Pediatric Endocrinology Review MCQs

PART - 6

Abdulmoein Eid Al-Agha, FRCPCH
Professor of Pediatric Endocrinology,
Website: http://aagha.kau.edu.sa

Elven- year old boy, known case of congenital adrenal hyperplasia, on hydrocortisone replacement therapy with not good compliance. Three months ago, started to have right sided testicular swelling. Mother was worried and patients was referred for further assessment. Ultrasound of testes revealed right sided small hypoechoic mass. Which one of the following is most likely diagnosis ?

a) Testicular adrenal rest tumor (TART).
b) Leydig cell hyperplasia.
c) Testicular abscess.
d) Testicular tumor.

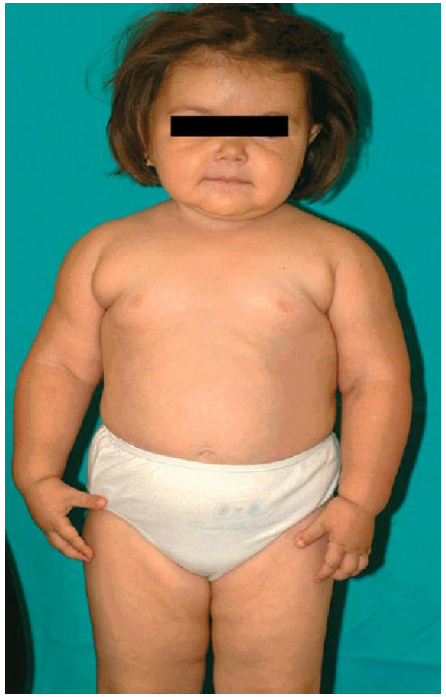
Testicular adrenal rest tumors (TART)

- One of the most important and frequently detected complications in male CAH patients is the development of testicular tumors.
- These tumors were first reported in 1940 by Wilkins et al.
- Because of the morphological & functional resemblance with adrenal tissue they are called “testicular adrenal rest tumors” (TART).
- These tumors can be found in childhood and puberty.
- Is an important complication leading to gonadal dysfunction & infertility.
- Usually only tumors of more than 2 cm are detectable by palpation because of their location within the rete testis.
- Therefore, the tumors can be easily missed when additional imaging techniques such as ultrasound or magnetic resonance imaging (MRI) are not performed.

Long-Term Consequences of TART

- Have no malignant features, therefore, no need to remove them at an early stage.
- Classified into 5 stages, depending on severity.
- Compression of the seminiferous tubules may lead to obstructive azoospermia and irreversible damage of the surrounding testicular tissue.
- Intensifying glucocorticoid therapy lead to reduction of the tumor size by suppression of ACTH secretion & improving testicular function in stages 2 and 3.
- In stage 4, increasing the dose of glucocorticoids is probably no longer effective in decreasing tumor size, surgical removal of the tumor may prevent further testicular damage.
- Stage 5, with signs of gonadal dysfunction, testicular biopsies are advised to evaluate the quality of the surrounding testicular parenchyma, before surgery is considered and usually in this stage irreversible damage with no benefit from removal of the tumor.
- Annual screening from age of 5 years to detect early stage.

Five - year old girl, presented with short stature since birth. Both parents were first cousins. On examination, she looked dysmorphic (photo), with short limb. She had growth hormone stimulation test with good response but his basal IGF-1 level was low. Bone age was of 2 years. Which one of the following is most likely diagnosis?

