Iron Deficiency Anemia Case Study

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Introduction

Ms. A's fatigue, exertional shortness of breath, palpitations, dizziness during sport, tachycardia, low blood pressure, and history of heavy menstrual bleeding make iron deficiency anemia a strong working diagnosis. Iron deficiency limits hemoglobin synthesis, reducing the blood's capacity to transport oxygen and forcing the cardiovascular system to compensate during activity. The original case correctly connects menstruation and possible blood loss with anemia, but the diagnosis cannot rest on symptoms alone. A complete assessment must confirm anemia, demonstrate depleted iron stores, identify the source of iron loss, and exclude other causes of microcytosis or exercise intolerance. This case analysis therefore treats iron deficiency anemia as probable rather than automatically proven.

Interpreting the Reported Laboratory Value

The reported hemoglobin value of 32.8 g/dL is not physiologically plausible and should not be used as evidence of anemia. It may represent a transcription error, a hematocrit of 32.8 percent, or a hemoglobin value written with the decimal in the wrong place. A hematocrit near 32.8 percent would support anemia in a nonpregnant adult woman, but the actual laboratory report must be checked before conclusions are made. Clinical documentation should never silently convert an impossible value into a convenient diagnosis. The correct approach is to verify hemoglobin, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin, red-cell distribution width, reticulocyte count, ferritin, transferrin saturation, and inflammatory markers when relevant.

How Iron Deficiency Produces the Symptoms

Iron is required for hemoglobin production and for several enzymes involved in cellular energy metabolism. As iron stores fall, ferritin usually declines first, followed by reduced iron availability for erythropoiesis and eventually a lower hemoglobin concentration. Red blood cells become smaller and contain less hemoglobin, producing a microcytic, hypochromic pattern. Reduced oxygen delivery explains fatigue, weakness, exertional breathlessness, headache, and dizziness, while compensatory tachycardia may occur when the body attempts to maintain tissue oxygenation. Symptoms vary with severity, speed of onset, fitness level, and coexisting illness. A young athlete may notice declining endurance before anemia becomes severe because exercise increases oxygen demand and reveals limitations that are less obvious at rest.

Heavy Menstrual Bleeding as the Most Likely Cause

In a menstruating young woman, heavy menstrual bleeding is a common and clinically important source of chronic iron loss. The history should clarify cycle length, duration, flooding, passage of large clots, nighttime changes, missed work or school, and the number of pads or tampons used. Clinicians should also ask about pregnancy, postpartum bleeding, uterine fibroids, endometriosis, endocrine disorders, anticoagulants, inherited bleeding disorders, and family history. Heavy bleeding is not merely an inconvenience; persistent monthly losses can exceed dietary replacement and progressively empty iron stores. Treating iron deficiency without evaluating menstrual loss may produce only temporary improvement, because the underlying cause continues to remove iron after supplementation has begun. (American College of Obstetricians and Gynecologists, 2019)

The Possible Contribution of Aspirin

The original discussion links aspirin use with hemorrhage, which is clinically reasonable but requires detail. Aspirin irreversibly inhibits platelet cyclooxygenase and can increase bleeding tendency, particularly when used frequently, combined with other antiplatelet or anticoagulant drugs, or taken by someone with gastrointestinal disease. It may worsen menstrual bleeding and can contribute to occult gastrointestinal blood loss. The assessment should establish why Ms. A uses aspirin, the dose, frequency, duration, and whether she has dyspepsia, black stools, abdominal pain, or easy bruising. She should not abruptly stop prescribed medication without medical advice, but unnecessary self-medication should be reviewed. Identifying medication-related loss is part of correcting the cause rather than simply replacing iron.

Laboratory Confirmation of Iron Deficiency

Serum ferritin is the most useful initial marker of iron stores in an otherwise healthy person, but it rises during infection and inflammation and may appear normal despite deficiency. A low ferritin strongly supports iron deficiency, while transferrin saturation, serum iron, total iron-binding capacity, C-reactive protein, and soluble transferrin receptor may help when inflammation complicates interpretation. The National Institutes of Health notes that hemoglobin and hematocrit alone are neither sensitive nor specific enough to describe the full spectrum of iron status. A peripheral blood smear may show microcytosis, hypochromia, anisocytosis, and elongated cells. Laboratory findings should be interpreted together with symptoms, menstrual history, diet, medications, and examination rather than through a single number. (National Institutes of Health, Office of Dietary Supplements, n.d.)

Differential Diagnosis

Other causes must be considered because fatigue, dizziness, and microcytosis are not unique to iron deficiency. Thalassemia trait can produce marked microcytosis with a relatively preserved red-cell count and normal iron stores. Anemia of inflammation may reduce circulating iron while ferritin remains normal or elevated. Vitamin B12 or folate deficiency usually produces macrocytosis, but mixed deficiencies can obscure the pattern. Pregnancy, thyroid disease, kidney disease, hemolysis, infection, eating disorders, dehydration, cardiopulmonary disease, and anxiety may also contribute to symptoms. If Ms. A's laboratory results do not fit straightforward iron deficiency, the clinician should broaden the evaluation rather than increasing iron indefinitely or attributing every symptom to menstruation.

