IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Pancytopenia Secondary To Vitamin B12 Deficiency – Case Report

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Abstract:
Watersoluble vitamin B12, also known as cobalamin CBL, is necessary for the formation of hematopoietic c ells, which include red blood cells, white blood cells, and platelets. It has a role in the synthesis of the myeli n sheath and DNA. Megaloblastic anemia, characterized by defective cell division leading to macrocytic ane mia with other characteristics, can be caused by deficiencies in vitamin B12 and/or folate. A less common e xordium of severe vitamin B12 deficiency is pancreatopenia. Neuropsychiatric symptoms might also result f rom a vitamin B12 shortage. Ascertaining the underlying reason is crucial to management, not only to rectif y the deficiency but also because it may affect the necessity of further tests, the length of therapy,and the mo de of administration.

Methods:
Four patients with megaloblastic anemia (MA) associated with pancytopenia are shown here. Every patient with a diagnosis of MA had their clinic-hematological and etiological profiles examined.

Results :
Megaloblastic anemia and pancytopenia were found in every case. A vitamin B12 deficiency was found in e very single case. There was no relationship found between the degree of anemia and vitamin deficiencies. In one case of MA, subclinical neuropathy was observed, but none of the cases had overt clinical neuropathy. In two cases, pernicious anemia was the cause of the vitamin B12 shortage, while in the other cases, poor fo od intake was the cause.

Conclusion: This case study emphasizes the role of vitamin B12 deficiency as a leading cause of pancytopenia among adults.

Keywords: Aging;vitaminB12;megaloblasticanemia; pancytopenia

1.INTRODUCTION:

Malnutrition, often known as inadequate nutrition,is a prevalent condition that worsens with age. Its frequen cy in older adults varies; it can be as high as 85% in nursing home residents, 30–60% in inpatients, and 5–10% in community,dwelling participants [1,2]. Anaemia [4], post operative delirium[3[,and adverseoutcomes in older individuals are all linked to malnutrition.

Bone marrow disorders such as pancytopenia, a clinicalhematological condition, are commonly seen in clini cal practice. It is not so much a disease entity as it is a clinical manifestation brought on by a range of illness es affecting the bone marrow and/or the white blood cells (WBCs), red blood cells (RBCs), and platelets [5], it should have hemoglobin <10 g%, absolute neutrophil count <1500 mm^3, platelets <100,000/mm^3. It is labeled as severe pancytopenia when hemoglobin <7 g%, absolute neutrophil count <500 mm^3, platelet <20,000 cumm.[2]

Its clinical manifestations differ according to the degree of leukopenia, thrombocytopenia, and anaemia. Pan cytopenia typically manifests as generalised weakness, fever, weight loss, abnormal bleeding tendencies, sh ortness of breath, etc. The prognosis is dependent on the accurate and prompt diagnosis of the underlying ae tiology [6].pancytopenia
can arise from a variety of inherited and acquired causes. Either enhanced peripheral destruction/sequestrati on or decreased bone marrow production could be the cause. Megaloblastic anaemia, cytotoxic chemotherap y, radiation therapy, bone marrow infiltration, myelofibrosis, myelodysplasia, and idiopathic aplastic anaemi a are the most frequent reasons of acquired decreased bone marrow production. Acute viral infections such a s Epstein Barr virus, mycobacterial infections, HIV, and systemic lupus erythematosus are among the other prevalent acquired causes.[7]

Common causes of pancytopenia due to increased destruction are due to liver disease, portal hypertension. Only few studies have been done in India regarding incidence and causes of pancytopenia. Among several causes of pancytopenia, megaloblastic anemia is one of the most commonly cited causes for pancytopenia [8,9].Megaloblastic anemia is one of the easily treatable causes for pancytopenia. Its early recognition and treatment helps in reducing morbidity and mortality.
Agerelated increases in vitamin B12 insufficiency have been linked to megaloblastic anaemia and/or overt n eurological consequences [10, 11]. Increased plasma bilirubin and serum lactic dehydrogenase (LDH), with usually normal AST levels [14]; higher iron, ferritin, and soluble transferrin receptor as a feature of a block in iron utilisation [15]; and ineffective erythropoiesis caused by intramedullary apoptosis of megaloblastic e rythroid precursors [12] and/or hemolysis because of shortened red cell survival [13].

pancytopenia affecting contemporarily erythrocytes, leukocytes, and platelet. Anemia is the third leading cause of hospitalization in our ward.

