Anemia in pregnancy

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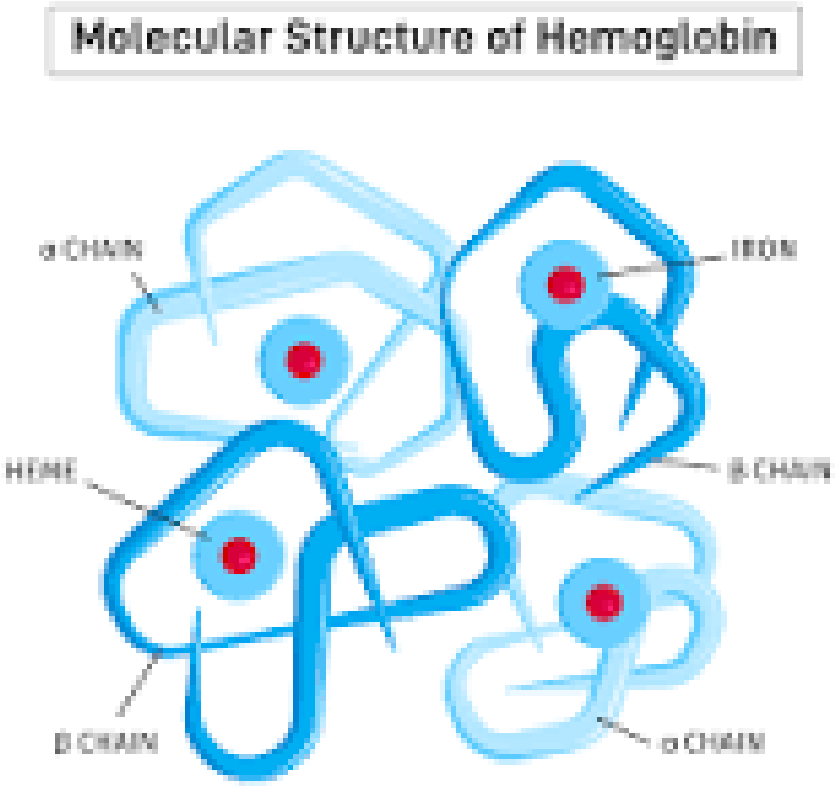
objectives

- Structure of hemoglobin
- Definition
- Types
- Effect of anemia on pregnancy
- Diagnosis
- Management

4 iron molecule + 4 protein chains



Hemoglobin structure

- Adult hemoglobin: NORMAL
- **Hemoglobin A** (more than 95%)
- is composed of four protein subunits
- two α (alpha) and two β (beta) subunits
- Hb A2 (2 alpha & 2 delta): β-thalassemia
- Fetal hemoglobin:
- is composed of two α (alpha) subunits and two γ (gamma) subunits

Hemoglobin function

- The primary function of Hb
- Transporting oxygen from the lungs to the tissues and facilitating the return transport of carbon dioxide

DEFINITION

- Anemia is Hb concentration **below:**
- 12 g/dl in non-pregnant women
- 11 g/dl in 1st trimester
- 10.5 g/dl in 2nd & 3rd trimesters
- 10 postpartum

Physiological changes

- **Hemodilutional anemia**
- Plasma volume increases by 50% and there is a fall in Hb concentration
- MCV & MCHC not changed
- Increase in demand for extra iron especially which cannot be overcome by diet
- Increase in folate requirements
- Increase in vitamin B12 requirements

Types of anemia

- Iron deficiency anemia is the most common hematological problem in pregnancy
- Folate deficiency is the second most common cause of anemia
- Hemoglobinpathies (thalassemia & sickle cell)

CBC

1. Hb : low
2. MCV: decreased / increased
   microcytic/ macrocytic
3. MCH: decreased hypochromic
4. MCHC: decreased

Hb, MCV, MCH, MCHC

- Microcytic hypochromic anemia:
- 1. Iron deficiency anemia
- 2. Thalassemia
- 3. Sickle cell disease
- Megaloblastic anemia:
- 1. folate deficiency
- 2. B12 deficiency

Iron deficiency anemia

Causes:

1. Low iron intake:

- DIET
- NO supplements

2. Impaired absorption

3. Loss

Causes:

- multiple pregnancy
- Intestinal infestations
- Malaria is a common cause of anemia in pregnancy
- 2-5% of women will have primary post partum hemorrhage
- Blood loss at the time of delivery contributes to iron deficiency in the puerperium

Symptoms:

- **non-specific**
- often dismissed as normal during pregnancy
- often attributed to the physiologic changes of pregnancy
- **Fatigue** is the most common symptom
- Dizziness, palpitations, irritability & dysponea
- Rarely pica develops, where there is a craving for non-food items such as ice and dirt

Effects on pregnancy:

- **FETAL:**
- low birth weight
- small for gestational age size
- preterm birth
- long-term neurocognitive effects in childhood

Effects:

- **MATERNAL:**
- Recurrent infections
- Need for blood transfusion
- postpartum hemorrhage
- Postpartum depression

Diagnosis

1. CBC (low Hb)
- **Diagnosis should be confirmed:**
- MCV, MCH, MCHC all reduced
- The first index to become abnormal is MCV

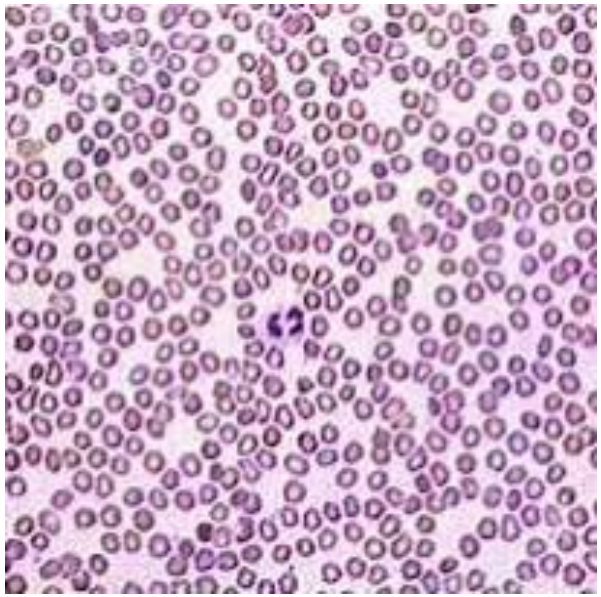
2. Serum iron < 12 µmol/L

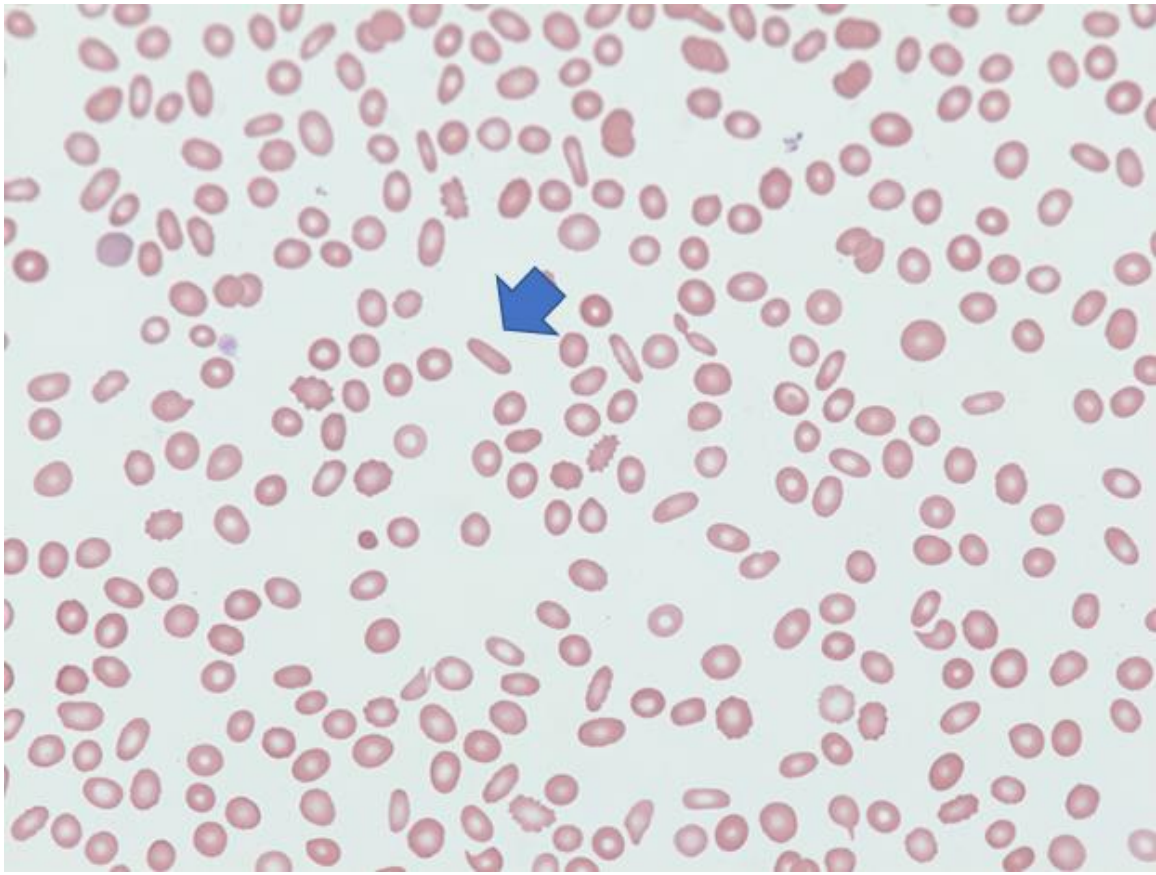
3. TIBG saturation < 15%

4. Serum ferritin < 12 µg/L

5. Blood film :microcytic hypochromic red cells and characteristic ‘pencil cells’

Elliptocytes, also known as ovalocytes or cigar cells





Diagnosis

- **Serum ferritin** provides an accurate assessment of iron stores in the absence of inflammation

- Ferritin and hemoglobin should be routinely assessed at the initial and 28-week prenatal visits

Management

- Increase iron intake
- Enhance absorption

Management

1. Diet

2. Oral iron is the first line of management

3. IV iron

4. Blood transfusion

Diet

Diet

Management

2. Routine supplementation with oral iron to meet the increased demand during pregnancy

<u>Recommended routine supplement:</u>

- Iron 60 mg/ d
- and folic acid 400 µg/ d

Management

- Iron absorption from small intestine enhanced by ascorbic acid and meat

- Inhibitors of absorption include:
- Phytic acid (present in bread)
- Tannins (present in tea, coffee, and **chocolate**)
- Food rich in calcuim

Management

- **GI side effects:**
- nausea, epigastric pain, costipation
- Side effects are directly related to the dose of iron taken
- **Response:**
- to oral iron should be evaluated by measuring the hemoglobin level 2–4 weeks after treatment begins
- **Duration:**
- Treatment should continue for at least 3 months after the hemoglobin level normalizes until 6 weeks postpartum

Management

- for those unable to tolerate oral preparation
- **IV iron** is safe throughout pregnancy
