Pediatric Endocrinology Review MCQs

(Part-3)

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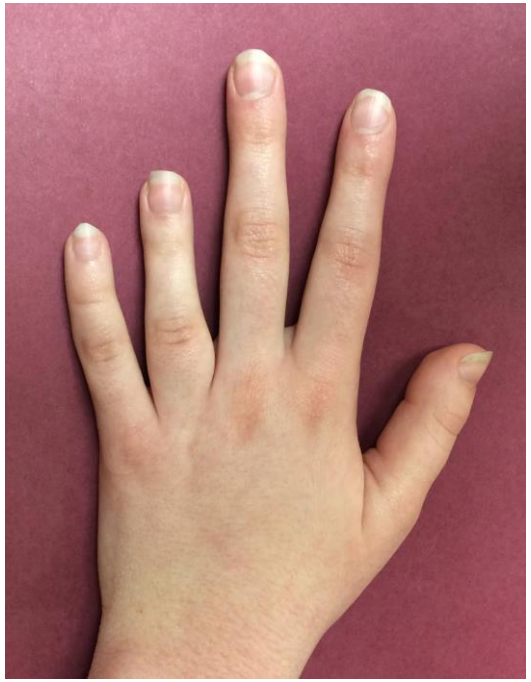
Six- year - old boy with obesity, mental retardation & subcapsular cataract. On examination, his hand (photo). Which one of the following is expected laboratory finding?

a) Low calcium, low phosphate
b) High calcium, high phosphate
c) Low calcium, high phosphate
d) Normal calcium, normal phosphate



Pseudohypoparathyroidism (PHP)

- In 1942, Fuller Albright first described Pseudohypoparathyroidism to patients who presented with PTH-resistant hypocalcaemia and hyperphosphatemia along with skeletal defects, collectively termed “Albright hereditary osteodystrophy (AHO)”.
- These features included short stature, rounded face, shortened fourth metacarpals of hands and feet, obesity, dental hypoplasia, and soft-tissue calcifications.
- Results from end organ resistance(renal & bone) to parathyroid hormone (PTH).
- Characterized by hypocalcemia, hyperphosphatemia, & elevated PTH level.

Pseudohypoparathyroidism (PHP)

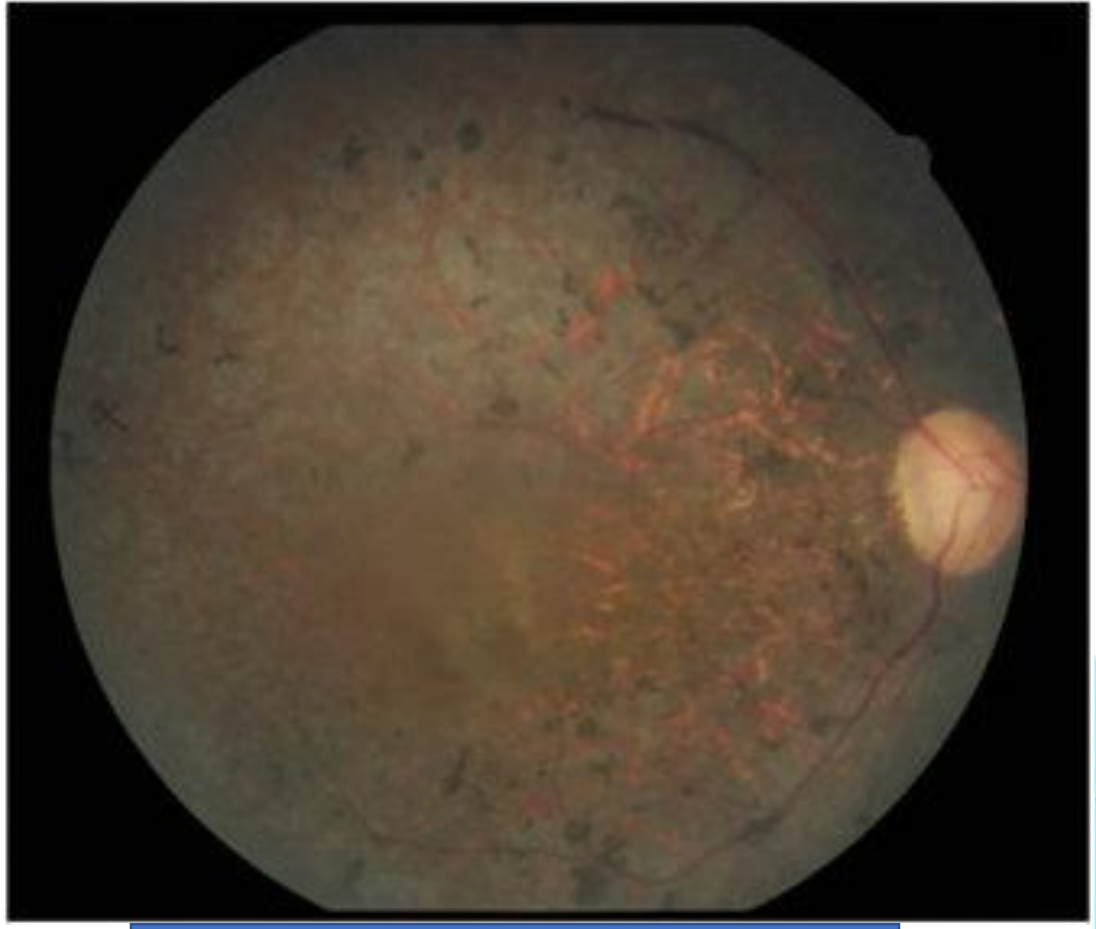
- There are several subtypes of PHP, based upon genetic & clinical characteristics including.
  - type 1a
  - type 1b
  - type 1c
  - type 2 (PHP-2)
  - pseudo pseudohypoparathyroidism (PPHP).
- PHP type 1a is the most common subtype and represents 70% of cases.
- AHO phenotype is not a feature of PHP-1b or PHP-2.