Assessing Severity and Urgency

Severity depends on the verified hemoglobin concentration, cardiovascular symptoms, active bleeding, hemodynamic stability, and the rate at which anemia developed. Syncope, chest pain, severe breathlessness at rest, ongoing heavy bleeding, marked tachycardia, or hypotension requires urgent medical assessment. A stable young adult with moderate chronic anemia may be managed as an outpatient, but dizziness during sport creates a safety concern because collapse can cause injury. Until evaluated, Ms. A should avoid strenuous activity that reliably provokes severe symptoms. Blood transfusion is not a routine treatment for uncomplicated iron deficiency; it is reserved for selected cases involving severe symptomatic anemia, instability, or urgent clinical circumstances after risks and alternatives are considered.

Oral Iron Treatment

For many stable patients, oral iron is the first treatment because it is effective, inexpensive, and widely available. Modern practice often uses a lower elemental-iron dose once daily or on alternate days rather than multiple large daily doses, because hepcidin responses and gastrointestinal side effects can reduce absorption and adherence. The exact preparation and schedule should be selected by a clinician. Nausea, abdominal discomfort, constipation, and dark stools are common, and patients should be told that these effects do not necessarily indicate harm. Iron is best absorbed away from substances that inhibit absorption, although tolerability may require taking it with food. Treatment should continue long enough to restore both hemoglobin and iron stores.

When Intravenous Iron May Be Appropriate

Intravenous iron may be considered when oral therapy is not tolerated, is poorly absorbed, cannot replace ongoing losses, or must work more rapidly because symptoms are significant. It is also used

in selected patients with inflammatory bowel disease, chronic kidney disease, bariatric surgery, or persistent anemia despite an adequate oral trial. Intravenous treatment replenishes iron more predictably but requires dosing based on deficit, monitoring for infusion reactions, and attention to preparation-specific risks. It does not remove the need to investigate bleeding. Giving intravenous iron while heavy menstrual or gastrointestinal loss continues may improve laboratory values temporarily without solving the clinical problem. Choice of route should reflect severity, cause, access, preferences, and response.

Nutrition and Absorption

Dietary counseling can support recovery but should not be presented as a substitute for therapeutic iron when anemia is established. Heme iron from meat, fish, and poultry is generally absorbed more efficiently than nonheme iron from legumes, fortified grains, leafy vegetables, nuts, and seeds. Vitamin C–containing foods can improve nonheme absorption, while tea, coffee, calcium, and some medications may reduce absorption when consumed close to an iron dose. The assessment should explore restrictive diets, food insecurity, disordered eating, gastrointestinal symptoms, and endurance-training practices. A balanced plan should respect cultural and ethical food choices. The goal is adequate intake and absorption without implying that the patient caused the condition through poor discipline.

Treating the Source of Blood Loss

Long-term recovery requires control of the cause. Heavy menstrual bleeding may be evaluated through pregnancy testing, pelvic examination or imaging when indicated, and assessment for structural, endocrine, or coagulation disorders. Treatment options can include hormonal contraception, a levonorgestrel-releasing intrauterine system, tranexamic acid, treatment of fibroids, or other gynecologic interventions depending on diagnosis and patient preference. If gastrointestinal loss is suspected, stool history, celiac testing, and endoscopic evaluation may be considered according to age, symptoms, risk factors, and guideline recommendations. Aspirin or other medication use should be reviewed with the prescriber. Iron replacement and source control should proceed as coordinated parts of one plan.

Monitoring Response

A follow-up plan should document whether symptoms improve and whether hemoglobin rises after treatment begins. Reticulocyte response can occur early, while hemoglobin usually increases over subsequent weeks when treatment is effective and bleeding has been controlled. Failure to respond should prompt review of adherence, dose, diagnosis, absorption, ongoing loss, inflammation, and mixed nutritional deficiency. Ferritin should eventually be reassessed to confirm restoration of stores,

because normal hemoglobin can return before iron reserves are adequate. Monitoring also prevents unnecessary prolonged supplementation, which can cause side effects and obscure another diagnosis. Ms. A's return to sport should be gradual and based on clinical improvement, verified laboratory recovery, and safe exercise tolerance.

Conclusion

Ms. A's symptoms and heavy menstrual bleeding make iron deficiency anemia a persuasive diagnosis, but the case contains a laboratory value that must be verified before treatment decisions are finalized. Proper evaluation combines a complete blood count, ferritin and related iron studies, menstrual and medication history, physical examination, and investigation of alternative causes. Management should replace iron, control the source of loss, address aspirin use, monitor response, and protect the patient from exercise-related collapse while symptoms are severe. The most important correction to the original discussion is that iron deficiency anemia is not confirmed merely by fatigue and presumed low hemoglobin. It is confirmed through coherent clinical and laboratory evidence and treated through both replacement and cause-specific care. (Ko, 2020)

References

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