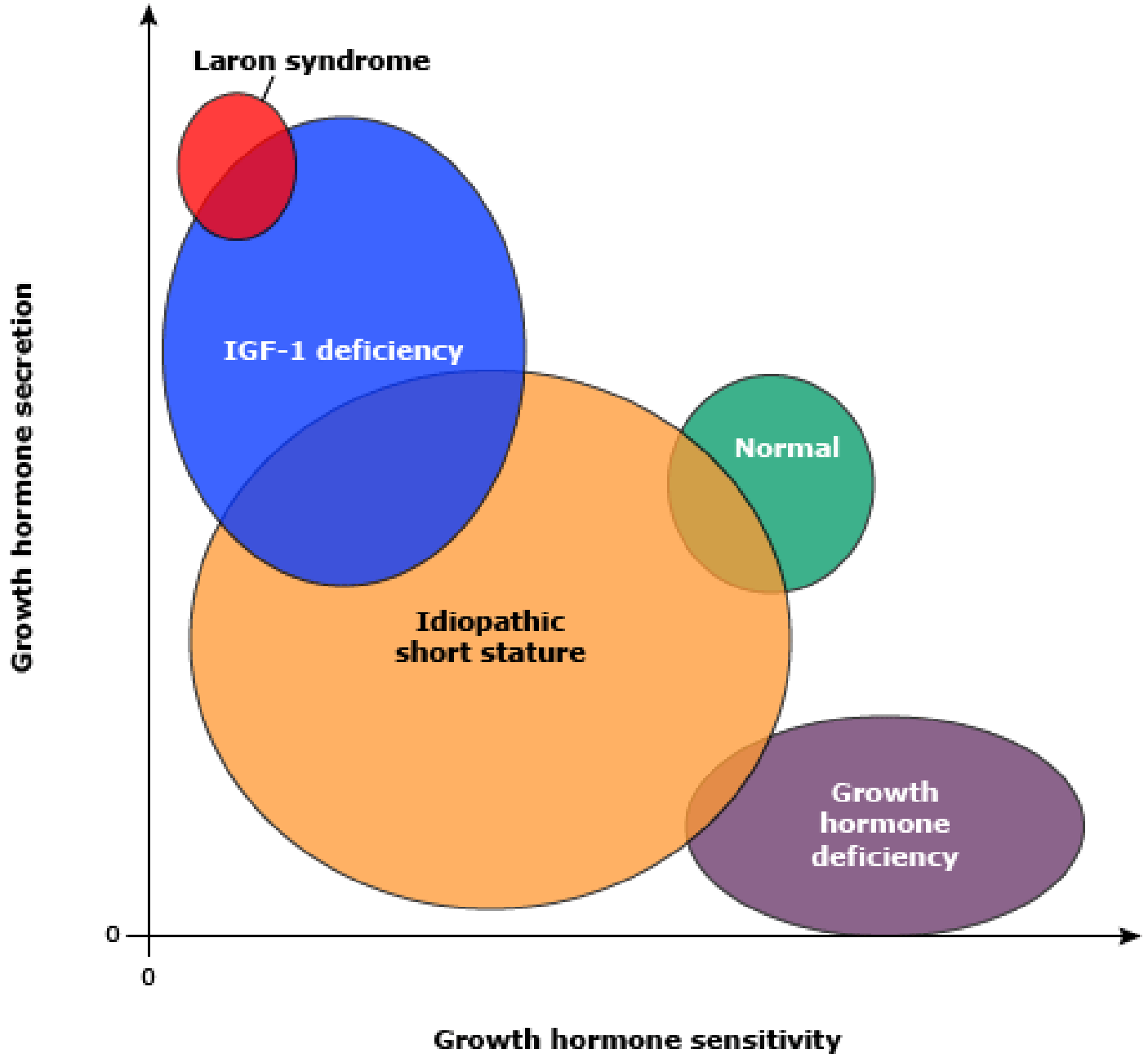


a) Achondroplasia
b) Turners syndrome.
c) Laron syndrome.
d) Noonan syndrome.

Growth hormone receptor mutations (Laron syndrome)

- Is the most common known cause of genetically mediated growth hormone receptor insensitivity.
- Is characterized by severe postnatal growth failure.
- Clinical features of Laron syndrome include:
  - Characteristic facies with saddle nose & prominent forehead.
  - Delayed skeletal maturation.
  - Small genitalia and testes.
  - Short limb length compared with trunk length.
  - abnormal body composition.
  - osteopenia and obesity.
- Characterized by normal or increased circulating levels of GH with low circulating levels of IGF-1 & IGFBP-3.

The clinical spectrum of growth hormone sensitivity



Three year old boy, who presented to emergency room with severe bronchopneumonia. He was admitted to PICU, then ventilated. His chest x- ray revealed bilateral batch infiltrates. Next day, in-charge nurse reported decreased urine output of 0. 3 ml/kg/ hour. His serum electrolytes revealed serum sodium was 115 mmol/l, chloride 98 mmol/l with low serum BUN & creatinine. Which one of the following is expected findings?

a) Low serum osmolality with high urinary osmolality.
b) Low serum and urine osmolality.
c) High serum and urine osmolality.
d) High serum osmolality and low urine osmolality.

The syndrome of inappropriate secretion of antidiuretic hormone (SIADH)

- Is a disorder of impaired water excretion caused by the inability to suppress the secretion of antidiuretic hormone (ADH).
- It should be suspected in any child with hyponatremia, serum hypoosmolality, and urine osmolality above 100 mosmol/kg.
- ADH secretion results in a concentrated urine and therefore a reduced urine volume.