Thirteen- year old girl with obesity, retinitis pigmentosa and hypogonadism.
Which of the following is most likely diagnosis?

a) Prader –Willi syndrome.
b) Laurence- Moon- Biedl syndrome.
c) Lowe - oculo-cerebral syndrome.
d) Familial cerebellar ataxia.

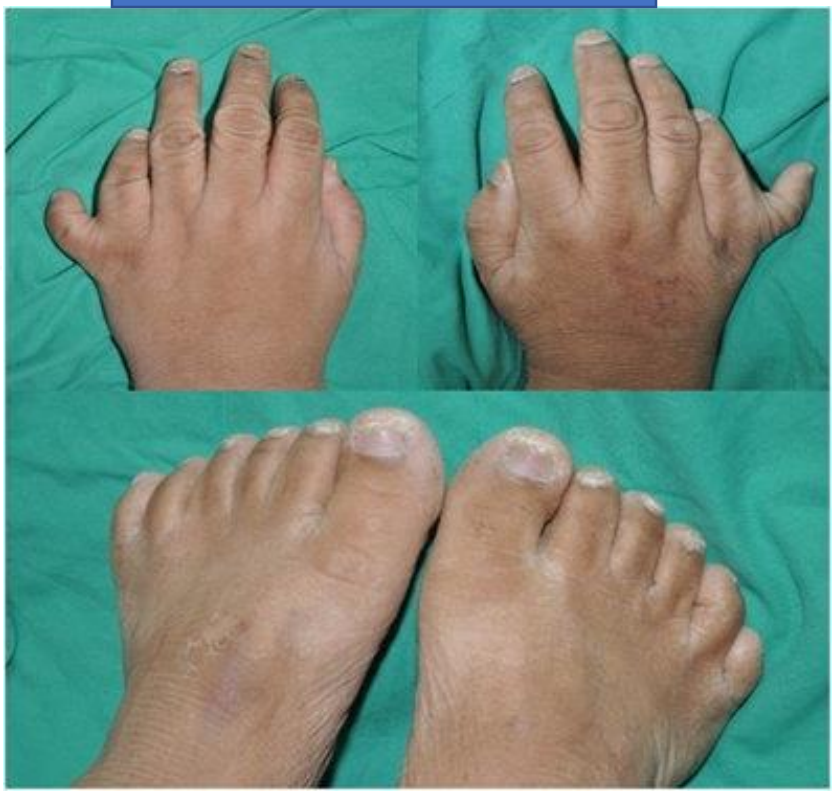
Bardet–Biedl syndrome (BBS)

- A rare autosomal recessive syndrome
- Characterized by retinitis pigmentosa, obesity, post-axial polydactyly, renal dysfunction, learning difficulties and hypogonadism.
- The diagnosis is based on clinical findings and can be confirmed by sequencing of known disease-causing genes in 80% of patients.