- Maximum rise in Hb with either oral or parenteral iron is 0.8g/dL per week

Management

- **Blood transfusion:**
- if Hb < 8 g/dl in late pregnancy

Megaloblastic anemia

Megaloblastic anemia

Macrocyti anemia

Folate deficiency

B12 deficiency

-Low Hb, increased MCV

-

Folate Deficiency Anemia

- Folate deficiency is the second most common cause of anemia

Folate Deficiency Anemia

- Folic acid is necessary for:
- CLOSURE OF NEURAL TUBE during early fetal development
- Neural tube closure is completed 15 to 28 days from conception ≈ 4- 6 weeks gestation

Folate Deficiency Anemia

- All women planning pregnancy are advised to take **400 µg /d folate**
- for 12 weeks pre-pregnancy
- and during the first trimester
- to reduce the risk of neural tube defects and other fetal anomalies

When to give folic acid 5 mg/day (high-dose)

- Women whom themselves have spina bifida
- Previous fetus with neural tube defect
- Taking anti-epileptic drugs or sulfasalazine
- Diabetics
- Obesity BMI > 30
- Hemoglobinopathies
- Malabsorption
- Proven folate deficiency

Hemoglobinopathies

Hemoglobinopathies

1. Thalassaemia (reduced production of normal Hb)
2. Sickle cell (abnormal Hb S, c)

Hemoglobinopathies

- In adults:
- HbA: 95% to 98% (0.95 to 0.98)
- HbA2: 2% to 3% (0.02 to 0.03)
- HbF: 0.8% to 2% (0.008 to 0.02)
- HbS: Absent
- HbC: Absent
- Hb electrophresis

Hemoglobinopathies

- Autosomal recessive
- Carriers (Trait) **OR** diseased
- Diagnosis by Hb electrophresis
- Offer them PGD (prenatal genetic diagnosis) if her husband is a carrier

THALASSEMIA

- The commonest genetic blood disorder
- There is reduced production of normal Hb
- Alpha/ beta

Management:

1. Multidisplenary team

2. Screening for iron overload
(e.g LFT and cardiac echo)

Cardiac Failure is the primary cause of death

3. Iron Chelation

(Desferrioxamine: safe from 20 weeks, SC antenatally & IV in Labor)

4. Serial growth scan from 20 weeks

5. Correct anemia to maintain Hb 10 (Transfusions)

6. Folate 5 mg/d

7. low dose Aspirin

8. Postnatal Thrombo Prophylaxis (LMWH).

Sickle cell anemia

- Hereditary disorders in which the red cells contain Hb-S
- Produced by substitution of valine for glutamic acid at the position 6 of the β-chain of normal haemoglobin
- Deoxygenated state, hemoglobin aggregates causing the red cells to sickle.

