



DATA INTERPRETATION AND BEYOND

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DATA INTERPRETATION



- A popular testing methods both during medical studies and as an element of clinical practice.
- Helps in taking decision regarding evidence based practice.

Take time to read the whole laboratory data in context of clinical scenario/photograph mindfully.

Read all the questions and the data again.

DATA-1

- A 50-year-old woman presented with weight loss, abdominal pain, low back pain and night sweats for three months.
- On examination, she was pale and ill-looking. No other positive physical findings on clinical examinations.
- Hb – 8.4 gm/dl, WBC – 11,800/cmm, poly – 70%, lympho – 21%, platelets – 2,70,000/cmm, ESR – 75 mm in 1st hr, myelocytes – 5%, metamyelocytes – 4%, nucleated RBC – 5%. • MCHC - 30 gm/dl (normal 30 to 35) • MCV - 88 fl (normal 78 to 98).
- PBF - Normocytic and normochromic anaemia.

QUESTIONS

1. What is the hematological diagnosis?
2. Write 2(two) underlying causes of this haematological abnormality.
3. Suggest 3(three) other haematological investigations for her.
4. Mention 6(six) non-haematological investigations to reach your diagnosis.

ANSWER

1. Leukoerythroblastic anemia.
2. a. Secondary deposit, b. lymphoma, c. multiple myeloma
d. tuberculosis
3. a. Reticulocyte count, b. coomb's test(direct and indirect),
c. bone marrow study
4. a. LDH b. CxR ray c. CT scan (or ultrasonography of
abdomen) d. MT e. Bone scan/ PET scan f. MRI of Lumbosacral
spine
g. protein/ immune electrophoresis

DISCUSSION

Causes of leucoerythroblastic anaemia:

- Severe bleeding, myelofibrosis, **secondary deposit in the marrow**, active **hemolytic anemia**, multiple myeloma, **lymphoma**, thalassemia major (specially after splenectomy).

DATA-2

- A 14-year-old girl consultant with gynecologist for her amenorrhea.
- On examination, the patient is short, pulse – 100/min.
BP – 140/100 mm Hg,
- Heart – systolic murmur in left second space, near the sternum.
- Full blood count - Hb – 10.9 gm/dl, WBC – 7,800/cmm, poly – 59%, lym – 39%, mono – 2%, ESR – 33 mm in 1st hr. • RBS - 5.3 mmol/L. • Urea - 37 mg/dl. Creatinine - 1.2 mg/dl.
- Serum electrolytes - Sodium 143 mmol/L, Potassium 4.3 mmol/L, Chloride 100 mmol/L, Bicarbonate 24 mmol/L.
- TSH - 3.1 mIU/L (N: 0.8 to 3.6). • LH - 39 IU/L (N; 2.5 to 21). • FSH - 20.8 IU/L (N:1 to 10). • Prolactin - 125 mu/L (N: less than 20 mu/L)

QUESTIONS

1. Mention 3 (three) expected findings on examination of face in this case.
2. State 2 (two) other endocrine abnormalities may associated with this condition.
3. What is the most likely cause of this murmur?
4. Mention 1 (one) investigation to confirm your diagnosis.
5. Suggest 2(two) important drugs to treat her.

ANSWER

1. a.Small lower jaw (micrognathia), b.mouth is small and fish like, c.high arched palate, d.webbing of neck,
2. a.Diabetes mellitus, b.Hashimoto's thyroiditis and c.hypothyroidism
3. Coarctation of aorta
- 4.Karyotyping from buccal smear.
5. a. Estrogen and progesterone therapy, b. Growth hormone, c. Anabolic steroid,

DISCUSSION

1. **Skeletal:** Short stature, short and webbing of neck, small lower jaw (micrognathia), mouth is small and fish like, high arched palate. Chest- broad, widely apart nipples (shield-like chest). **Hand-** short 4th metacarpal (other metacarpals may be short), lymphoedema of hands (also feet), nails- hypoplastic. **Elbow-** increased carrying angles (cubitus valgus).
2. **Cardiac abnormality:** Coarctation of aorta (10 to 20% cases), ASD, VSD, AS, Hypertension.
3. **Renal abnormality:** Horse shoe shaped kidney, hydronephrosis.