Retinitis pigmentosa

Post axial polydactyly



Three-year-old girl with delayed motor milestones & learning disability. Perinatal histories were normal. Mother reported that her daughter was floppy in first year of life with poor feeding. On examination, weight was above 99 % , height was on 10%. She has short stubby fingers, and almond shaped eyes. What is most likely genetic cause of this condition?

a) Triploidy on chromosome 21.
b) Maternal uniparental isodisomy of chromosome 7.
c) Deletion of paternal copies of genes on chromosome 15.
d) Duplication of the long arm of the X chromosome.

Prader–Willi syndrome (PWS)

- In infancy, symptoms include muscle weakness, poor feeding, and slow development.
- In childhood, the person becomes constantly hungry, which often leads to obesity.
- Mild to moderate intellectual impairment & behavioral problems are typical.
- Often, those affected have a narrow forehead, small hands and feet, short height, light skin and hair.
- About 75% of cases occur when part of the father's chromosome 15 is deleted.
- In another 25% of cases, the person has two copies of chromosome 15 from their mother and none from their father." uni-parental diosomy".
- Similar mechanism occurs in Angelman syndrome, except the defective chromosome 15 is from the mother or two copies are from the father.

Genetic syndromes associated with childhood obesity include the following:

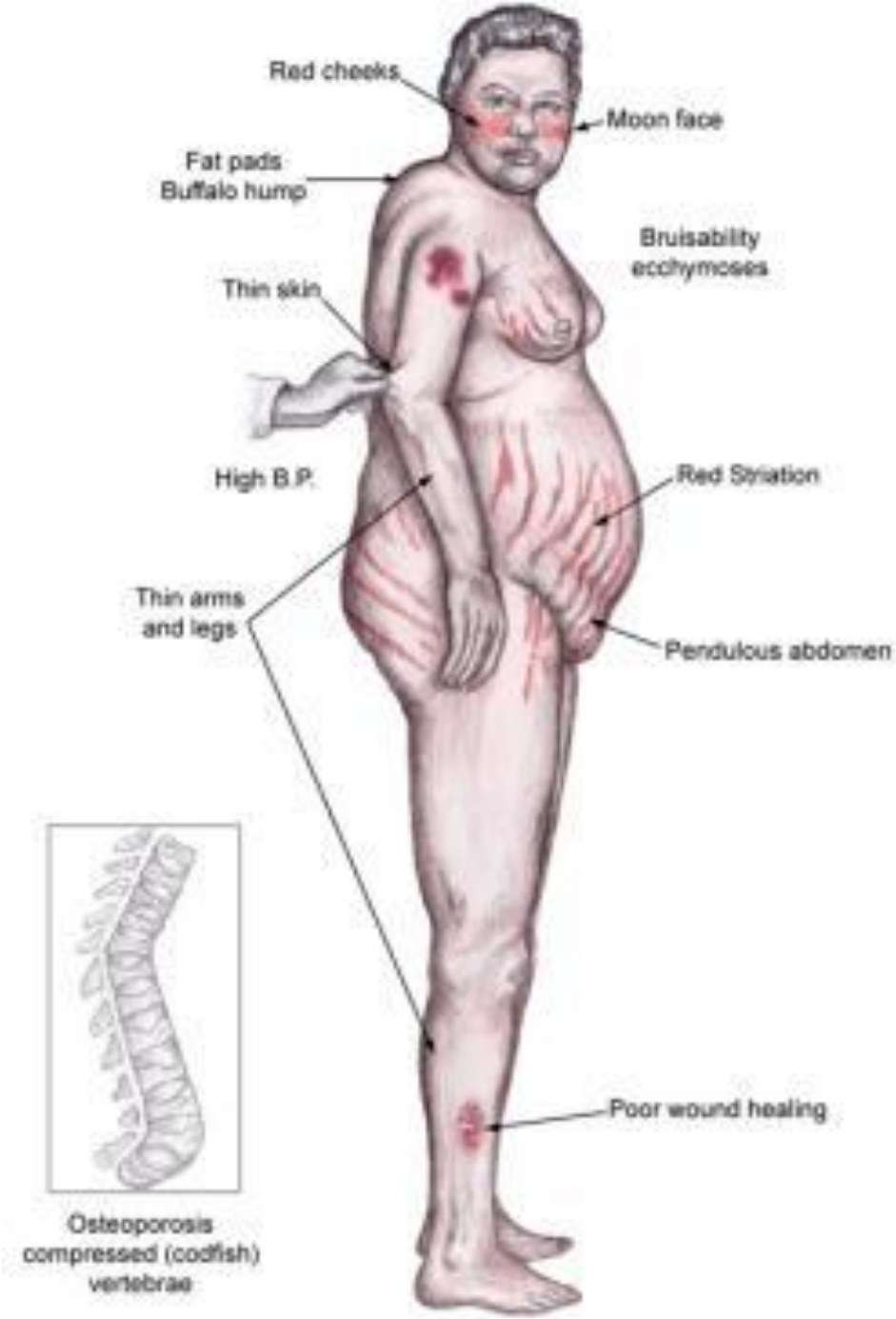
- Prader-Willi syndrome.
- Pseudohypoparathyroidism.
- Laurence-Moon-Biedl (Bardet-Biedl) syndrome
- Cohen syndrome.
- Down syndrome.
- Turner syndrome.