Effects on the disease

- Sickle cell crisis
- which usually occurs in the last trimester

- Hemolytic crisis

- Painful crisis.

Effects on pregnancy

- Maternal:
- Anemia
- Recurrent infections
- Chronic hyperbilirubinemia
- Acute chest syndrome
- Pre-eclampsia
- Venous thromboembolism
- Death

Effects on pregnancy

- Fetal:
- Miscarriage
- Fetal growth restriction
- Premature labour
- Placental abruptio

Management

- Multidisplenary team
- prevent crises:
- (hypoxia, stress, infection, hemorrhage)
- Prevent infections
- Screen for PET
- Serial growth scan from 20 weeks
- Correct anemia to maintain Hb 10 (Transfusions)
- Folic acid 5 mg/d
- Low dose Aspirin from early pregnancy
- Postnatal Thrombo Prophylaxis (LMWH)


Thank you!

HYPEREMESIS GRAVIDARUM

Definition

- Nausea & vomitting are common (50%-80%)
- **HG** occurs only in 0.3-3% of pregnancies
- **HG** is severe nausea & vomitting
- with weight loss (more than 5% of pre-pregnancy weight)
- Dehydration
- Electrolyte imbalance
- Ketonuria /ketosis

Clinical presentation:

- First trimester usually weeks 6-8
- Nausea, vomiting
- Signs of dehydration
- Reduced urine output, dark coloured urine
- Tachycardia
- Postural hypotension
- Muscle wasting

Diagnosis:

HG is a diagnosis of exclusion

Diagnosis

- **HG** is a diagnosis of exclusion:

1. Multiple pregnancy
2. Molar pregnancy
3. Infections: urinary, ear, GIT
4. Endocrine:
   - thyrotoxicosis, hyperparathyroidism
   - Diabetic keto-acidosis, addison's disease
5. Surgical: peptic ulcer, pancreatitis, cholecystitis
6. Neurological: increased intra- cranial pressure
7. Drugs: iron supplements, antibiotics

Investigations:

- Ultrasound:
- Confirm gestational age
- Multiple pregnancy
- Molar pregnancy

Investigations:

1. CBC: raised Hct
2. Sr electrolytes:
   -Hyponatremia
   -Hypokalemia
   -metabolic Hyochloraemia alkalosis
3. Thyroid function test: thyrotoxicosis
4. Blood sugar
5. Liver function test (abnormal in 50% of cases)
6. Urine: ketonuria, UTI

Complications:

Serious morbidity & mortality may result if **HG** is inadequately /inappropriately treated

Effects on pregnancy

- 1. Wernicke's encephalopathy

- Due to B1 (thiamine) deficiency
- Precipated by carbohydrate containing food
- **Fatal but reversible**
- Blurred vision, unsteadiness, confusion, memory problem
- Nystagmus, ophthalmoplegia, 6th nerve palsy, gait or finger nose ataxia
- Diagnosis is clinical, confirmed by MRI
- Associated with 40% fetal loss

6th nerve palsy

Effects on pregnancy

- 2. Hyponatremia
- Lethargy & seizures
- 3. Mallory-Weiss tears
- 4.Thrombosis
- 5.Vitamin (B6, B12)deficiency
- 6.Psychology

management

- IV fluids & correction of electrolyte imbalance
- **Adequate** & **appropriate** fluid & electrolyte replacement
- IV fluids that contain dextrose are inappropraite
- Give **normal saline & Hartman's** Infusions only

management

- IV fluids & correction of electrolyte imbalance
- Anti emetics not teratogenic
- Proton pump inhibitors are safe
- Thiamine supplement
- Corticosteroids: in severe cases
- stop drugs that may cause nausea & vomitting
- Thromboprophylaxis
- Emotional support & frequent reassurance

Response:

- No ketonuria
- Nausea / vomitting
- Tolerates oral diet
- Normal electrolytes


THANKS
FOR YOUR
ATTENTION