DATA-3

- A 30- year-old married, male presented with chronic cough with sputum and recurrent headache.
- Hb-12.5mg/dl, TC-12,000/cmm
(N-77%,L-26%, B-2%, E-5%),ESR-56mm, Platelet count-5,00,000/cmm
- RBS-%.6 mmol/ L
- S. creatinine- 1.1 mg/L



QUESTIONS

- 1.What is the most likely clinical diagnosis ?
- 2.State 3(three) other important symptoms you will ask to the patient.
- 3.Mention the cause of his headache .
- 5: Suggest 4(four) further investigations to confirm the diagnosis .

ANSWER

1. Kartagener's syndrome

2. a. Haemoptysis b. Recurrent chest pain c. Weight loss d.
Ask about infertility

3. Sinusitis

4. a. HRCT Scan of chest b. Xray PNS OM view c. Saccharin
test to assess mucociliary function d. Semen Analysis e. ECG

DATA-4

- A 42-year-old man admitted with the history of increasing breathlessness and ankle swelling for 1 week. He was also complaining of recurrent both knee joints pain for six months. His father had died from same problem.
- On examination, she looks pigmented and emaciated.

Anemia – mild, pulse – 120/min, BP – 100/60 mm Hg on lying, 85/50 mm Hg on standing, irregular. Liver – palpable, 4 cm, non-tender.

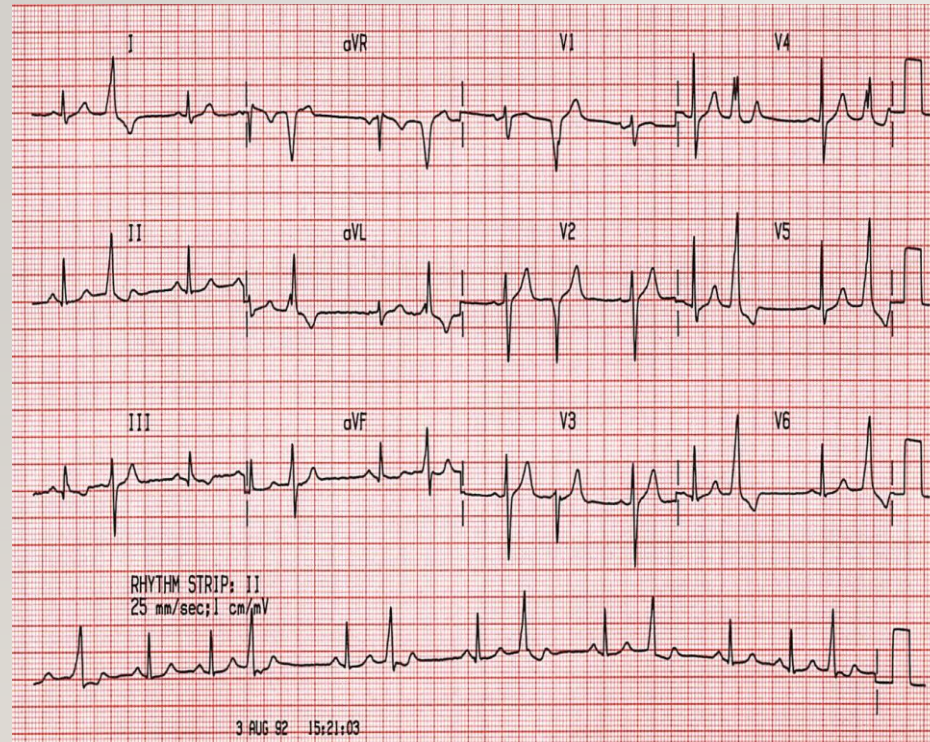
DATA-4

CONT'D

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- Full blood count - Hb – 8.6 gm/dl, WBC – 6,800/cmm, poly – 63%,
lympho – 31%, eosinophil – 4%, monocyte – 2%, ESR – 80 mm in 1st hr.
 - Serum electrolytes - Sodium 123 mmol/L. Potassium 4.7 mmol/L. Chloride 92 mmol/L.
 - Serum urea - 10 mg/dl. • Serum creatinine - 1.2 mg/dl. • RBS - 13.1 mmol/L.
 - Serum cortisol 180 nmol/L (normal 170 to 720) • TSH 0.52 mIU/L (normal 0.5 to 5.1 mIU/L.)

