

## Case - 15: Anemia: Student Handout

### **Part 1, History:**

**ID:** Nouf Al-Ali a 27 year-old Saudi lady who is a school teacher from Riyadh.

### **Reason for consultation:**

She was referred to you in the clinic because of anemia (Hemoglobin 70 gm/L)(MCV 65 fl).

### **History of presenting illness:**

She comes with the complaints of headache, fatigue, palpitations, and SOB on exertion for the last 2 months.

She noticed that the symptoms are getting worse with time which now makes her unable to perform her daily activities. There was no associated chest pain. No weight loss, fevers or night sweats.

No history of bleeding from any source except that she has irregular heavy menstrual cycle for the last 8 months.

No history of abdominal pain, diarrhea, chest pain or cough. She denied any past history of thalassemia in her or her family.

### **Past medical history**

No past medical history or any hospital admissions.

### **Allergy and Medication**

NIL.

### **Family history**

Her father passed away when she was 10 years old, in a car accident. Her mother is alive and healthy and has two older brothers who are well and healthy.

## **Social history**

She is born and raised in Riyadh, she is married with 4 children and graduated from University with a Masters degree in education two years back, and since then she is teaching in school. There is no history of smoking, alcohol consumption or illicit drugs.

## **Part 2, Clinical examination:**

Her vitals are as follows:

Pulse: 100 beats/min

Blood pressure: 120/85

Respiratory rate: 16 breaths/min

Temperature: 37.2 °C

## **General examination:**

On general examination she looked comfortable and well apart from pallor that was seen in her palm creases and conjunctivae.

## **Abdominal examination:**

Her abdomen was soft and non-tender, there was no signs of organomegaly. She had normal bowel sounds.

## **Cardiovascular and respiratory examination:**

On cardiovascular examination: She had normal S1 and S2, there was no murmurs or added sounds. In particular, there was no signs of heart failure (no gallop or S3, no basal crackles and normal JVP with no lower limb edema).

On respiratory examination: she had normal chest expansion and normal breath sounds.

### Part 3, Investigations:

#### Complete Blood Count (CBC)

Blood Test		Normal range
Hemoglobin	70	115-155 gm/L
White blood cell count (normal differential count)	8,000	5,000 -10,000 ( $10^3/\mu\text{L}$ )
RBC	3.9	4.04-6.13 ( $(10^6/\mu\text{L})$ )
Hematocrit	32	37-47%
MCV	65 fl	80-96 fl
RDW	23	11.6-15.5 %
MCH	25	27-32 pg
MCHC	210	300-350 g/L
Platelet count	242,000	160,000-500,000 ( $10^3/\mu\text{L}$ )

**Urea, creatinine, electrolytes and LFTs:** were normal.

## Learning objectives:

At the end of the session the students should be able to

1. Enlist the differential diagnosis of anemia based on MCV (normal 80-100) and identify the causes under most likely & less likely categories.
  - a. Microcytic anemia: TAILS mnemonic (thalassemia, anemia of chronic diseases, iron deficiency anemia, lead poisoning and sideroblastic anemia). The last 2 causes are extremely rare and sideroblastic anemia is a congenital anemia that happens in pediatric cases. Anemia of chronic disease is a diagnosis of exclusion after excluding iron deficiency and thalassemia). So, for any microcytic anemia the student should think of iron deficiency or thalassemia.
  - b. Normocytic anemia: the differential here depends on whether the bone marrow is appropriately responding to the anemia with making high reticulocytes (retics), normal response is >1% percentage or 100 absolute count.
    - i. If so then normocytic anemia with high retics means there is recent bleeding or hemolysis or treated nutritional deficiency.
    - ii. If retics are normal or low, it means the bone marrow is not healthy and anemia is likely related to bone marrow suppression, failure or infiltration.
  - c. Macrocytic anemia:
    - i. Megaloblastic (ovalocytes in blood film and or hyper segmented neutrophils (>5 segments is abnormal): causes include B12, folic acid deficiencies. Methotrexate.
    - ii. Non-megaloblastic: (no ovalocytes, no hyper segmentations of neutrophils): causes include liver diseases, thyroid disease, alcohol, myelodysplastic syndrome, multiple myeloma.
2. Discuss the further questions needed in history based on the above approach.
3. Discuss how to differentiate iron deficiency anemia from thalassemia.

	Iron deficiency anemia	Thalassemia
MCV	Low (80-70s)	Very low (70-60s)
RBC	Low	High or normal
RDW	High	normal
Ferritin/iron level	Low	High or normal

4. Justify the abnormal findings in the history and clinical examination.
5. Enumerate any further investigations required.
6. Discuss the management plans in treating a patient with Iron deficiency anemia

### **Suggested Reading:**

- Kumar P and Clark M. Clinical Medicine. 7<sup>th</sup> ed. Edinburgh: WB Saunders, 2009.
- Tierney LM. And Henderson MC. The Patient History: Evidence-Based Approach. The McGraw Hills Company, 2005
- Patel AT, Ogle AA.(2002) "Diagnosis and Management of Acute Low Back Pain". American Academy of Family Physicians;61:1779-86,1789-90

### **Important Information to students:**

- The students are expected to read the case and related question carefully, before they come to case-based discussion session.
- Formulate an approach to anemia based on MCV.
- Try to come up with differential diagnosis and think of what relevant questions, physical examination finding and investigations are needed.