Causes of SIADH

Category	Specific etiology
Physiologic	Hyperosmolar state, hypovolemia
Pulmonary	Pneumonitis, pneumothorax, asthma, bronchiolitis, cystic fibrosis
Drug effect	Narcotics, barbiturates, carbamazepine, vincristine, cyclophosphamide
Metabolic	Hypothyroidism, hypoadrenalism, porphyria
CNS	Infection (meningitis or encephalitis), tumor, trauma, hypoxia, shunt malfunction, nausea, pain, anxiety

Six year old boy presented to the endocrine clinic with tall stature which was started sine first year of life. Child was having delayed speech with autistic behavior. He is studying in special school as his IQ is below normal. On examination, his both weight and height above 99%. What is the most likely diagnosis?

a) Pituitary gigantism
b) Fragile X syndrome.
c) Soto's syndrome.
d) Beckwith Weidman syndrome.

Soto's syndrome (cerebral gigantism)

- Is caused by 5q35 deletion.
- Is characterized by overgrowth that is evident at birth with an increase in head circumference.
- Hypotonia and delayed gross and fine motor milestones are typical.
- These children are considered "clumsy."
- They have mild intellectual disabilities.
- They have characteristic facial features, with a bossed forehead, receding hairline, hypertelorism, down slanting palpebral fissures, large ears, high-arched palate, and pointy chin.

Soto's syndrome (cerebral gigantism)

- Premature teeth eruption is commonly seen.
- Skeletal features include scoliosis and large hands and feet. Advanced bone age is commonly seen.
- Brain imaging may show dilated ventricles, increased extra-axial cerebrospinal fluid (CSF), cortical atrophy spaces, and abnormalities of the corpus callosum.
- Cardiac anomalies, including patent ductus arteriosus (PDA) and atrial septal defect (ASD).
- Renal anomalies may include hypoplastic kidneys & hydronephrosis.

A neonate has a moderately enlarged thyroid gland with respiratory distress. His thyroid function test revealed high TSH and low fT4. There was history of maternal anti arrythmia medication during pregnancy. Which one of the following is underlying cause of his goiter and hypothyroidism?

a) Congenital thyroid dysgenesis.
b) Iodine deficiency goiter “endemic goiter”.
c) Hypothyroidism due to maternal treatment with anti-thyroid.
d) Hypothyroidism due to iodine excess.

Amiodarone related hypothyroidism

- Amiodarone is class III antiarrhythmic drug, has multiple effects on myocardial depolarization and repolarization that make it an extremely effective antiarrhythmic drug.
- However, amiodarone is associated with a number of side effects, including thyroid dysfunction (both hypo- and hyperthyroidism), which is due to amiodarone's high iodine content and its direct toxic effect on the thyroid.
- When intrathyroidal iodine concentrations reach a critical high level, iodine transport and thyroid hormone synthesis are inhibited (Wolff-Chaikoff effect).

Seven year old boy diagnosed with Langerhans cell histiocytosis presented with generalized seizures, due to hypernatremia. His serum sodium was 165 mmol/l. mother has reported that for the last 2 days, he started to go frequently to toilet. Which one of the following is important diagnostic investigations?

a) Repeat serum sodium every 12 hours.
b) Fasting glucose, and 2 hours post prandial.
c) Urinalysis.
d) Timed serum & urine osmolality.

Central diabetes insipidus (CDI)

- Is characterized by decreased release of antidiuretic hormone (ADH; arginine vasopressin or AVP), resulting in a variable degree of polyuria.
- Lack of ADH can be caused by disorders that act at one or more of the sites involved in ADH secretion: the hypothalamic osmoreceptors; the supraoptic or paraventricular.
- Patients with untreated CDI typically present with polyuria, nocturia, and, due to the initial elevation in serum sodium and osmolality, polydipsia.
- The causes of CDI include idiopathic disease, familial and congenital disorders, neurosurgery or trauma, primary or secondary cancers, hypoxic encephalopathy, infiltrative disorders, post-supraventricular tachycardia, and anorexia nervosa.
- The vast majority of cases are due to idiopathic CDI or result from primary or secondary tumors, or infiltrative diseases (such as Langerhans cell histiocytosis).