DATA-4

CONT'D



QUESTIONS

1. What is the likely cause of his joint pain?
2. Mention the cause of this cardiac problem.
3. What is the underlying diagnosis?
4. Suggest 2(two) further important investigations to confirm your underlying diagnosis.
5. Mention 1(one) invasive and 1(one) non-invasive options of the treatment of underlying disease.

ANSWER

- 1. Chondrocalcinosis
- 2. Cardiomyopathy
- 3. Primary hemochromatosis
- 4. a. Serum ferritin b. Liver biopsy for iron staining and quantitative measurement of iron (>180 mmol/gm liver tissue) c. Genetic testing
- 5. Venesection and family screening.

DISCUSSION

- **Combination of diabetes mellitus, cardiac abnormality, hepatic problem with arthritis, and pigmentation are highly suggestive of hemochromatosis.**
- Primary hemochromatosis is a hereditary disorder, inherited as autosomal recessive, characterized by increased iron absorption by the intestine, increased total body iron and deposition of iron in different organs of body with its dysfunction.
- Commonly, iron is deposited in liver, heart, pancreas, endocrine organs, joints, testis, skin, etc. Chondrocalcinosis may occur.
- Cardiac involvement leads to dilated or restrictive cardiomyopathy, abnormal ECG.
- Hypogonadism occurs due to deposition of iron in gonads, also hypopituitarism may occur

DATA-5

- A 40-year-old man presented with tiredness, loss of weight, abdominal pain, recurrent muscular weakness and pains in the lower limbs for one year.
- Full blood count - Hb – 9.5 gm/dl, WBC – 10,900/cmm, poly – 63%, lympho – 37%, platelets – 3,90,000/cmm, ESR – 30 mm in 1st hr.
- Urea - 8.7 mmol/L (normal 2.5 to 6.6).
- Creatinine - 140 μ mol/L (normal 60 to 120).
- Calcium – 1.9 mmol/L (normal 2.1 to 2.62). • Serum phosphate - 0.8 mmol/L (normal 0.8 to 1.4). • Alkaline phosphatase - 200 IU/L (normal 30 to 100). • Serum albumin - 40 gm/L (normal 2 to 17)
- Serum electrolytes - Sodium 137 mmol/L. Potassium 2.8 mmol/L. Chloride 117 mmol/L. Bicarbonate 12 mmol/L.

QUESTIONS

- 1. What is the most likely diagnosis?
- 2. Mention 2(two) likely causes of muscle weakness.
- 3. Suggest 1(one) biochemical test to confirm the diagnosis.
- 4. State 2 (two) useful therapeutic measure.

ANSWER

- 1. Distal renal tubular acidosis.
- 2. Hypokalemia , hypocalcaemia
- 3. a. Early morning urinary pH measurement b. measurement of urine pH after ammonium chloride infusion.
- 4. Sodium bicarbonate and potassium citrate.

