Iron deficiency anemia in a patient with active pulmonary tuberculosis: a case report

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Abstract

Introduction: Anemia is a common finding in active pulmonary tuberculosis and majority of them are due to the anemia of chronic disease / inflammation. But herein we reported a case of anemia due to the iron deficiency that is far less common in a patient with active pulmonary tuberculosis.

Case Report: A 47 year-old Thai Buddhist monk complained of chronic cough with scanty sputum and fatigue without fever for a year. The physical examination revealed a slim monk with mild pallor and unremarkable lung signs. The body temperature was 37.0 degree Celsius. His blood tests showed Hb 10.0 g/dL, WBC 11,800/mm³, platelet 649,000/mm³, MCV 70.7 fL, MCH 21.4 pg, Hb analysis: A2ACS, Hb Constant spring (CS) 0.4%, Hb A2 2.2%, serum ferritin 16.4 ng/mL, Hb A1c 5.3%. The chest film showed diffuse fibro-nodular infiltration scattering nearly whole lung of both sides. Acid fast bacilli staining of the sputum was found positive. His definite diagnoses were active pulmonary tuberculosis, iron deficiency anemia (IDA) and Hb Constant Spring heterozygosity. He was treated with the 4-drug anti-tuberculous regimen, and iron tablets. He responded well to therapy. His Hb concentration was raised to 15.2 g/dL, MCV 79.1 fL, MCH 25.8 pg within three months of therapy.

Conclusion: An iron deficiency anemia in a case of active pulmonary tuberculosis was reported. It could be completely corrected after the treatment with anti-tuberculous regimen and iron tablets.

Introduction

Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis. It can be found infecting any specific organ of human or even as disseminated form particularly in immuno-compromised hosts. The most frequent organ involvement is the lung resulting in pulmonary tuberculosis. Patients always have respiratory symptoms such as cough and hemoptysis and constitutional symptoms such as low grade fever, anorexia and weight loss.1 Chest film is important for the diagnosis but its definite diagnosis is based on the
finding of the organism in the appropriate specimen. It usually runs chronic inflammatory course and needs a long term multi-drug regimen for many months.

Anemia is a common finding in the active pulmonary tuberculosis, about 67%. In majority of cases, it is mostly attributed by the anemia of chronic disease (ACD) / inflammation (ACI) (75.9%). In contrast, the prevalence of iron deficiency anemia (IDA) is only 2.4%. Most cases of ACI are characterized by the normochromic normocytic red blood cell morphology, the hemoglobin concentration rarely less than 8 g/dL, high serum ferritin, low serum iron and low transferrin. When microcytic anemia is encountered in cases with active pulmonary tuberculosis, the common causes like thalassemia and IDA should be searched for as in this case.

Case Report

A 47-year-old Thai Buddhist monk visited the physician at the Department of General Practice, Maharat Nakhon Ratchasima Hospital, with the complaint of chronic cough with scanty sputum, anorexia and gradually progressive fatigue without fever for a year. He losted his weight for 5 kg. His body temperature was 37.0 degree Celsius. The physical examination revealed a slim, bony monk with mild pallor, unremarkable lung signs, pulse rate 111/min, and his oxygen saturation was 95%.

His initial blood tests showed: Hb 10.0 g/dL, Hct 33.1%, WBC 11,800/mm³, platelet 649,000/mm³, MCV 70.7 fl, MCH 21.4 pg, MCHC 30.2 g/dL, RDW 20.2%, N 78%, L 11%, M 8%, Hb analysis using the capillary zone electrophoresis method: A² ACS, Hb CS (Constant spring) 0.4%, Hb A₂ 2.2%, serum ferritin 16.4 ng/mL (normal 21.8-274.7 ng/mL), HbA1c 5.3%, FBS 81 mg/dL, HIV antigen/antibody-negative, albumin 3.2 g/dL, globulin 4.8 g/dL, cholesterol 147 mg/dL.

The chest film showed the diffuse fibro-nodular infiltration scattering through nearly whole lung of both sides. The acid fast staining of sputum was found positive for numerous bacilli.

