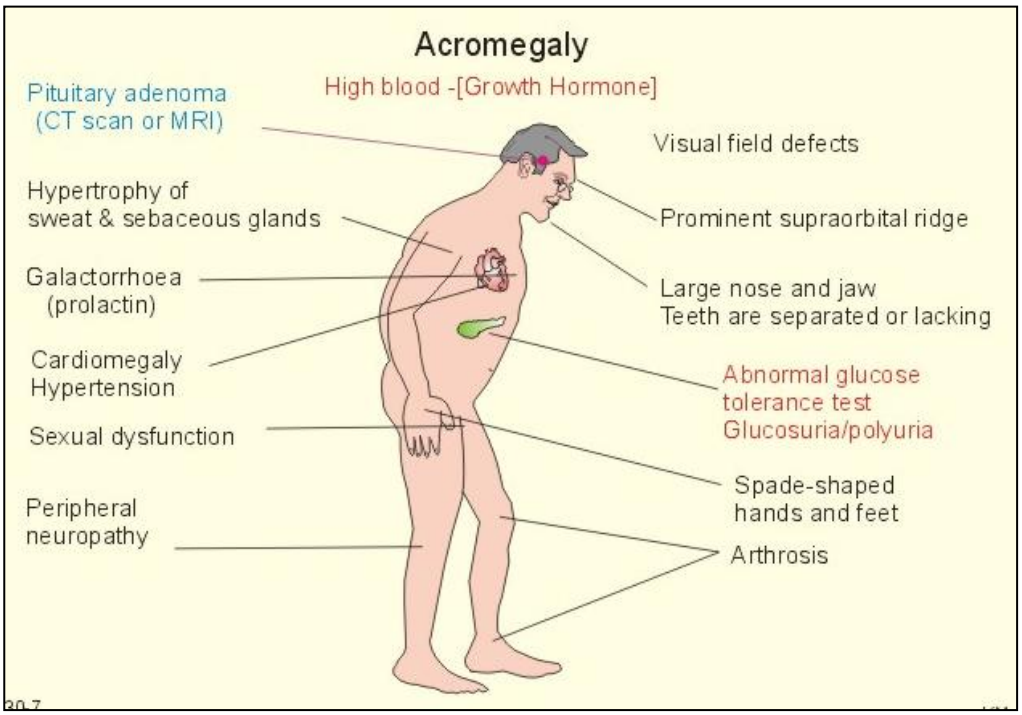
A hormonal disorder that results from too much growth hormone (GH) in the body. The pituitary gland is what makes GH. In Acromegaly, the pituitary gland produces excessive amounts of GH. Usually, this excess of GH comes from tumors called adenomas.

Signs & Symptoms:

- Bone enlargement (hand & feet + membranous bones) which might lead to change in ring size and shoe size
- Altering of facial features
- Protruding of brow & lower jaw
- Nasal bone enlarges
- Teeth become more spread out (because of gum hyperplasia)
- Joint aches

Signs & Symptoms (cont.):

- Thick and/or course oily skin
- Skin tags
- Enlarged lips and tongue (because of soft tissue enlargement)
- Deepening of the voice due to enlarged sinuses & vocal cords
- Sleep apnea
- Excessive sweating
- Skin odor
- Fatigue & weakness
- Headaches
- Impaired vision



Further questions to ask:

- History of viral infections
- History of sleep disturbance, depression, stress
- History of chronic disease (diabetes, heart failure, respiratory problems, kidney problems)
- History of muscle problems

- History of anemia
- How long does he have the headache?
- Describe the headache, where, how severe... etc
- History of migraine
- Problems with eyes/vision
- Medications
- Allergies

Differential Diagnosis:

1) Tiredness:

- Didn't sleep well for several days
- Depression and stress
- Infection
- Chronic diseases (heart failure, DM)
- Severe anemia
- Muscle problem (myalgia, myopathy)
- Medication

2) Headaches:

- Intracranial masses (brain tumor)
- Stress related
- Trigeminal nerve
- Teeth, gum, jaw problem
- Migraine
- Eyes: Error, or infection
- Sinusitis