DISCUSSION

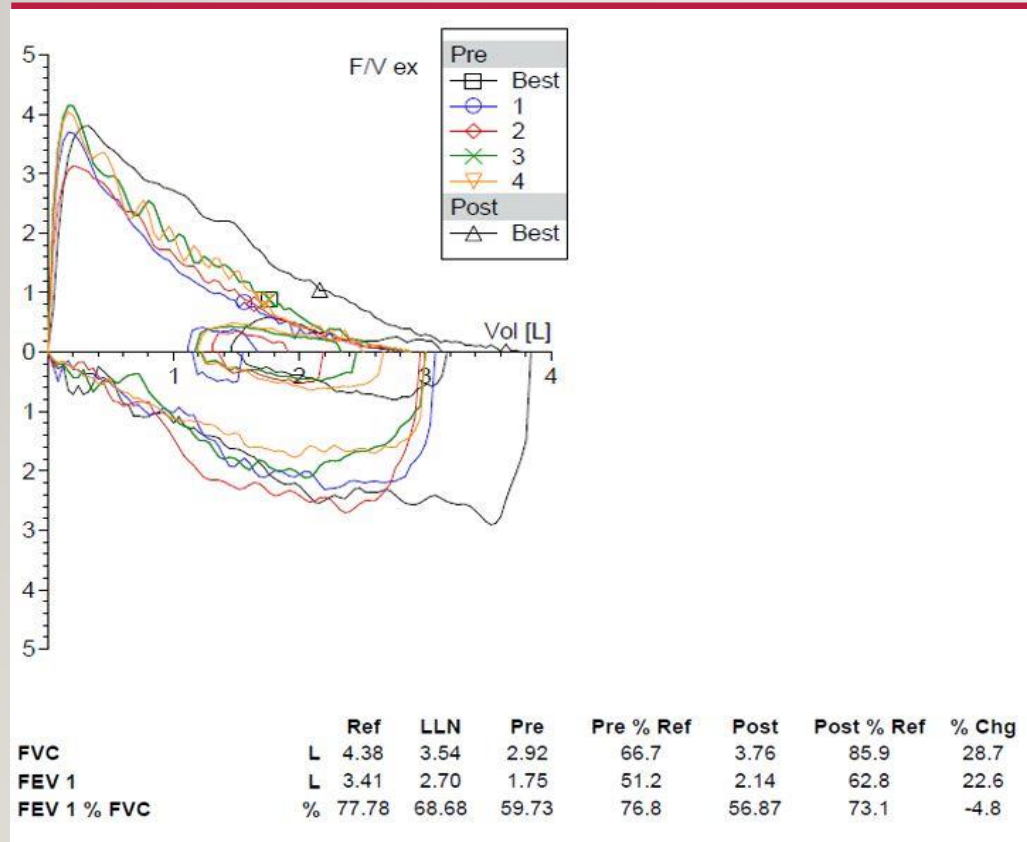
- Hypokalemia is usually associated with alkalosis.
- In distal RTA, hypokalemia is associated with acidosis. High chloride, low potassium with metabolic acidosis is highly suggestive of RTA.
- Muscular weakness is due to severe hypokalemia and hypocalcemia
- Treatment is with sodium bicarbonate and potassium citrate. The latter reduces calcium excretion and provides supplementary potassium.

DATA-6

- A 45-year-old, obese woman complained of increased tendency to sleep, difficulty in breathing with mild exertion, headache, vertigo, lack of concentration and weakness.
- On examination, BP – 160/100 mm Hg, pulse – 86/min, multiple linear striae are present in different parts of the body. Weight – 80 kg.

DATA-6

CONT'D



- Full blood count - Hb – 17.5 g/dl, WBC – 5,900/cmm, poly – 65%, lympho – 33%, mono – 2%, ESR – 5 mm in 1st hr, platelets – 2,30,000/cmm, RBC – 8.6 million/cmm.
- Chest X-ray - Normal.
- ECG - Low voltage tracing
- Arterial blood gases – pH 7.3, PaO₂ 55 mm Hg). PaCO₂ 56 mm Hg.

QUESTIONS

1. What abnormality present in this PFT?
2. Mention the most likely underlying cause of this PFT
3. What is the cause of raised hemoglobin?
4. State 1 (one) important cardiac complication in this case.
5. What is the most appropriate therapy?

ANSWER

1. Obstructive pattern
2. Obstructive sleep apnoea
3. Secondary polycythemia
4. Pulmonary hypertension/ Cor pulmonale
5. Nocturnal continuous positive-pressure ventilation

DISCUSSION

- Obesity, sleep disturbance or sleep apnea with polycythemia, the likely diagnosis is Pickwickian syndrome. It is also called obesity-hypoventilation syndrome.
- Gross obesity is associated with respiratory failure. In most cases, PaCO_2 is normal, but may be high.
- Serum leptin is high.
- Complications such as pulmonary hypertension and cor pulmonale may occur in Pickwickian syndrome.

DATA-7

A 45- year-old woman presented with frequent headache, vertigo, insomnia, bodyache and difficulty in walking for three months.

On examination, BP – 180/120 mm Hg, pulse – 90/min, high volume.