![Fig. 1. The chest film showed diffuse fibro-nodular infiltration in both lungs](image)

He was definitely diagnosed as having active pulmonary tuberculosis and IDA with the underlying Hb Constant Spring heterozygosity. The endoscopy for identifying the causes of iron loss was not allowed while the stool examination was not performed. The treatment was started with 4-drug anti-tuberculous regimen, isoniazid, rifampicin, pyrazinamide, ethambutol, and Ferro-B-Cal. He could tolerate all drugs well and had good adherence and good response.

Within three months of treatment, he gained the body weight for 3 kg, Hb 15.2 g/dL, Hct 46.6%, MCV 79.1 fl, MCH 25.8 pg, WBC 8,700/mm³, platelet 258,000/mm³, ferritin 39.3 ng/ml. The anti-tuberculous drugs and the iron tablet were still continued.
Discussion

The diagnosis of pulmonary tuberculosis in our case was based on the history of chronic cough and fatigue, diffuse fibro-nodular infiltration in the lungs and it was confirmed by the positive AFB staining of the sputum while that of the IDA was based on the serum ferritin less than 30 ng/mL in the case of microcytic anemia, MCV < 80 fL, Hb < 13.0 g/dL.6

In patients with active pulmonary tuberculosis, mean serum ferritin is generally found to be 363.5 ng/mL in males and 235.9 ng/mL in females.7 However as one of chronic infectious inflammatory diseases, the pulmonary tuberculosis8 as well as the disseminated tuberculosis9 may have serum ferritin high or even higher than 10,000 ng/mL.

For the diagnosis of IDA in the patients with rheumatoid arthritis, the chronic non-infectious inflammatory disease which is always complicated by the ACI, the cut point of serum ferritin is proposed to be 60 ng/mL10 instead of 30 ng/mL because the ferritin is one of positive phase reactant proteins. The pulmonary tuberculosis is also a chronic infectious inflammatory disease11, the cut point of ferritin for diagnosis of IDA should be set higher than usual, parallel to those of rheumatoid arthritis. With this proposal, the IDA in cases of pulmonary tuberculosis may be more frequently diagnosed.

Although the iron therapy for IDA in a case of pulmonary tuberculosis is necessary, the avoidance of the iron overload must be also kept in mind otherwise it may increase the risk of active tuberculosis12 because the iron will accumulate within the macrophages that normally responds to Mycobacterium organism.13

One difference between ACI and IDA is the mean corpuscular volume (MCV). It is normal (MCV > 80 fL) in most cases of the former14 except for 25% that is microcytic (MCV < 80 fL) whereas it is usually microcytic in the latter except for 40% that may be normal.15 Our case had the initial MCV of 70.7 fL that favored the diagnosis of IDA or IDA co-incidentally with ACI although in pulmonary tuberculosis, 20% of cases have the MCV significantly lower than the normal control, 79.42 ± 2.4 vs. 88.04 ± 2.5 respectively.16

Without IDA, Hb Constant Spring traits usually have normal MCV, 83.3 ± 6.1 fL, MCH 25.7 ± 2.1 pg, Hb 12.0 ± 1.3 g/dL.17 The MCV, MCH and Hb level of our patient at the initial presentation were 70.7 fL, 21.4 pg and 10.0 g/dL, respectively during having IDA and they turned to 79.1 fL, 25.8 pg and 15.2 g/dL respectively which were approximately similar to those of naive Hb CS heterozygosity, after the adequate iron therapy and recovery from pulmonary tuberculosis.

An association between IDA and tuberculosis seems possible because IDA patients can have impaired cell mediated immunity18 resulting in being more susceptible to infections particularly by intracellular organisms such as tuberculosis. This fact is accentuated by the nationwide study in Taiwan which found that patients with newly diagnosed IDA developed tuberculosis twice more frequently than the control group.19 Likewise, among tuberculosis patients in Tanzania, 64% had anemia and more than a half of these had microcytosis20 that can be thalassemia/hemoglobinopathy and/or IDA.21 Because both IDA22 and tuberculosis23 are still health problems in Thailand, their association or cause-effect relationship should be clarified in further studies.

Conclusion: A 47 year-old Thai monk presented with active pulmonary tuberculosis with mild microcytic anemia that was proved to be an iron deficiency anemia. After treatment with anti-tuberculous drugs and iron tablets for three months, the iron deficiency anemia could be completely corrected.
Reference


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