Eleven- year - old boy, presented with truncal obesity, striae, hypertension & osteoporosis. Which one of the following is the commonest cause?

a) Adrenal adenoma.
b) Adrenal carcinoma.
c) congenital adrenal hyperplasia.
d) Lipoid adrenal hyperplasia.

Frequency of causes of Cushing's syndrome

Diagnosis	Percent of patients
ACTH-dependent Cushing's syndrome	
Cushing's disease	68
Ectopic ACTH syndrome	12
Ectopic CRH syndrome	<<1
ACTH-independent Cushing's syndrome	
Adrenal adenoma	10
Adrenal carcinoma	8
Micronodular hyperplasia	<1
Macronodular hyperplasia	<1


Red cheeks
Moon face
Fat pads
Buffalo hump
Bruisability
ecchymoses
Thin skin
High B.P.
Red Striation
Thin arms
and legs
Pendulous abdomen
Poor wound healing
Osteoporosis
compressed (codfish)
vertebrae

Ten-year old boy with Cushing syndrome presented acutely in the emergency room with Addisonian crisis. Which statement is most accurate?

a) This is impossible, as diagnosis must be inaccurate.
b) The patient should be reinvestigated again.
c) The patient should be treated as Addisonian crisis.
d) The patient is likely to have mixed pituitary tumor causing both diseases.

- The most common cause of Cushing syndrome in children is prolonged exposure to steroids.
- This often lead to suppression of H-P-A axis, so patient will not be able to produce cortisol in stress situations.
- This result in Addisonian crisis if steroid doses were not increased during stress.

Eleven - year old girl, has presented with headache, associated with hypertension. Her electrolytes revealed hypokalemia and metabolic alkalosis.

Which one of the following is most likely diagnosis?

a) Diuretic therapy.
b) Bartter syndrome.
c) Gitelman syndromes.
d) Conn’s syndrome.

Conn’s syndrome

- The classic presenting signs of Conn's syndrome are hypertension & hypokalemia.
- The most common causes of primary Aldosteronism are:
  - Aldosterone-producing adenoma.
  - Bilateral adrenal hyperplasia.
  - Unilateral adrenal hyperplasia.
  - Aldosterone-producing adrenocortical carcinoma.
  - Ectopic aldosterone-producing tumor.

Sixteen -year old boy presented with Gynecomastia. Which of the following medications could be the cause?

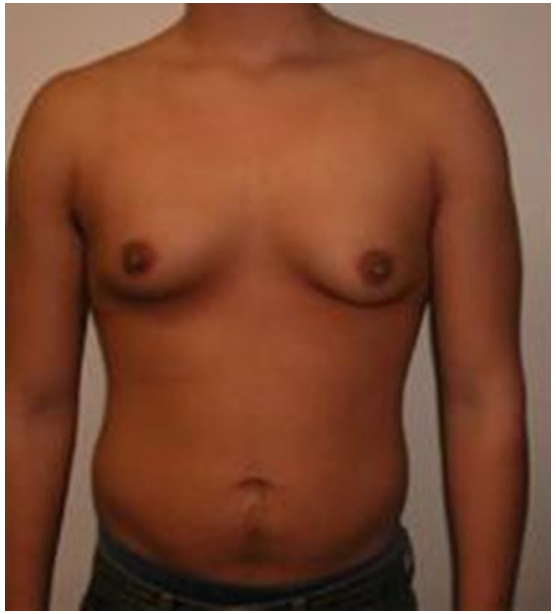
a) Hydralazine.
b) Tamoxifen.
c) Spironolactone.
d) Danazol.