Differential Diagnosis (cont.):

3) Didn't see cars on his side:

- Corneal problem (ulcer, nebula)
- Lens problem (opacity, cataract)
- Intra-ocular problem: increase pressure
- Optic nerve problem (lesion, pressure)
- Optic chiasm problem (pressure on nerve fibers)
- Occipital problem (tumor, vascular)

4) Facial changes:

- Increased growth of skull bones, muscle and skin (increased secretion of growth hormone)
- Salt and water retention
- Localized tumor
- Facial nerve palsy
- Myopathy
- Nephritic syndrome
- Chronic liver disease

Clinical examination:

- Vital signs: normal, except blood pressure is increased (because of increased thickness of arteries)
- Visual field examination: bilateral hemianopia (because of the compression effect of the tumor on the optic chiasma)
- Hands and feet are spade like

Investigation:

- Growth hormone blood test
- Oral glucose tolerance test
- GHRH blood test (useful to detect non-pituitary tumors)
- Radiological Scans:
    - CT Scan of pituitary or other organs, seeking the tumor
    - MRI scan of pituitary or other organs, seeking the tumor

Treatment:

- **Medical therapy:**
    - Dopaminergic Analogues
    - Bromocriptine (Parlodel)
    - Somatostatin analogues
    - Octreotide (Sandostatin): mimics somatostatin which will inhibit the release of GH
    - Pegvisomant (a new drug that directly blocks the effects of growth hormone)
- **Surgery**
- **Radiation therapy**

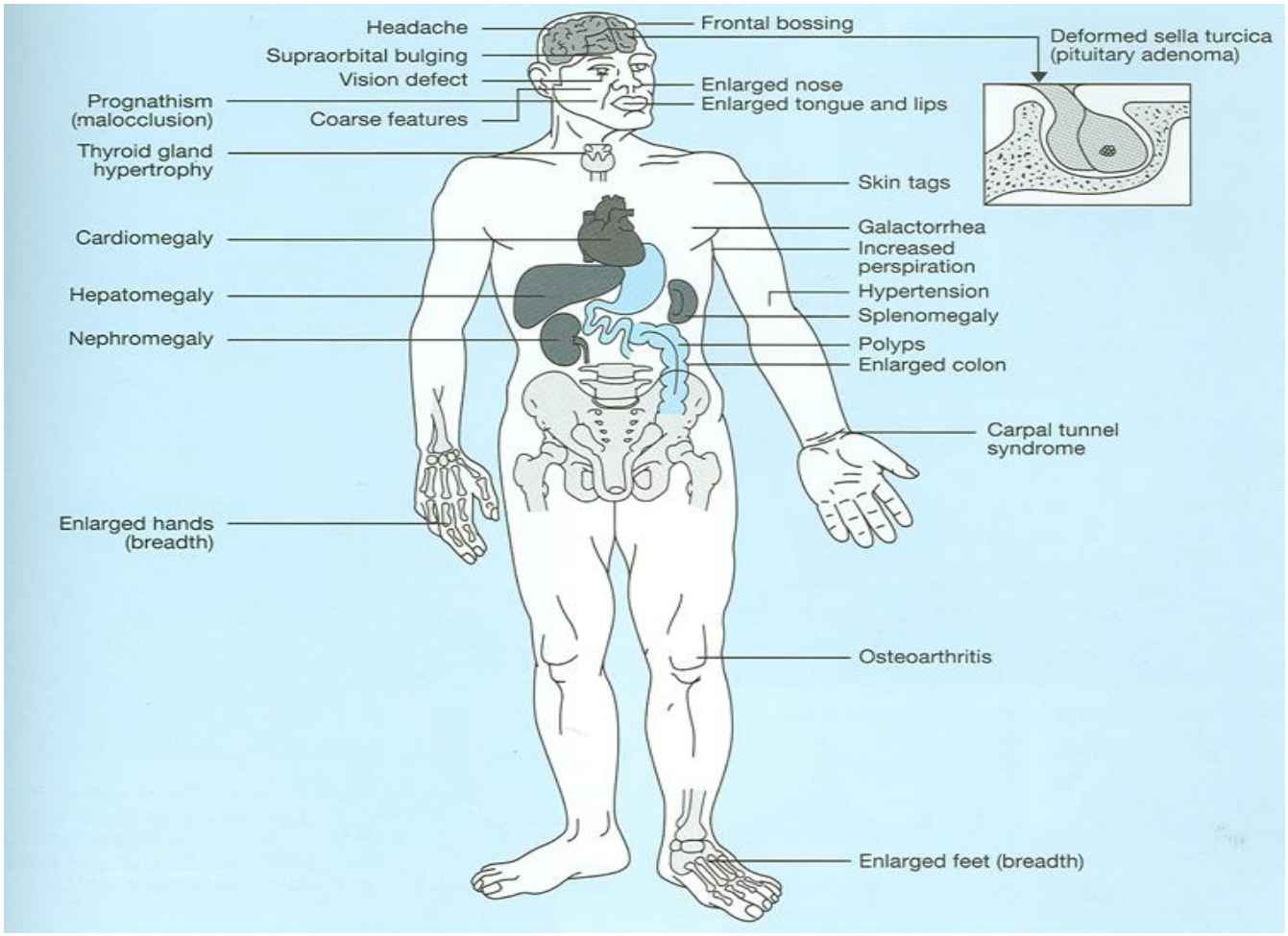
Prevention:

Early detection and treatment are the best options as they may prevent the disease from getting worse.

Complications:

- Severe headache
- Arthritis and carpal tunnel syndrome (overgrowth of bone & cartilage often leads to arthritis. When tissue thickens, it may trap nerves, causing carpal tunnel syndrome. This leads to numbness and weakness of hands)
- Enlarged heart
- Hypertension
- Diabetes mellitus
- Heart failure

Complications (cont.):



Revision Questions:

1- Discuss the anatomy and the function of the pituitary gland?

- Anatomy:

-Lies at the base of the skull as sella turcica.
- Roof is formed by diaphragma sellae.
- Floor by the roof of sphenoid sinus.

- Function:

Hormones secreted from the pituitary gland help control the following body processes: .....
(GH-TSH-ACTH-FSH-LH-PRL)

2- Explain the role of feedback mechanism in the regulation of pituitary gland?

Endocrine glands are linked to neural control centers by homeostatic feedback mechanisms. The two types of feedback mechanisms are negative feedback and positive feedback. An example of positive feedback can be found in childbirth. The hormone oxytocin stimulates and enhances labor contractions. As the baby moves toward the vagina (birth canal), pressure receptors within the cervix (muscular outlet of uterus) send messages to the brain to produce oxytocin. An example of negative feedback is the feedback to excess Cortisol (and many other hormones). When there is an excess amount of the

hormone, signals are sent to the pituitary to suppress releasing more of that hormone.

3- Discuss the mechanisms underlying the development of acromegaly?

Pituitary adenoma will lead to increase level of GH which will lead to enlargement of many organs (and all the symptoms that were mentioned earlier).

4- Explain the management option available for a patient with acromegaly?

Medical therapy (mentioned earlier). Surgery if the patient does not respond to treatment.

5- Discuss the pharmacology of somatostatin receptor agonist (Octretide), dopamine agonist, and growth hormone antagonist?

- Octretide: mimics somatostatin (GHIH) which will inhibit the release of GH
- Dopamine agonist: it will inhibit the release of prolactin
- Growth hormone antagonist: it will prevent GH from working on target tissues

Learning Objectives:

- Anatomy and functions of pituitary gland
- Physiological mechanisms underlying the secretion of anterior pituitary hormones (GH, TSH, LH, FSH, PRL, ACTH)
- Physiological effects of GH
- Pathology of common pituitary-related tumors and their impact
- Use basic science to explain the signs and symptoms obtained from a patient with acromegaly
- Mechanisms underlying development of acromegaly and gigantism
- Interpretation of lab and radiological investigations of a patient with acromegaly
- Management goals and options for a patient with acromegaly
- Pharmacology of somatostatin receptor agonists (octreotide) dopamine agonists and GH antagonists