

Anemia & cyanosis Examination

Anemia

Definition

- It is defined as the qualitative or quantitative diminution of RBC and / or haemoglobin concentration in relation to standard age and sex, and is clinically manifested by pallor. It is not a disease but denotes manifestation of some disease, and thus a cause must be searched for.

Where will you look for anaemia ?

- Lower palpebral conjunctiva (retract the lower eyelids downward and ask the patient to look upwards — both eyes at a time)
- Tongue, specially the tip and the dorsum.
- Mucous membrane of palate.
- Nail-beds (press the pulp to see the redness of nail-bed).
- Palms, soles and general skin surfaces.

Nail-beds are the windows of the cutaneous capillary network.

normal haemoglobin concentrations

- Males — 14.6 to 15.5 g/dl,
- females — 13.3 to 14.6 g/dl.
- Clinically, 14.5 g/dl may be taken as 100%.

Clinical classification :

- Mild anaemia — 60-80% of Hb (9-12 g/dl).
- Moderate anaemia — 40-60% of Hb (6-9 g/dl).
- Severe anaemia — < 40% of Hb (< 6 g/dl).

Examination of the hands in anaemia :

- Colour nail-beds and palms give an indication of presence of anaemia.
- Koilonychia gives a clue to the type of anaemia, such as iron deficiency anaemia. In severe anaemia, there may be capillary pulsation.
- Presence of splinter haemorrhage or Osier's node points towards SBE.
- Anaemia with finger deformities may indicate rheumatoid arthritis.
- Colour of palmar creases gives a clue to the degree of anaemia. When they are as pale as the surrounding skin, the patient usually has haemoglobin level < 7 g/dl.

- In ophthalmoscopy if the retina seems very pale, the haemoglobin concentration is usually < 4 g/dl.
- Jaundice associated with anaemia points towards haemolytic anaemia.

Cardiovascular (CVS) features in severe anaemia :

- Tachycardia
- Capillary pulsation.
- Water-hammer pulse.
- Cervical venous hum.
- Cardiomegaly (cardiac dilatation) and
- later signs of heart failure.

- Hyperdynamic apex beat.
- Mitral systolic murmur due to functional MI (ring dilatation).
- Haemic murmur over the pulmonary area.
- Rarely mid-diastolic (non-rumbling) murmur in mitral area may be auscultated (due to relative stenosis at mitral valve) secondary to Increased blood flow.

Features in other systems in severe anaemia :

- General survey - a) Pallor b) Dyspnoea c) Ankle oedema or anasarca.
- CVS - same
- G.I. tract -Hepatosplenomegaly
- Respiratory system - Basal crepitations.
- Nervous system - Features of polyneuropathy; sometimes, there is papilloedema
- Lymphoreticular system- sternal tenderness.

Ankle oedema in anaemia :

- Severe anaemia per se (renal retention of salt and water).
- Congestive cardiac failure may be associated with.
- Associated renal or hepatic disorders, hypoalbuminaemia, myxoedema.

Clinical diagnosis of iron deficiency anaemia :

- H/O 'pica' (eating of strange non-nutrient items such as clay—geophagia, ice—pagophagia, cornstarch—amylophagia, or coal) or chronic blood loss from G. I. tract.
- Pallor (pearly white sclera).
- Glossitis (bald or depapillated tongue)
- Angular stomatitis,
- cheilosis.
- Brittle finger nails, flat nails (platynychia) or even koilonychia.
- Brittle hairs.
- Dysphagia (Plummer-Vinson syndrome)

How do you examine a patient for polycythemia ('ruddy cyanosis') ?

- Polycythemia is the increase in red blood cells above normal. It is examined in the same way as done for the clinical detection of anaemia i.e, look for the lower palpebral conjunctiva, tongue, palate, nail-beds, palms and soles, and general skin surface.
- The colour of the mucous membrane turns dusky-red.
- Patients of polycythemia usually have facial plethora, suffused conjunctiva, increased redness of lower palpebral conjunctiva and palmar erythema.

Cyanosis

Definition:

- bluish discolouration of the skin and mucous membrane due to presence of increased amount of reduced haemoglobin (> 5 g/dl), or of haemoglobin derivatives in the capillary blood.
- Absolute concentration of reduced haemoglobin above 5 g/dl in the capillaries makes the blood dark and gives the tissue a bluish hue ('kyanos' means dark blue colour and 'osis' means condition). According to few clinicians, > 4 g/dl of reduced (desaturated) haemoglobin in the capillary blood produces cyanosis (recent view).
- Cyanosis is a grave sign and needs immediate evaluation as well as intervention.

