High Ferritin And High TIBC: A Case Of Anemia With A Uniquely Paradoxical Iron Study

Category: Medicine & Medical Specialties; Poster Presentation
Disclosure: The authors did not report any financial relationships or conflicts of interest
Supplemental Video

Presenting Author: Yichi Zhang, BS, Medical Student, 3rd Year, Department of Medicine, Tulane University School of Medicine, New Orleans, LA

Coauthors: Faizan Malik, MD, Fellow, Pulmonary Critical Care Medicine, Tulane University School of Medicine, New Orleans, LA.

Ferritin and total iron binding capacity (TIBC) are both crucial parts of the iron study used to ascertain causes of anemia. Under most circumstances, ferritin and TIBC correlate inversely with one another, owing to their physiological significance. Here, we present a case of anemia where this rule was broken under a unique set of coexisting conditions.

A 45-year-old female with a past medical history of IV heroin use and MRSA skin lesions presents with three days of sharp chest pain, cough, subjective fevers, and fatigue. A chest CT showed a 4.7x3.6cm lung mass in the right upper lobe with central cavitation. Her WBC was 7.6 and hemoglobin was 8.8. Sputum AFB smear, tuberculosis PCR test, and Fungicell screen were negative. Transthoracic echocardiogram revealed no valvular vegetations. Broad spectrum coverage was started due to concern for lung abscess. An iron study was obtained to investigate anemia and fatigue, which showed paradoxical findings of high ferritin (415), high TIBC (523), low serum iron (22), and low saturation (4%). Meanwhile, her CBC demonstrated low mean corpuscular volume [MCV] (56.7) and high red blood cell distribution width [RDW] (21.1). Subsequent hemoglobin electrophoresis revealed 95.2% HbA1 and 4.8% HbA2, suggesting beta-thalassemia minor. The patient underwent lung biopsy, which confirmed an abscess due to MSSA. She was then initiated on IV cefazolin, which led to her eventual recovery.

Serum ferritin and TIBC levels typically show an inverse correlation. However, this case demonstrates a unique scenario where both ferritin and TIBC are elevated due to the coexistence of iron deficiency anemia, beta-thalassemia minor, and a systemic inflammatory response secondary to lung abscess. Iron deficiency is the most common cause of anemia, characterized by low serum iron and saturation, as well as high TIBC and RDW. Beta-thalassemia is a genetic disorder due to low hemoglobin production, thus leading to low MCV, and increased HbA2 production. Finally, chronic systemic inflammation and infection can lead to anemia of chronic disease, which results in macrophage sequestration of iron and high ferritin levels. Ultimately, this interesting trio of clinical conditions resulted in this uniquely paradoxical iron study.

Learning Objectives
Discuss how levels of ferritin and TIBC levels typically correlate with one another and how this rule-of-thumb can be broken in atypical scenarios.