Drugs associated with gynecomastia

Antiandrogens/inhibitors of androgen synthesis
Cyproterone acetate
Flutamide, bicalutamide, nilutamide
Finasteride, dutasteride
Spironolactone
Ketoconazole
Lavender oil
Tea tree oil
Antibiotics
Ethionamide
Isoniazid
Ketoconazole
Metronidazole
Antiulcer drugs
Cimetidine
Ranitidine
Omeprazole
Cancer chemotherapeutic drugs
Alkylating agents
Methotrexate
Vinca alkaloids
Combination chemotherapy
Imatinib
Cardiovascular drugs
ACE inhibitors (captopril, enalapril)
Amiodarone
Calcium channel blockers (diltiazem, nifedipine)
Digitoxin
Methyldopa

Drugs of abuse
Alcohol
Amphetamines
Heroin
Marijuana
Methadone
Hormones
Androgens
Anabolic steroids
Chorionic gonadotropin
Estrogens
Growth hormone
Psychoactive drugs
Diazepam
Haloperidol
Phenothiazines
Tricyclic antidepressants
Atypical antipsychotics
Other
Auranofin
Diethylpropion
Domperidone
Etretinate
HAART
Metoclopramide
Phenytoin
Penicillamine
Sulindac
Theophylline

Fifteen – year old boy, has presented with tender gynecomastia (3 cm in diameter bilaterally). He is in early to mid puberty. Which one of the following is first option in the management?



a) Treatment with an anti-estrogen (Tamoxifen).
b) Treatment with an aromatase inhibitor.
c) Surgery.
d) Reassurance.

- Gynecomastia is benign proliferation of glandular breast tissue in males.
- Pubertal Gynecomastia is common from puberty till age of 25 years.
- It resolves spontaneously without any intervention.
- It is most likely due to aromatization of testosterone into estrogen.

A thorough history should be obtained that addresses the following:

- Age of onset and duration of the condition
- Any recent changes in nipple size and any pain or discharge from the nipples
- History of mumps, testicular trauma, alcohol use, or drug use
- Family history of Gynecomastia
- History of sexual dysfunction, infertility, or hypogonadism.

Sixteen –year- old boy, noted to have firm mass behind the right nipple. The mass is mobile, non tender. Select the most likely diagnosis?

a) Lymphoma.
b) Intraductal papilloma.
c) Gynecomastia.
d) Benign cyst.

- Gynecomastia is a benign enlargement of the male breast (usually bilateral but sometimes unilateral) resulting from a proliferation of the glandular component of the breast.
- It is defined clinically by the presence of rubbery or firm mass extending concentrically from the nipples.
- Gynecomastia should be differentiated from pseudo gynecomastia (lipomata), which is characterized by fat deposition without glandular proliferation.

Seven - years old boy has presented with vomiting, constipation, lethargy & excessive urination. No dysmorphic signs were noted. His serum calcium was 2.9 mmol/l (2.1-2.5), phosphate 0.8 (1.1-1.8), urinary calcium: creatinine ratio was high, PTH level was100 (6-15) &vitamin D was 77 (75-125). Which one of the following is the most likely cause?

a) William's syndrome.
b) Familial hypocalciuric hypercalcemia.
c) Hypervitaminosis D.
d) Parathyroid adenoma.

Hypercalcemia in children

- It may present with hypotonia, poor feeding, vomiting, constipation, abdominal pain, lethargy, polyuria, dehydration, failure to thrive and seizures.
- In severe cases renal failure, pancreatitis and reduced consciousness may also occur.
- In adolescents may present with psychiatric symptoms.
- The causes of hypercalcemia in children can be classified as PTH-dependent or PTH-independent.
- Could be congenital or acquired.

Hypercalcemia in children

- PTH-independent hypercalcemia:
  - hypervitaminosis D.
  - granulomatous disorders.
  - idiopathic infantile hypercalcemia.
  - William's syndrome.
- PTH-dependent hypercalcemia:
  - parathyroid tumors, which may give rise to primary hyperparathyroidism (PHPT).
  - tertiary hyperparathyroidism, which usually arises in association with chronic renal failure.
  - treatment of hypophosphatemic rickets.