Langerhans cell histiocytosis (LCH)

- Is a rare histiocytic disorder that may be seen in all age groups, but is most common in children from one to three years old.
- The clinical presentation varies depending on the sites and extent of involvement.
- The disease is limited to one organ system (e.g., bone) in approximately half of patients.
- Acute disseminated multisystem disease is most commonly seen in children less than three years old.
- Skin involvement is seen in approximately 40 % of patients. (eczematous rash resembling a candida infection).
- Lung involvement occurs in approximately 10 % of cases (may be asymptomatic or present following a spontaneous pneumothorax or with nonproductive cough, dyspnea, chest pain).

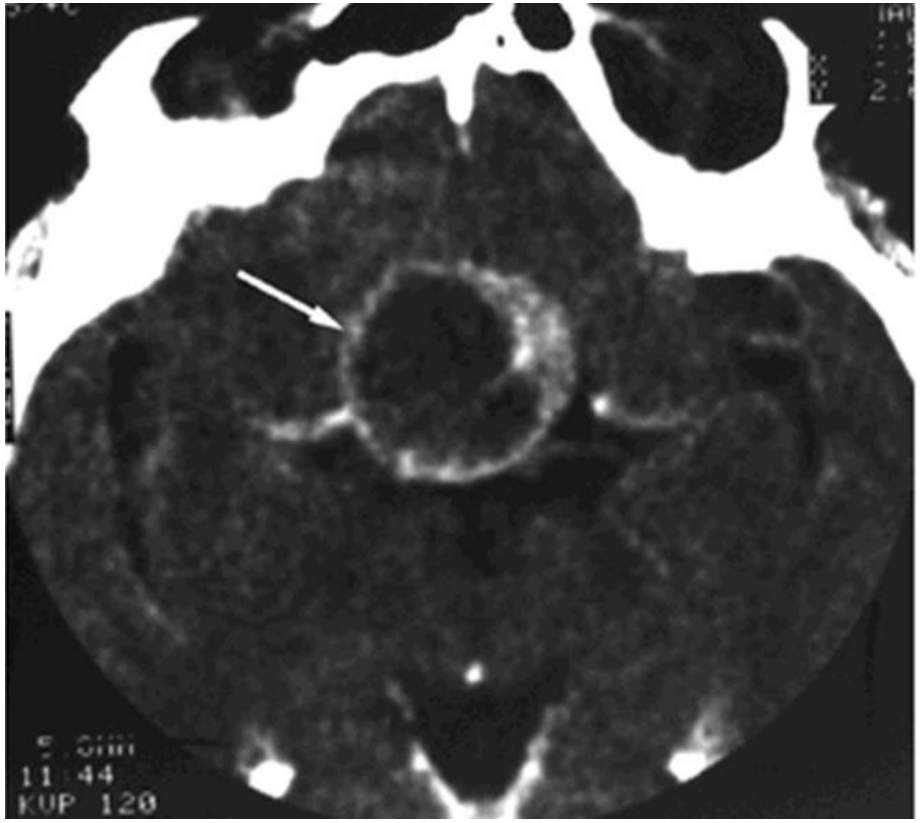
Three months old boy presented to the clinic with history of recurrent documented hypoglycemic attacks not related to missed feeds. Which one of the following is the initial important work-up you are going to order?

a) Oral glucose tolerance test.
b) Serum lactic acid.
c) Plasma insulin.
d) Serum ketone.

Diagnostic approach to infant with hypoglycemia

- The history & physical examination are essential, and the evaluation is tailored accordingly.
- As examples, clinical features suggesting endocrine cause or specific inborn error of metabolism should prompt specific testing for the suspected disorder.
- Initial work up should be serum ketone to differentiate whether or not hypoglycemic attack is ketotic or non ketotic as work up different.
- Evaluation for the majority of children presenting with hypoglycemia will require obtaining a "critical sample" of blood and urine at the time of hypoglycemia.
- It must be obtained at the time of hypoglycemia (plasma glucose <50 mg/dl.

Six year old boy who has parented with on & off headache with blurred vision for the last 8 months. Previously was otherwise healthy. On examination, his height was below 3%, weight was on 25%. Ophthalmological examination revealed mild bilateral optic nerve atrophy. CT scan of the brain (photo). Which one of the following is most likely diagnosis?



