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Major Clinical Case: Anemia for interpreting CBC

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LEARNING OUTCOMES

After completing this session, students will be able to:

- ❑ Define what laboratory tests are and explain their general role in patient care.
- ❑ Differentiate between screening, diagnostic, and monitoring tests with relevant examples.
- ❑ Identify the purpose and appropriate use of screening, diagnostic, and monitoring tests in clinical scenarios.
- ❑ Recognize how different types of lab tests contribute to early detection, diagnosis, and disease management.
- ❑ Appreciate the importance of selecting the right type of test based on clinical need.

Case of Anaemia

Patient Presentation:

- ✓ A 32-year-old woman presents with fatigue, weakness, and shortness of breath on exertion for the past 3 months.
- ✓ She reports pale skin, brittle nails, and occasional dizziness.
- ✓ She has a history of heavy menstrual bleeding and a vegetarian diet.

Physical Examination

- Pale conjunctiva and nail beds
- Tachycardia (HR: 98 bpm)
- Normal blood pressure (120/80 mmHg)
- No hepatosplenomegaly

ADVISED for complete blood test (screening test)
& Specific Diagnostic tests

Laboratory Findings

Test	Result	Reference Range
Hemoglobin (Hb)	**9.0 g/dL**	12–16 g/dL (F)
Hematocrit (Hct)	30%	36–46% (F)
RBC Count	3.8 × 10^6/µL	4.0–5.2 × 10^6/µL
MCV	76 fL	80–100 fL
MCH	24 pg	27–33 pg
MCHC	28 g/dL	32–36 g/dL

SCREENING TESTS

Test	Result	Reference Range
RDW	18%	11–14.5%
Reticulocyte Count (Reticulosytosis)	2.2%	0.5–2.5%
WBC Count	6.0 × 10^3/µL	4.0–11.0 × 10^3/µL
Platelet Count	280 × 10^3/µL	150–450 × 10^3/µL

SPECIFIC DIAGNOSTIC TESTS

Test	Result	Reference Range
Serum Iron	30 µg/dL	50–170 µg/dL
TIBC	450 µg/dL	250–400 µg/dL
Transferrin Sat.	7%	20–50%
Ferritin	8 ng/mL	15–150 ng/mL (F)

Peripheral Blood Smear Findings

- Microcytic, hypochromic RBCs
- Pencil cells (elliptocytes)
- Anisocytosis (increased RDW)
- No target cells or basophilic stippling

INTERPRETATION OF LAB TESTS

- Microcytic, hypochromic RBCs:*Complete Blood Count (CBC) – Key Findings*
Interpretation: Low mean corpuscular volume (MCV) and low hemoglobin content (MCH) per RBC. Classic for iron deficiency anemia (IDA).

Differential: Also seen in thalassemia, but history and other findings favor Iron Deficiency Anaemia.
Pencil cells (elliptocytes):
Interpretation: Elongated RBCs; highly specific for iron deficiency.

Anisocytosis (↑ RDW – Red Cell Distribution Width):
Interpretation: Increased variation in RBC size due to mixed populations of microcytic and normocytic cells. Early IDA often shows high RDW.

Screening Tests

Likely included hemoglobin (Hb), hematocrit (Hct), RBC indices (MCV, MCH, MCHC) : LOW in IDA.

Specific Diagnostic Tests

Peripheral Blood Smear: Confirmed microcytic, hypochromic RBCs with pencil cells (gold standard for IDA morphology).

Iron Studies:

- ❑ Low serum ferritin (most specific for IDA).
- ❑ High TIBC (Total Iron-Binding Capacity), low serum iron, low transferrin saturation.

DIAGNOSIS

Iron Deficiency Anemia (IDA) due to chronic blood loss (menorrhagia) and inadequate dietary iron intake.

Key Takeaways

Lab findings (microcytic/hypochromic RBCs, pencil cells, ↑ RDW) + history are diagnostic of IDA.

Next Steps

- ❑ Oral iron supplementation (e.g., ferrous sulfate) + dietary counselling.
- ❑ Address underlying cause (e.g., gynecologic evaluation for menorrhagia).
- ❑ Follow-up CBC to monitor response (expect reticulocytosis in 1-2 weeks, Hb normalization in 6-8 weeks).

THANK YOU