BMI-31.

No other physical findings. Heart, lungs and abdomen – normal

- Full blood count - Hb – 11.5 gm/dl, WBC – 8,300/cmm, poly – 64%, lympho – 33%, mono – 3%, platelets – 2,70,000/cmm. ESR – 48 mm in 1st hr,
- Urine - Few pus cells, Glycosuria (++) , proteinuria (+). FBS - 9.3 mmol/L. • Serum cholesterol - 180 mg/dl. • Serum triglyceride - 185 mg/dl.
- S. electrolytes - Sodium 145 mmol/l. Potassium 3.1 mmol/l. Chloride 101 mmol/L. Bicarbonate 30 mmol/l. • Urea - 5.9 mmol/L. • Creatinine - 1.3 mg/dl. • Chest X-ray - Heart slightly enlarged.
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QUESTIONS

1. State 5(five) other important physical signs you may get in this case.
2. Mention 2(two) differential diagnoses.
3. Suggest 6(six) further investigations to reach your diagnosis.
4. Mention 4 (four) oral drugs are used to treat this case.

ANSWER

1. a. Obesity, striae b. plethoric face c. skin is thin with bruise
d. proximal myopathy e. papilloedema
2. a. Cushing's syndrome/disease b. ectopic ACTH syndrome. c.
primary
aldosteronism
3. a. Serum morning and midnight cortisol, b. urinary cortisol c.
dexamethasone suppression test, d. ultrasonography of abdomen e.
CT scan or MRI of suprarenal glands/pituitary gland f. serum ACTH g.
bilateral petrosal sinus sampling h. CT scan of chest
- 4. a. ketoconazole, b. mitotane, c. metyrapone, d. osilodrostate

DISCUSSION

- Hypertension with hypokalemia and diabetes mellitus is highly suggestive of Cushing's syndrome.
- In primary aldosteronism, diabetes mellitus is not common and hypokalemia is more severe. To diagnose Cushing's syndrome, serum morning and midnight cortisol, 24 hours urinary-free cortisol, short overnight dexamethasone suppression test should be done, first to see whether Cushing's syndrome is present or not. Then further test should be done to find out causes (e.g. ACTH, X-ray chest, USG of suprarenal gland, CT or MRI of suprarenal glands and pituitary gland).

DATA-8

- A 40-year-old man developed scanty micturition and arthralgia four days after starting of Cat-1 antitubercular therapy for pulmonary tuberculosis .
- On examination, face – puffy, pulse – 106/min, BP – 170/100 mm Hg, edema –present, temp –38.8°C, multiple skin rashes – present
- Full blood count - Hb – 10.9 gm/dl, WBC – 11,200/cmm, poly – 64%, lympho – 28%, eosinophil – 8%, ESR – 110 mm in 1st hr, platelets – 1,75,000/cmm.
- Urine - Pus cells – plenty, proteinuria (++) .
- Total protein in urine - 1 gm/24 hours.
- Urea - 19 mmol/L (normal 2.5 to 6.6), Creatinine -4.5 mg/dl, FBS- 5.9 mmol/L.
- S. electrolytes - Sodium 130 mmol/L. Potassium 6.1 mmol/L. Chloride 90 mmol/L. Bicarbonate 17 mmol/L.

QUESTIONS

1. What is your diagnosis?
2. Which is the offending antitubercular drug causing this problem.
3. Suggest 2(two) further investigations to reach your diagnosis
4. Mention 4(four) principles of treatment.

ANSWER

1. Acute interstitial nephritis with ARF
2. Rifampicin
3. a. USG of kidney b. renal biopsy.
4. a. Offending drug should be stopped b. prednisolone
c. Correction of electrolytes d. Dialysis,

DISCUSSION

- This patient presents with fever, skin rash, eosinophilia and renal impairment shortly after antitubercular therapy.
- These findings are consistent with acute interstitial nephritis. It is an acute inflammation of tubular interstitium, probably due to hypersensitivity reaction. It is characterized by fever, arthralgia, skin rash, bodyache and renal failure.
- There is also oliguria, salt and potassium loss, proteinuria, high eosinophil in the blood. In urine, leukocyturia is common and eosinophils are high in 70%. Oliguria may be absent, despite moderately severe ARF.