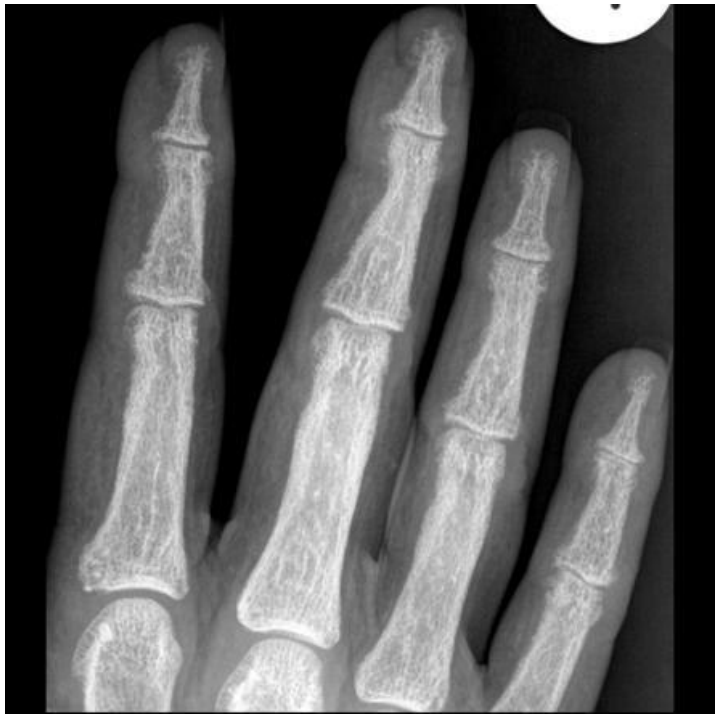
a) Pituitary gland hyperplasia.
b) Pituitary adenoma
c) Craniopharyngioma.
d) Meningioma

Craniopharyngioma

- Rare solid or mixed solid and cystic tumors that arise from remnants of Rathke's pouch.
- Peak age in children between 5 - 14 years old.
- A wide range of symptoms may be present.
  - Visual symptoms are frequent, result from compression of the optic chiasm or nerves; the specific deficit depends upon the growth pattern of the tumor.
  - Endocrine abnormalities from direct damage to or compression of normal structures. Frequently observed complications include diabetes insipidus (75%)and deficiencies of growth hormone, gonadotropin, thyroid-stimulating hormone, and adrenocorticotropic hormone.
  - moderate to severe daily headaches are present in approximately 50 % of cases.

Eight-year-old girl, known case of CKD (chronic kidney disease) who has presented with bone pain. Her calcium was 2.8 mmol/l, phosphate 3.2 mmole/l, alkaline phosphatase 860 pg/ml, PTH 760 (35-70 pg/ml), both vitamin D metabolites were low. Hand x ray (photo). Which one of the following is the underlying diagnosis?

a) Hypoparathyroidism.
b) Tertiary hyperparathyroidism.
c) Secondary hyperparathyroidism.
d) Primary hyperparathyroidism.



Chronic kidney disease & Hyperparathyroidism

- Elevated PTH level in conjunction with secondary hyperparathyroidism is common in patients with chronic kidney disease.
- Target ranges for patients with CKD are different than those with normal kidney function since some assays may incorrectly detect inactive fragments of PTH in CKD patients.
- The target ranges of plasma intact PTH by stage of CKD are as follows:
  - Stage 3: 35-70 pg/mL (3.85-7.7 pmol/L)
  - Stage 4: 70-110 pg/mL (7.7-12.1 pmol/L)
- iPTH > 500 - 600 pg/mL suggests moderate - severe hyperparathyroidism.
- Parathyroidectomy may be appropriate in hypercalcemic and/or hyperphosphatemia patients with repeated iPTH levels >800 pg/mL who do not respond to standard medical interventions.
- Serum phosphorous, calcium & iPTH should be monitored in all chronic kidney disease patients with a glomerular filtration rate below 60 mL/min/1.73 m2.

iPTH testing

- It is important to measure serum calcium simultaneously with PTH.
- Whole (intact) PTH is metabolized to several different fragments, including N-terminal, mid-molecule, and C-terminal.
- The intact PTH and the N-terminal are metabolically active.
- These can all be measured by immunoassay.
- The intact PTH and all fragments generally provide accurate information concerning the level of PTH in the blood.
- The intact PTH is probably most often tested, as it is most reliable.
- PTH levels are affected by a diurnal variation. Levels are highest around 2 AM and lowest around 2 PM.
- Usually an 8 AM blood specimen is drawn.
- If the patient works nights, the laboratory should be notified so that changes in the diurnal variation can be factored in.

