PRENATAL CARE: ANEMIA

Week 51

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Reading Assignment
- ACOG Practice Bulletin 95, July 2008: Anemia in Pregnancy
- Pavord S, et al. UK guidelines on management of iron deficiency in pregnancy.
LEARNING OBJECTIVES

• Understand screening guidelines for anemia in pregnancy

• Be able to diagnosis iron deficiency anemia

• Learn the management of iron deficiency anemia in pregnancy
CASE VIGNETTE

• Ms. Nunca Sangre is a 19 yo G3 P2012 woman presenting at 28w 4d EGA for routine follow up care.

• She states that she feels exhausted all the time.
What aspects of this patient's history are most important?

- **PMH:** Obesity
- **PSH:** Gastric sleeve (2017)
- **PObH:** NSVD x 2, last delivery less than 12 months ago
- **PGynH:** Heavy menses, denies STIs or abnormal Paps
- **Social:** Denies T/E/D
- **Allergies:** NKDA
- **Meds:** Prenatal multivitamins

*Age (Teen pregnancy)*
Pertinent Physical Exam Findings


• **Gen:** NAD, appears fatigued
• **Skin:** Some pallor
• **Pulm:** CTAB
• **Cardio:** Sinus tachycardia, no murmurs, rubs, or gallops
• **Abd:** Obese, 3 well-healed LSC port site incisions, non-tender
• **Ext:** WWP

Following your visit, CBC returns notable for

Hgb 9.6, Hct 29%, Plts 204
DIFFERENTIAL DIAGNOSIS

• Iron deficiency anemia
• Physiologic dilution anemia of pregnancy
• Hemorrhagic anemia
• Hemoglobinopathies
  • Thalassemia
  • Sickle Cell disease
• Nutritional deficiencies
  • Folate
  • Vitamin B12
• Hypothyroidism/ endocrine dysfunction
• Autoimmune hemolysis
• RBC membrane disorders
• Anemia of chronic disease
ANEMIA: DEFINITION AND SYMPTOMS

• **Definition**: A hemoglobin or hematocrit value less than the fifth percentile in a healthy reference population based on the stage of pregnancy.
  - **First trimester**: Hgb < 11 g/dL and Hct < 33%
  - **Second trimester**: Hgb < 10.5 g/dL and Hct < 32%
  - **Third trimester**: Hgb < 11 g/dL and Hct < 33%
  - **Non-pregnant women**: Hgb < 12.0 g/dl and Hct < 35%

• **Symptoms**:
  - Weakness, fatigue, headaches, dizziness, lightheadedness
  - Changes in cognitive performance and psychological well being

• Pregnancy is a state of **physiological hemodilution**:
  - Intravascular blood volume expands by approximately 50%
  - Total red blood cell mass expands by approximately 25%
  - No change in MCV
Who should be screened for anemia?

• **All pregnant women** should be screened for anemia during pregnancy
  • CBC collected at the initial prenatal visit, and beginning of 3TM

• Women who meet the criteria for anemia (e.g. Hct < 33% in the first and third trimesters) warrant further evaluation even if they are asymptomatic:
  • Medical history and physical examination
  • RBC indices (e.g. MCV, MCHC, reticulocyte count, etc)
  • Serum iron, ferritin, transferrin
  • Hemoglobin electrophoresis
  • Peripheral smear, if indicated by history
BACK TO THE PATIENT- EVALUATION

What are next steps?

• Labs:
  • CBC with red cell indices
  • Hemoglobinopathy screen
  • Serum iron level
  • Ferritin level
  • Transferrin level
  • Total iron binding capacity

• Start empiric iron treatment

Ms. Nunca Sangre- Results

• Hgb: 9.6, Hct: 29%, MCV 80
• Hgb AA
• Plasma Iron: 25 mcg/dL
• Ferritin level: 8 mcg/dL
• Transferrin level: 400 mg/dL
• TIBC: 450 mcg/dL
DIAGNOSIS

Table 1. Normal Iron Indices in Pregnancy

<table>
<thead>
<tr>
<th>Test</th>
<th>Normal Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma iron level</td>
<td>40–175 micrograms/dL</td>
</tr>
<tr>
<td>Plasma total iron-binding capacity</td>
<td>216–400 micrograms/dL</td>
</tr>
<tr>
<td>Transferrin saturation</td>
<td>16–60%</td>
</tr>
<tr>
<td>Serum ferritin level</td>
<td>More than 10 micrograms/dL</td>
</tr>
<tr>
<td>Free erythrocyte protoporphyrin level</td>
<td>Less than 3 micrograms/g</td>
</tr>
</tbody>
</table>

Table 3. Biochemical Tests for Diagnosis of Anemia

<table>
<thead>
<tr>
<th>Test</th>
<th>Results Indicating Iron Deficiency Anemia</th>
<th>Results Indicating Thalassemia</th>
<th>Results Indicating Anemia of Chronic Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron level</td>
<td>Decreased level</td>
<td>Normal</td>
<td>Decreased level</td>
</tr>
<tr>
<td>Total iron-binding capacity</td>
<td>Increased capacity</td>
<td>Normal</td>
<td>Decreased capacity</td>
</tr>
<tr>
<td>Ferritin level</td>
<td>Decreased level</td>
<td>Normal</td>
<td>Increased level</td>
</tr>
<tr>
<td>Iron/total iron-binding capacity</td>
<td>Less than 18%</td>
<td>Normal</td>
<td>More than 18%</td>
</tr>
</tbody>
</table>
IRON DEFICIENCY ANEMIA

