Anaemia in Pregnancy

Dr LAMA AL-MEHAISEN
Physiological Changes in pregnancy:

- Progressive increase in plasma volume up till 32-34 weeks, (50%).
- Progressive increase in Red Cell mass, although the pregnancy, (25%).
- Maximum physiological anaemia occur at 32-34 weeks gestation.
- MCV, MCHC stay constant, i.e. dilutional anaemia.
- Progressive fall in platelet count, Low platelets only if Platelets are <100 or pathologically reduced count. 5-10% will be 100-150*10^9/l
- There is 2-3 fold increase in Iron requirements in pregnancy
- Hypercoagulable state.
Classification of anemia

- Physiological anemia of pregnancy
- Pathological - Deficiency anemia
  - Fe deficiency
  - Folic acid deficiency
  - Vit B12
  - Protein deficiency
- Haemorrhagic
  - Acute - following bleeding in early months or APH
  - Chronic - Hookworm infestation, bleeding pile
Hereditary
- Thalassemias
- Sickle cell haemoglobinopathies
- Hereditary haemolytic anemias
- Other haemoglobinopathies

Bone marrow insufficiency
Anemia of infection
Chronic disease (renal) or neop
Physiological Anaemia

- **Lower Hb normal values:**
  - Non-Pregnant 11.5-12 g/dl
  - Pregnant, change with gestation, but generally <11 g/dl.

- **Clinical features:**
  - Mostly detected on routine testing.
  - Tiredness.
  - Lethargy.
  - Dizziness.
  - Fainting.
Dilutional anemia

- Plasma volume increases by 10 to 15 percent at 6 to 12 weeks of gestation, expands rapidly until 30 to 34 weeks
  - The total gain at term averages 50% above that in non-pregnant women.
  - The RBC mass also increases, but to a lesser extent (25%).
  - Typically, these changes result in mild anemia (hemoglobin 10 to 11 g/dL), but there is no specific hemoglobin or hematocrit value that can be used to distinguish physiologic dilutional anemia from other causes of anemia.
Criteria for physiological anemia

- Hb - 11gm%
- RBC: 3.2 million/mm3
- Peripheral smear: normal morphology of RBC with central pallor
Iron Deficiency Anaemia.

- The commonest in pregnancy.
- Increased demand by the developing fetus, leads to increased absorption and increased mobilisation from stores.

Several factors contribute to iron deficiency in this population:

- insufficient dietary iron.
- Blood losses from previous pregnancies and/or menstruation, as well as a short interpregnancy interval
- Iron requirements increase dramatically through pregnancy due to the expanding blood volume of the mother and the iron requirements for fetal RBC production and fetoplacental growth
- Delivery results in the loss of approximately 250 mg.
- Certain underlying conditions that preclude adequate iron intake or impair iron absorption. Examples include nausea and vomiting of pregnancy, inflammatory bowel disease, bariatric surgery (eg, gastric bypass), and other conditions.
laboratory findings during the development of iron deficiency

<table>
<thead>
<tr>
<th></th>
<th>Normal range*</th>
<th>Iron deficiency without anemia</th>
<th>Iron deficiency with mild anemia</th>
<th>Severe iron deficiency with severe anemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin</td>
<td>Normal range*</td>
<td>Normal range*</td>
<td>9 to 12 g/dL (90 to 120 g/L)</td>
<td>6 to 7 g/dL (60 to 70 g/L)</td>
</tr>
<tr>
<td>Red blood cell size and appearance</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal or slight hypochromia (slight decrease in MCHC)</td>
<td>Microcytosis (decrease in MCV) and hypochromia (decrease in MCHC)</td>
</tr>
<tr>
<td>Serum ferritin</td>
<td>40 to 200 ng/mL (40 to 200 mcg/L; 89.9 to 449 picoM/L)</td>
<td>&lt;40 ng/mL (≤40 mcg/L; ≤89.9 picoM/L)</td>
<td>&lt;20 ng/mL (≤20 mcg/L; ≤45 picoM/L)</td>
<td>&lt;10 ng/mL (≤10 mcg/L; ≤22.5 picoM/L)</td>
</tr>
<tr>
<td>Serum iron</td>
<td>60 to 150 mcg/dL (10.7 to 26.7 microM/L)</td>
<td>60 to 150 mcg/dL (10.7 to 26.7 microM/L)</td>
<td>&lt;60 mg/dL (≤10.7 microM/L)</td>
<td>&lt;40 mcg/dL (≤7.1 microM/L)</td>
</tr>
<tr>
<td>Total iron-binding capacity (TIBC; transferrin)</td>
<td>300 to 360 mcg/dL (53.7 to 64.4 microM/L)</td>
<td>300 to 390 mcg/dL (53.7 to 69.8 microM/L)</td>
<td>350 to 400 mcg/dL (62.6 to 71.6 microM/L)</td>
<td>&gt;410 mcg/dL (&gt;73.4 microM/L)</td>
</tr>
<tr>
<td>Transferrin saturation (serum iron/TIBC)</td>
<td>20 to 50%</td>
<td>20%</td>
<td>&lt;15%</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>Bone marrow iron stain</td>
<td>Adequate iron present</td>
<td>Iron absent</td>
<td>Iron absent</td>
<td>Iron absent</td>
</tr>
<tr>
<td>Erythrocyte zinc protoporphyrin, ng/mL RBC</td>
<td>30 to 70</td>
<td>30 to 70</td>
<td>&gt;100</td>
<td></td>
</tr>
</tbody>
</table>
a serum ferritin level alone If low (eg, <30 ng/mL [<30 mcg/L]), this is sufficient to confirm the diagnosis of iron deficiency; levels ≥30 ng/mL are sufficient to eliminate the possibility of iron deficiency in the majority of cases

serum ferritin may have limited use during pregnancy because its concentration often decreases in late pregnancy as maternal iron stores are used to supply iron to the placental and fetal circulations

but using hemoglobin or hematocrit measurement alone to determine iron deficiency status is indirect and imprecise

Use Both s. ferritin and Hg level
Why anemia during pregnancy???