Otherwise healthy 6-week infant presented with generalized seizure. She was, somewhat sleepy with normal examinations. Her glucose was 4.1 mmol/l, sodium 141 mmol/l, calcium 1.5 mmol/l, phosphorus 2.1 mmol/l, magnesium 0.8 mmol/l & ALP 200 IU/l, PTH was undetectable. Which one of the following is most likely diagnosis?

a) Pseudo pseudohypoparathyroidism.

b) Hypoparathyroidism.

c) Vitamin D deficiency.

d) Albright's hereditary osteodystrophy.

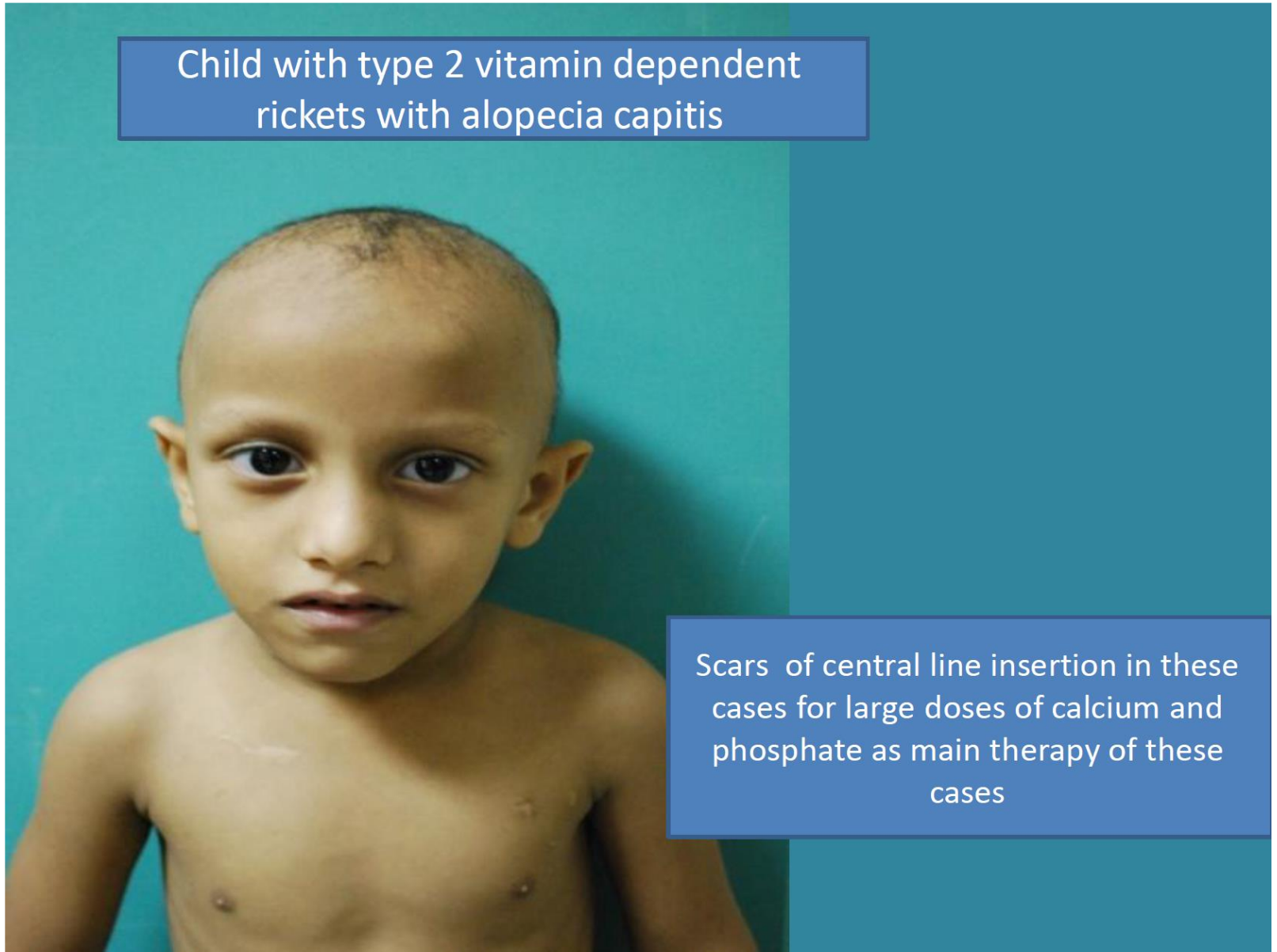
- Hypoparathyroidism may be transient, inherited, or acquired.
- Transient hypoparathyroidism:
  - Preterm & SGA are at increased risk, due to functional immaturity.
- Permanent hypoparathyroidism:
  - DiGeorge syndrome (hypoparathyroidism, absence of thymus gland with T-cell abnormalities, and cardiac anomalies).
  - DiGeorge syndrome & velocardiofacial syndrome are variants of the chromosome arm 22q11 micro deletion syndrome.