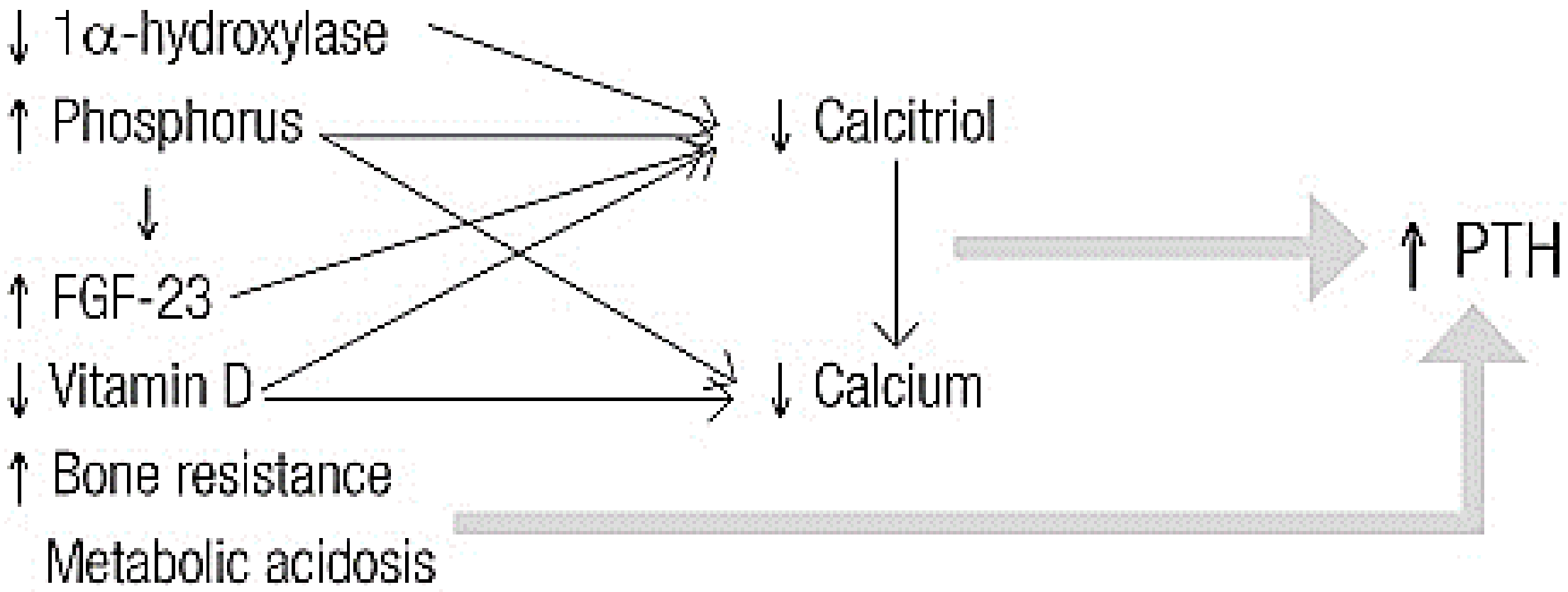
Radiological findings in patients with hyperparathyroidism

- The most common radiologic finding in primary hyperparathyroidism is osteopenia, which may be generalized or asymmetric.
- Bone resorption may be classified as subperiosteal, intracortical, trabecular, endosteal, subchondral, subligamentous, or subtendinous.
- Subperiosteal bone resorption is an early and virtually Pathognomonic sign of hyperparathyroidism.
- Although subperiosteal bone resorption can affect many sites, the most common site in hyperparathyroidism is the middle phalanges of the index and middle fingers, primarily on the radial aspect.

Tertiary hyperparathyroidism

- In children with chronic kidney disease (CKD), abnormalities in mineral bone metabolism occur early and are universal.
- If untreated, these patients will develop CKD-mineral and bone disorder (CKD-MBD).
- Both in children and adults, CKD-MBD is defined as one or a combination of the following three components:
  - Abnormalities of calcium, phosphorus, parathyroid hormone (PTH), fibroblast growth factor 23 (FGF23), and vitamin D metabolism
  - Abnormalities in bone turnover, mineralization, volume linear growth, or strength
  - Extra skeletal calcification.
  - Renal osteodystrophy, one of the components of CKD-MBD (osteitis fibrosa cystica, a dynamic bone disease, Osteomalacia).

CKD-mineral and bone disorder (CKD-MBD)



GOOD LUCK

End of part- 6