



The Three Sides of Anemia In the Elderly

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In the past decade, the World Health Organization (WHO) established anemia criteria that have generally been accepted with regard to geriatric patients: aging is not a cause of anemia; rather, it predisposes the person to anemia.

What is anemia?

Anemia is defined as a lower-than-normal number of red blood cells in the blood. WHO criteria determine anemia to be present when the hemoglobin count is < 130g/L in a man and

< 120 g/L in a woman.

The prevalence of anemia in the geriatric population varies, depending on the study, from 8% to 44%. Hospitalized men, especially those over 85, are the most affected. The most frequent causes of anemia are chronic diseases and iron deficiency.

Table 1

Initial investigation

- Complete blood cell count
- Peripheral blood smear
- Reticulocytic count
- Serum ferritin
- B₁₂
- Red cell folate concentration
- Plasma creatinin
- Serum STC concentration

Supplementary assessment

- Hemolysis assessment
- Hepatic assessment
- Assessment for celiac disease
- Bone marrow biopsy
- Serum protein electrophoresis
- Upper- and lower-digestive endoscopy
- Erythropoietin
- Homocysteine and methylmalonic acids
- *Helicobacter pylori* test
- Erythrocyte sedimentation rate

STC: Serum theophylline concentration

Table 2

Classification of anemias

1. Macrocytic (MCV > 100fL):

- Vitamin B₁₂ deficiency
- Folate deficiency
- Myelodysplastic syndrome
- Chronic alcohol abuse

2. Microcytic (MCV < 80fL):

- Iron deficiency
- Thalassemia
- Inflammatory anemia
- Siderolastic anemia
- Copper deficiency,
- Zinc poisoning

3. Normocytic (MCV 80-100):

- Chronic-disease anemia
- Renal insufficiency
- Iron deficit (onset)
- Acute blood loss

MCV: Mean corpuscular value

How is anemia diagnosed?

Initial case management of an anemic patient involves a questionnaire and physical examination. The questionnaire must identify the anemia's causes and repercussions. Non-specific symptoms include:

- weakness,
- fatigue, and
- dyspnea.

The condition may go unnoticed when the anemia has developed gradually as the patient has had time to adjust to it.

Tests included are listed in Table 1.



The morphologic approach to anemias based on mean corpuscular value (MCV) is practical in the clinical approach to anemia (Table 2).

Many elderly persons present with anemia without a red blood cell size change.

What are the different types of anemia?

1 Microcytic Anemia Iron-deficiency anemia

Underinvestigated among the general population, iron-deficiency anemia is most often caused by an upper gastrointestinal (GI) injury. Serum ferritin is the most useful test; a value < 15 µg/L is highly indicative of iron deficiency.

It is important to assess the upper and lower gastrointestinal tract since, in 10% to 15% of cases, two co-existing pathologies are found.

An esophagogastro-duodenoscopy (EGD) should be accompanied by a gastric and duodenal biopsy to rule out a *Helicobacter pylori* infection and celiac disease. If the patient

is unable to undergo an EGD, a barium meal with upper gastrointestinal series, measurement of anti-transglutaminase antibodies and immunoglobulin antibodies (for celiac disease), and a serologic test for *H. pylori*, are all alternatives—bearing in mind that the barium meal is less sensitive than an endoscopy in detecting an upper digestive lesion. The alternative to a colonoscopy is a sigmoidoscopy with double-contrast barium enema, which provides meaningful sensitivity compared with the colonoscopy.

If the patient cannot tolerate a colonoscopy, the barium enema alone seems acceptable if the rectal touch is negative in the absence of proctorrhagia and any change in intestinal habits.

The principal complications of colonoscopy (hypotension and hypoxemia) are primarily associated with sedation.

2 Macrocytic Anemia Vitamin B₁₂ deficiency

The prevalence of vitamin B₁₂ deficiency among the geriatric population is estimated at 5% to 15%. Table 3 lists the various causes of this type of anemia in

the elderly.¹ Hematologic, neurologic, and neuropsychiatric manifestations may appear simultaneously, sequentially or independently.

Serum methylmalonic acid (MMA) and homocysteine level measurement is recommended when the B₁₂ level is within the lower third of normal values.

A normal methylmalonic acid and homocysteine reading virtually rules out vitamin B₁₂ deficiency. A high methylmalonic acid level supports a B₁₂ deficiency diagnosis. If the homocysteine is high, other causes of elevation must be ruled out.

Folate deficiency

The most common cause of folate deficiency is inadequate nutrition. The hematologic manifestations of folate deficiency are similar to those of vitamin B₁₂ deficiency. Many elderly patients present with normocytic anemia. Neurologic abnormalities do not occur.