Eleven - year old boy, presented with mental subnormality, facial dysmorphism (photo), & severe growth failure. Which diagnostic laboratory investigation, you are going to order?

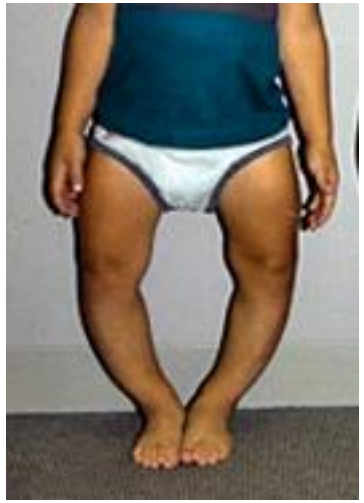
a) IGF- 1.
b) GH provocative test.
c) Bone age.
d) Serum calcium & PTH.

- Sanjad Sakati syndrome (SSS) is an autosomal recessive disorder found exclusively in people of Arabian origin.
- It is first reported from the Kingdom of Saudi Arabia in 1988 as a newly described syndrome mainly from the Middle East and the Arabian Gulf countries.
- Children affected with this condition are:
  - severe growth failure both intrauterine & extra uterine.
  - mild to moderate mental retardation.
  - present with hypocalcemic tetany or seizures due to hypoparathyroidism at an early stage in their lives.
  - Dysmorphic features include; long narrow face, deep set small eyes, beaked nose, large floppy ears, micrognathia.

HRVD type 2A


Child with type 2 vitamin dependent rickets with alopecia capitis
Scars of central line insertion in these cases for large doses of calcium and phosphate as main therapy of these cases

An 18-month-old infant is seen because the mother is concerned that his legs are bowed (photo). The infant was breastfed until 14 months of age. Which one of the following, laboratory tests are MOST likely to reveal?



a) High circulating parathyroid hormone concentrations.
b) Increased reabsorption of phosphate by the kidney.
c) Inadequate stimulation of bone resorption by parathyroid hormone.
d) Low conversion of vitamin D to 25-hydroxylase vitamin D.

Rickets

- Refers to deficient mineralization of bone and occurs before the closure of the growth plates.
- Rickets is classified according to the predominant mineral deficiency.
  - Calcipenic rickets is caused by calcium deficiency, which usually is due to insufficient intake of or metabolism of vitamin D, and in some cases, insufficient intake or absorption of calcium in the setting of normal vitamin D levels.
  - Phosphopenic rickets usually is caused by renal phosphate wasting.
  - The concentration of serum alkaline phosphatase is elevated in both types of rickets, and it is a good marker of disease activity in children.