- The woman who has got sufficient iron reserve and is on balanced diet - unlikely
Anaemia results if:

- Stores are depleted.
- Iron intake is poor.
- Absorption is poor.
- Utilisation is reduced.
- Demand is increased:
  - Multiple gestations.
  - Chronic blood loss.
  - Haemolysis.
- A lot of patients start pregnancy with already depleted stores.
  - Menorrhagia.
  - Inadequate diet.
  - Previous recent pregnancies
  - Conception while breast feeding.
Symptoms

- Tiredness
- Lethargy
- Headache
- Soft murmurs
- Oedema
- Crepitations - base of lung
- others
Diagnosis:

- Iron Deficiency Anaemia:
  - As it is the commonest, it is always presumed to be the diagnosis, but should always be confirmed.
  - Changes in the indices as follows:
    - MCV reduced.
    - MCH, MCHC reduced.
    - Serum iron fall, <12mmol/l (normally falls in pregnancy).
    - Total iron binding capacity increased, saturation <15% indicate anaemia.
    - Serum ferritin, fall.
IDA is more common in multiple pregnancies.

Blood loss at delivery will further increase maternal anaemia, so it is not only a problem confined to pregnancy period.
Management:

- Routine iron supplement, as demand is rarely met by normal iron intake.
- Oral supplementation is not without side effects:
  - Constipation.
  - Taste.
  - Diarrhoea.
  - Nausea and vomiting.
- Alternate routes are available:
  - IM.
  - IV.
  - The maximum rate of rise in Hb is around 1g/dl/week.
treatment of iron deficiency

- **Oral iron** — For most women we treat with oral iron.
  - Oral iron is safe, inexpensive, readily available, and can be given during any trimester.
  - Up to 70% of pts report significant gastrointestinal side effects including metallic taste, gastric irritation, nausea, diarrhea, and/or constipation;

- **Intravenous iron** — in women who cannot tolerate oral iron;
  - those with severe anemia,
  - especially later in the pregnancy;
  - and those for whom oral iron is not effective in raising the hemoglobin and/or ferritin level
  - Intravenous iron is not used during the first trimester, as there are no safety data for first-trimester use
Intravenous route

Total dose diffusion: deficit of iron is calculated, and the total amount of iron required is administered by a single sitting intravenous infusion. Advantages:

- Eliminates repeated and painful intramuscular injections
- Treatment completed in a day
- Less costly

Intramuscular therapy:

- Total dose to be administered is calculated
- After an initial dose of 1ml, the injections are given daily or on alternate days in doses of 2ml intramuscularly.
- Drawbacks: • Painful • Chance of abscess • Reactions
Blood transfusion

Limited. But indications are:

- PPH
- Severe anaemia in later months of pregnancy
- Refractory anemia
- Assoc infection.

Advantages:

- Increased oxygen carrying capacity of the blood
- Hb may be utilised for the formation of new red cells.
- Stimulated erythropoiesis
- Improvement expected after 3 day
Folate Deficiency Anaemia:

- Second commonest in pregnancy.
- The normal dietary Folate intake is inadequate to prevent megaloblastic changes in the bone marrow in 25% of pregnant ladies.
- Prevalence varies according to:
  - Social class.
  - Nutritional status.
- Factors increasing the risk of FDA:
  - Anticonvulsant therapy.
  - Haemolytic anaemia.
  - Thalassemia.
  - Hereditary spherocytosis.
Incidence

0.5 – 3% • Common in multiparae and multiple pregnancy
Diagnosis

Folate Deficiency:
- MCV increased.
- Megaloblastic changes in the bone marrow.
- Reduced serum and red cell folate.
Haematological examination and other blood values

- Hb - 10gm%
- Stained blood film: hypersegmentation of the neutrophils, macrocytosis and anisocytosis. Megaloblasts.
- MCV - 100 µm3
- MCH - high, MCHC - normal
- Associated leucopenia and thrombocytopenia
- Serum iron is normal or high
- Serum folate - 3ng/ml
- Serum B12 level below 90pg/ml
COMPLICATIONS

- Abortion
- Dysmaturity
- Prematurity
- Abruptio placentae
- Fetal malformation
Prophylactic

- Avoidance of frequent child births
- Supplementary iron therapy
- Dietary prescription
- Adequate treatment
- Early detection of falling Hb level is to be made
Preconception advice for all women is to take folate supplement of 0.4mg/day to reduce the risk of NTD, this will increase to 5mg/day in cases of previous NTD baby, or in case of intake of anti-folate medications.
Complication of severe anemia

During pregnancy
- Pre-eclampsia
- Intercurrent infection
- Heart failure
- Preterm labour

During labour:
- Uterine inertia
- PPH
- Cardiac failure
- Shock
During Puerperium:
- Puerperal sepsis
- Subinvolution
- Failing lactation
- Pulmonary embolism
Effects on baby:

- LBW
- Intra uterine death

Risk period

- At about 30 - 32 weeks of pregnancy
- During labour
- Immediate following delivery
- Any time in puerperium specially 7 - 10 days following delivery