Types of cyanosis :

- It is principally of two types : Central and peripheral cyanosis.
- Other clinical types of cyanosis are : enterogenous, mixed and differential cyanosis.

Differentiating features between central and peripheral cyanosis

	<i>Central cyanosis</i>	<i>Peripheral cyanosis</i>
Mechanism	Arterial destauration	Increased peripheral utilization
Sites	Skin, mucous membrane of oral cavity	Only skin involved
Temperature	Warm	Cold clammy
Clubbing	Present	Absent
Secondary erythrocytosis	Present	Absent
On warming	Cyanosis same	Cyanosis reduces
Oxygen therapy	Pulmonary cause can improve	Cyanosis reduces
Exercise	Cyanosis worsens	Cyanosis same or improves
Arterial blood gas	pO ₂ low	pO ₂ normal

Source : Essentials of Postgraduate Cardiology 2018

Peripheral cyanosis and sites to be examined :

- In peripheral cyanosis, the arterial blood is normally saturated (arterial PaO₂ is normal) but there is oxygen unsaturation at the venous end of capillary.
- Peripheral cyanosis results from excessive extraction of oxygen from the normally saturated arterial blood.
- The different mechanisms play in its production are,
 - Reduced cardiac output.
 - Peripheral vasoconstriction.
 - Slow speed of circulation in the extremities.

Sites to be looked for (in good natural light)—

- Tip of the nose.
- Ear lobules.
- Outer aspect of lips, chin and cheek.
- Tip of fingers and toes.
- Nail-bed of fingers and toes.
- Palms and soles.

Central cyanosis and sites to be examined :

- There is decreased arterial oxygen saturation as a result of marked reduction in oxygen tension in the arterial blood (arterial PaO₂ is reduced) either due to imperfect oxygenation of blood in lung or admixture of venous and arterial blood. This is usually detected when the oxygen saturation of arterial blood goes below 80-85%.

Sites to be looked for (in good natural light)—

- Tongue (mainly the margins as well as the undersurface).
- Inner aspect of lips
- Mucous membrane of gum, palate, cheeks.
- Lower palpebral conjunctiva.
- Plus, the sites mentioned in the peripheral cyanosis (one must examine these sites)—as same deoxygenated blood circulates everywhere in the body i.e., patients with central cyanosis will also be cyanosed peripherally.

Differential Cyanosis UL SaO ₂ > LL SaO ₂	Reversed Differential Cyanosis UL SaO ₂ < LL SaO ₂
- Severe pulmonary hypertension with PDA - Severe aortic coarctation H10(preductal) or interruption	- Transposition of great arteries (or Double-outlet right ventricle with subpulmonary ventricular septal defect) with severe pulmonary hypertension and PDA - TGA with severe aortic arch obstruction / interruption and PDA - Supracardiac TAPVD with PFO and PDA - Anomalous right subclavian artery connected by the ductus to the right pulmonary artery (Isolated RSA) (RUL SaO₂ lower than LUL and LL SaO₂)

Differential Cyanosis: another form of cyanosis

1) the upper part of the body remains pink and lower part of the body remains cyanotic.



right-to left shunt from the pulmonary artery to the descending aorta through the patent ductus arteriosus (PDA) such as in hypoplastic left heart syndrome or severe pulmonary hypertension

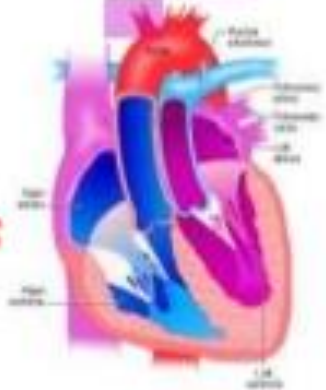
patent ductus arteriosus



2) the upper part of the body remains cyanotic while the lower part of the body remains pink.



transposition of the great vessels with pulmonary hypertension and shunt through PDA,



total anomalous pulmonary venous drainage above the diaphragm with shunt through PDA (higher oxygen content in the right ventricular blood).



Thank you