The seric folic acid assay may be falsely normal after a meal. The red cell folate concentration reflects tissue stores more accurately. In the case of a low normal reading, a homocysteine assay can be requested; it will be increased in 90% of folate deficiency. The MMA level is usually normal.

Myelodysplastic syndrome

Myelodysplastic syndromes are a group of diseases character-

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ized by a clonal disorder involving bone marrow stem cells. They lead to an inefficient hematopoiesis resulting in various combinations of anemia, neutropenia, and thrombocytopenia. These

Assess both the upper and lower GI tracts as two co-existing pathologies are found in 10% to 15% of cases.

syndromes are sometimes called pre-leukemia syndromes, owing to their capacity to develop into acute leukemia.

It has a median age of diagnoses between 60 to 70, and affects men more often than women.

Myelodysplastic syndrome must be suspected in the case of chronic cytopenia, hyperplasia of the bone marrow, and morphological abnormalities of the bone marrow precursor cells. Treatment remains limited in elderly patients and consists of support care.

3 Normocytic Anemia *Bone marrow deficiency*

Normocytic anemia comprises:

Table 3

Vitamin B₁₂ deficiency etiologies in the elderly

Mechanism	Causes
Inadequate support	Chronic alcoholism Chronic malnutrition Strict vegetarian
Inadequate absorption	Atrophic gastritis Gastrectomy Small-intestine bacterial proliferation Malabsorption Crohn's disease Chronic pancreatitis <i>Helicobacter pylori</i> gastritis
Inadequate utilization	Medications Transcobalamin II deficiency Anti-vitamin B ₁₂ analogues
Inadequate stores	Advanced hepatic disease
Medication Interaction	
<ul style="list-style-type: none"> • Malabsorption 	Metformin, antibiotic, phenytoine, colchicine, para-aminosalicylic acid, Cholestyramin
<ul style="list-style-type: none"> • Metabolic inactivation • Malabsorption of nutrition containing vitamin B₁₂ 	Vitamin C, nitrous oxide, Proton pump inhibitor, H2 antagonist

Primary bone marrow deficiencies

- aplastic anemia
- anemia resulting from bone-marrow invasion,

Secondary anemia

- anemia of chronic disease,
- onset iron-deficiency anemia,
- anemia associated with renal insufficiency,
- hepatic diseases,
- endocrinopathies,
- loss of blood, or
- acute hemolysis.

Anemia of chronic disease

A number of chronic diseases are associated with mild to moderate anemia. Frequent causes include infectious and inflammatory diseases and cancers (Table 4).²

The initial assessment reveals anemia that is often normocytic-normochrome, but may be mildly microcytic. If the hemoglobin drops below 100 g/L, the association of another etiology must be suspected. The reticulocytic count, serum iron, and



Table 4

Diseases associated with inflammatory anemia

Acute infections:

- Bacterial, fungal, viral

Chronic infections:

- Tuberculosis, endocarditis, urinary infection, coccidiomycosis and other chronic fungal diseases

Non-infectious chronic inflammatory diseases:

- Arthrosis, rheumatoid polyarthritis, polymyalgia rheumatica, acute and chronic hepatitis, pressure ulcers

Cancer:

- Metastatic carcinoma, hematologic cancer

Malnutrition

A bone marrow biopsy is often the only way to distinguish inflammatory anemia from iron-deficiency anemia.

total iron-binding capacity are low. Ferritin is normal or elevated. However, it should be noted that in the aged population, 14% of men and 6% of women present with supra-normal iron stores.

Serum transferrin-receptor assay and the transferrin receptor-ferritin index are

potential tools for differentiating these two states, but their indication in an anemia investigation has not yet been clearly established.

A bone marrow biopsy to assess the iron stores is often the only way to distinguish inflammatory anemia from iron deficiency anemia.

Idiopathic normocytic-normochromic anemia

There is a subgroup of elderly patients (14% to 36% of elderly anemic patients) among whom a clinical assessment and investigation (including a bone marrow biopsy) do not reveal any underlying cause to explain a drop in hemoglobin. These patients are asymptomatic and their quality of life is satisfactory. No treatment is required and the prognosis remains good. CME

1. Dharmarajan, T.S., Adiga, G.U., Norkus, E.P.: Vitamin B12 deficiency. Recognizing subtle symptoms in older adults. *Geriatrics* 2003; 58(3): 30-38.
2. Lipschitz, D.A.: The anemia of chronic disease. *J Am Geriatr soc* 1990; 38(11): 1258-64.

Further references available—contact *The Canadian Journal of CME* at CME@sta.ca.

Take-home message



- The prevalence of anemia in the geriatric population varies from 8% to 44%.
- Although anemia is more common in hospitalized persons and men over 85, age should not be seen as a cause of anemia, but a predisposing factor.
- Patients should always have the choice of whether or not to proceed with an endoscopy investigation.