Hypochromic, microcytic anemia (MCV < 80fL) ***

- However microcytosis may only occur later in iron deficiency anemia
- Measurement of ferritin levels has the highest sensitivity and specificity for diagnosing iron deficiency in anemic patients
  - Ferritin level < 10 mcg/dL

**Risk factors:**

- Iron poor diet
- Malabsorptive conditions i.e. gastric bypass procedures
- Heavy menses pre-pregnancy
- Short inter-pregnancy interval
- Teen pregnancy
- Obesity
- Low BMI

**Prevalence:** 21.55 per 1,000 pregnant women in the US

- Iron deficiency anemia during pregnancy is associated with adverse outcomes including low birth weight, preterm delivery, increased need for transfusion, perinatal mortality, and postpartum depression

What will you prescribe for Ms. Nunca Sangre?

Oral supplementation

- With oral formulations, should see increase in hgb in 2 wks
- Multiple formulations
  - Starting with 60 mg elemental iron, daily to every other day dosing to improve absorption and limit side effects
- Absorption improved taking in the morning with vitamin C (ascorbic acid) and avoidance of taking with coffee, tea, or milk
- Adverse effects: constipation, gastrointestinal irritation, nausea

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrous fumarate</td>
<td>106 mg elemental iron per 325 mg tablet</td>
</tr>
<tr>
<td>Ferrous sulfate</td>
<td>65 mg elemental iron per 325 mg tablet</td>
</tr>
<tr>
<td>Ferrous gluconate</td>
<td>34 mg elemental iron per 300 mg tablet</td>
</tr>
<tr>
<td>Iron dextran</td>
<td>50 mg elemental iron per milliliter, intramuscularly or intravenously</td>
</tr>
<tr>
<td>Ferric gluconate</td>
<td>12.5 mg iron per milliliter, intravenously only</td>
</tr>
<tr>
<td>Iron sucrose</td>
<td>20 mg iron per milliliter, intravenously only</td>
</tr>
</tbody>
</table>

What will you prescribe for Ms. Nunca Sangre?

**IV Iron:**

- For patients:
  - who cannot tolerate PO iron
  - with severe anemia (Hgb 8-10) especially after 30 wks
  - in which PO iron will be ineffective (impaired absorption from gastric surgeries or IBD)
- Safe after first trimester
- Variety of formulations (iron dextran, iron sucrose or venofer, etc)
- No need for premedication in most patients
- AE include low risk (1-3%) of minor infusion reactions

Transfuse only for severe anemia (hgb <6) due to risk of fetal compromise from deoxygenation
What measures can be taken to prevent anemia in pregnancy?

As per CDC recommendations:
- Start every pregnant patient on low dose oral iron supplementation (e.g. 30 mg/day) at the initial prenatal visit.
- Nutritional counseling be provided for pregnant women with regards to an iron-rich diet, as well as a diet that supports iron absorption.

As per ACOG recommendations:
- Iron supplementation decreases the prevalence of maternal anemia at delivery.
- It is unclear whether iron supplementation in well-nourished pregnant women who are not anemic affects perinatal outcomes.
TAKE HOME POINTS

• Anemia in pregnancy is very common
• Screen all pregnant women for anemia at the initial visit and beginning of 3TM with a CBC
  • 1TM/3TM: Hgb < 11.0 g/dL and Hct < 33%
  • 2TM: Hgb < 10.5 g/dL and Hct < 32%
• Pregnant patients with anemia warrant further clinical and serological evaluation
• Therapy with oral iron supplementation of 65 mg/ day to every other day is effective
• Consider parenteral iron therapy for early diagnosis of anemia, severe anemia, or those not expected to respond to PO iron

- Data from >20,000,000 births were examined
- Anemia of pregnancy (AIP) was defined as hemoglobin-concentration <10g/dl
- Prevalence of AIP was two times higher among non-Hispanic blacks (20.44/1,000) than among non-Hispanic whites (10.73/1,000)

A large systematic review and meta-analysis from 2013 found that lower hemoglobin concentration is associated with higher risk of poor pregnancy outcomes (PTB, and LBW).
Description: Management of Anemia in Pregnancy
Patient was counseled about the diagnosis of anemia in pregnancy. Hemoglobinopathy screen was reviewed and found to be ***. Iron studies, including ferritin, serum iron level, total binding iron capacity, and transferrin were sent. The patient was recommended to begin oral iron daily to every other day with plan for repeat CBC to assess improvement in 4 weeks. Possible side effects of oral iron were discussed including nausea, GI irritation and constipation. Plan for referral to hematology for possible IV iron was discussed in case of intolerance or ineffectiveness of oral iron.
Coding/ Billing

- O99.019, anemia complicating pregnancy, unspecified trimester
- D50.9, iron deficiency anemia, unspecified
- D53.9, nutritional anemia, unspecified
- O90.81, anemia of the puerperium
EVIDENCE