DATA-9

A 25-year- old woman presented with recurrent deep vein thrombosis of right legs. On query she gave H/O cerebral venous thrombosis 2 year ago.

- CBC- Hb-10.5 gm/dl, TC- 4,000/cmm, Platelets- 1,15,000/cmm
- PT : 15 sec(c-12 sec)
- APTT: 60 sec(c-40sec)
- ANA –ve, Anti ds DNA-ve

1. Mention 2(two) other neurological manifestations of this condition.
2. State 2 (two) other cardiac complications that may occur.
3. Mention 3(three) investigations to confirm your diagnosis.
4. Suggest 2(two) drugs

ANSWER

1. a. TIA b. Chorea c. Migraines,
2. a. Pulmonary hypertension b. liebmann-sachs
endocarditis
3. a. Anticardiolipin antibody b. Lupus anticoagulant
c. Anti- β_2 -glycoprotein
4. a. Heparin b. Warfarin

DATA-10

- A 65- year-old man of known COPD presented with worsening dyspnea and an increase in the frequency and purulence of his sputum production over the past 2 days. His oxygen saturation is 78% on room air.
- Air arterial blood gas is drawn and reveals
pH = 7.3 ; PaO₂ = 55 ;
PaCO₂ = 80 ; HCO₃=30 ; BE
= +6 ; SaO₂ = 72% .

QUESTIONS

1. What is the ABG diagnosis?
2. Write down 6(six) signs on general examination you may search for initial assessment of this case.
3. Mention 5(five) principles of treatment.

ANSWER

1. Primary respiratory acidosis with partial metabolic compensation

2. a. Level of consciousness b. cyanosis c. Pulse d. Blood pressure
e. Features of carbon dioxide retention (Warm periphery, Bounding pulse, flapping tremor) f. Raised JVP g. oedema

3. a. Maintenance of airway b. Treatment of specific precipitating cause. c. Nebulized bronchodilator d. Controlled oxygen therapy
e. Antibiotics , f. Diuretics if evidence of fluid overload

Interpretations:

$PaO_2 = 55 \text{ mmHg}$,

$PaCO_2 = 80 \text{ mmHg}$

$SaO_2 = 72\%$

Type 2 respiratory failure

$pH = 7.30$, $PaCO_2 = 80$,

$\Delta PaCO_2 = 40$, $\Delta pH = 0.12$

Expected $pH = 7.28$,

Expected $HCO_3 = 38$

Observed $HCO_3 = 30$; $BE = + 6$;

Primary respiratory acidosis ,

with Secondary partial metabolic compensation

DATA-11

A 14-year-old boy of rheumatic fever developed with high grade fever, restlessness, severe shortness of breath following starting of his treatment 1 day ago.

Hb – 11.4 gm/dl, WBC – 11,800/cmm, poly – 70%, lympho – 21%, platelets – 2,70,000/cmm, ESR – 65 mm in 1st hr,

Blood sugar- 4.4 mmol/L, S. creatinine-1.8 mg/dl, ECG- sinus tachycardia

Arterial blood gases on inspiring room air -pH 7.49, PaCO₂ 20mm of Hg, PaO₂ 20 mm of Hg, Bicarbonate 12 mmol/L.

QUESTIONS

1. What is the acid–base disturbance?
2. What is the underlying cause?
3. Suggest 4 (four) investigations suggestive of your diagnosis.
4. Mention 3(three) options of treatment.

ANSWER

1. Respiratory alkalosis and metabolic acidosis.
2. Salicylate poisoning
3. a. Serum salicylate b. Serum electrolyte c Serum lactate d. Serum/ urine for ketone body
4. a. Intravenous saline b. Intravenous bicarbonate
c. Haemodialysis

DISCUSSION

The management is dependent on the serum salicylate level.

Levels below 500 mg/l are treated with intravenous saline to promote renal clearance.

Levels between 500 and 750 mg/l are treated with intravenous bicarbonate but may require forced alkaline diuresis on a high-dependency unit.

Levels between 750 and 1,000 mg/l are best treated with haemodialysis.