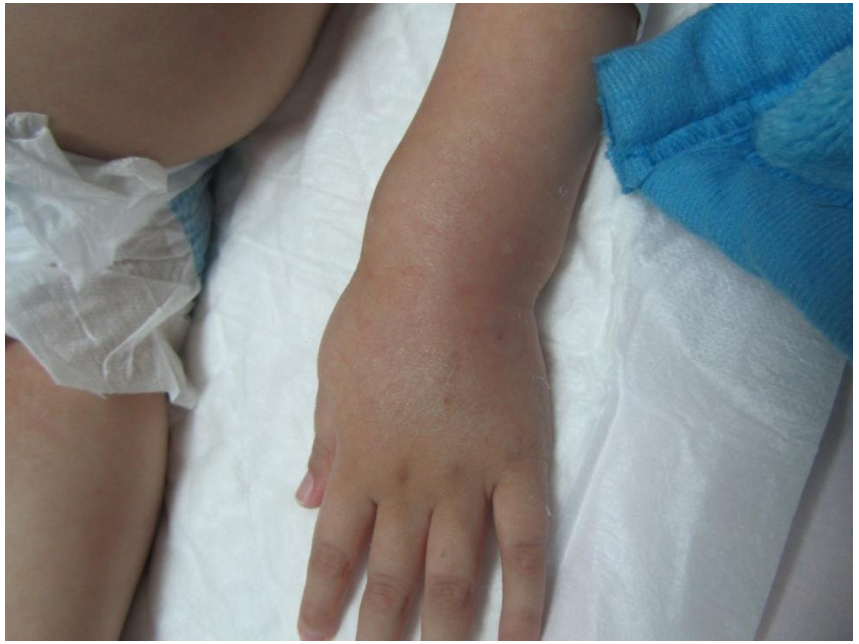
Rickets

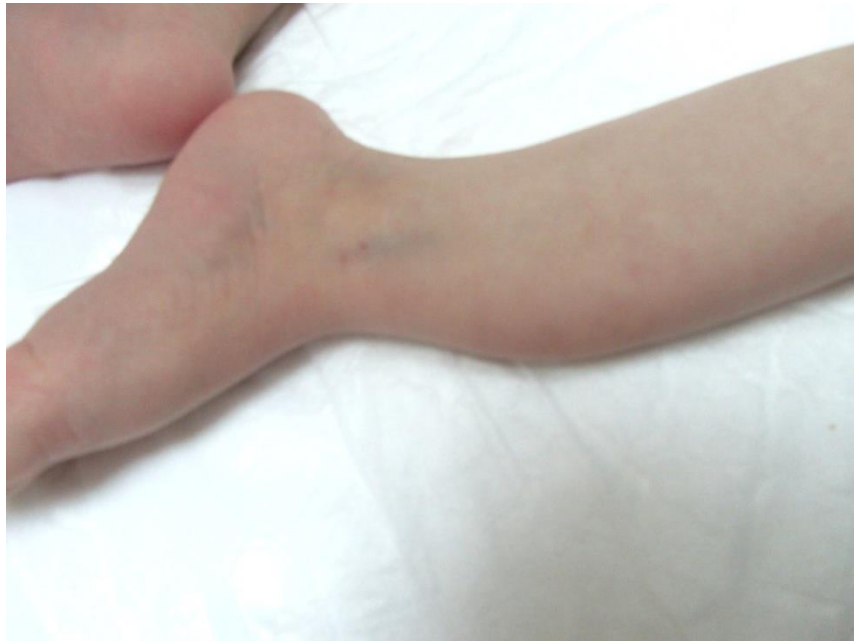
- Serum concentration of parathyroid hormone (PTH) typically is elevated in Calcipenic rickets but not in Phosphopenic rickets.
- Measurements of serum PTH and inorganic phosphorus serve to distinguish Calcipenic from Phosphopenic rickets.
- For children with Calcipenic rickets, measurements of serum 25-hydroxyvitamin D (25OHD) help to distinguish rickets caused by vitamin D deficiency (the most common form) from other causes of calcipenic rickets.
- For children with phosphopenic rickets, assessment of renal excretion of phosphate should be performed.

Eighteen months old boy was referred for further assessment of his increasingly bowing of legs. His parents are first degree cousins. He has been on vitamin D3 therapy for last 6 months, dose of 3000 unit/day with good compliance. His serum calcium was 1.37mmol/L, phosphate 0.13mmol/L , alkaline phosphatase 805IU/L, PTH 100 (6-15) pmol/L. Which one of the following is a diagnostic investigation?

a) Do wrist x- ray to confirm active rickets.
b) Do 25- hydroxy vitamin D metabolite.
c) Do both 25 &1,25- di hydroxy vitamin d metabolites.
d) Repeat bone profile next day after correction of hypocalcemia.

HRVD type 2





HRVD type 2

- Is a rare, autosomal recessive form of rickets.
- Reported so far worldwide in approximately 100 cases only.
- Is associated with end–organ resistance to 1,25-dihydroxyvitamin D.
- Caused by mutations in the gene encoding the vitamin D receptor.
- Affected children usually appear normal at birth, develop rickets within the first two years of life.
- Alopecia and ectodermal anomalies resulting from the lack of vitamin D receptor activity within keratinocytes develops in approximately two-thirds of cases and is a marker of disease severity (HRVD type 2A).
- Other patients without alopecia or other ectodermal anomalies (HRVD type 2B).

Good LUCK

End of Revision
Part -3