2.CASE REPORT:

A 64 years female patient was admitted in the General Medicine Department at Sri Balaji Medical college, hospital and research Institute, Renigunta. With the chief complaints of fatiguability, shortness of breath on Exertion,fever, vomiting, generalized myalgia since 4 days. On General examination patient was conscious and her vitals were as followsc Temperature is normal,Bp-130/80,PR-92bpm,Spo2-96%,cvs-s_1s_2 + ,Rs-B/L,NVBS +,pallor +,Tachycardia +,No murmurs.

Investigations :

Her laboratory investigations were as follows glycolated random blood sugar-100 mg/dl ,FBS-69 mg/dl ,PPBS-95 mg/dl.

- Electrolytes:

sodium-144mEq/l,potassium-41mEq/l,chlorides-108mEq/l,Magnesium-2.2mg/dl,sr.calcium- 2.4mg/dl.

- Renal function test:

Sr.creatine-1.18mg/dl,Sr.urea-7mmol/l,BUN-40mg/dl,uric acid-6.4 mg/dl.

- Liver function testes:

Totalproteins-8.52g/dl,SGOT-17.75u/l,SGPT-14.18u/l,ALT-39mu/mL,Bilirubintotal-0.9 mg/dl,Bilirubin Direct-2mg/dl,Bilirubin Indirect-0.6 mg/dl.

- Haemotology:

Haemotology report of O+ blood group patient at the time of admission is Hb-4.6 g/dl,WBC-3,500 permicrolitre[Neutrophils-38%,lymphocytes-56%,eosinophils-2%,midcells-4%] ,PCV-16% volume,MCV-100fl, RBC-1.60m/cu ,Platelets -1.2 lac/cum,vitamin b12- 94pg/mL.

Based on her chief complaints and haemotology report patient diagnosed as pancytopenia secondary to vitamin b12 deficiency .

Treatment given to patient at the time of admission is inj.optineuron ,inj.pantop ,tab. Amchelate,tab.Limcee ,inj.meaxon plus for 5 days. 2 units of PRBS blood transfusion at the time of admission.

After receiving the treatment patient haemotological values areHb-9.6g/dl,WBC-4,500permicrolitre[Neutrophils-18%,lymphocytes-45%,eosinophils-1%,midcells-3%],PCV-39% volume,MCV-92fl, RBC-3.60m/cu ,Platelets -1.4 lac/cum,vitamin b12-230pg/mL.

Patient discharge medications are T. AMchelate,inj.Meaxon gold/plus alternate day for 2 weeks,Tab.Limcee,Tab.pantop.

3.DISCUSSION:

The severe form of vitamin B12 deficiency known as pancytopenia causes decreased numbers of all three peripheral blood cell lineages [4]. Platelet counts less than 150,000 per mcL, leukocyte counts less than 4,000 per mL (or absolute neutrophil count less than 1,800 per mL), and haemoglobin levels below 12 g/dL in women and 13 g/dL in men are indicative of the condition [16]. Usually, pancytopenia is brought on by either increased or decreased cell division. Pancytopenia can be caused by splenic sequestration from some diseases (e.g., alcoholic liver cirrhosis, HIV, tuberculosis, malaria), as well as autoimmune ailments (e.g., systemic lupus erythematosus, rheumatoid arthritis) that damage cells [16].
The result of bone marrow failure is pancytopenia, or aplastic anaemia. Infections (e.g., parvovirus B19, hepatitis, HIV, CMV, EBV), medication toxicity, or chemotherapy drugs (e.g., methotrexate, dapsone, carbimazole, carbamazepine, chloramphenicol) are examples of aetiologies [16]. Yet, pancytopenia brought on by a decrease in cell formation is mostly caused by nutritional inadequacies [16]. We think that the patient's prior vitamin B12 insufficiency was greatly influenced by her homelessness and low socioeconomic standing.

Characterizing the anemia in this patient, which included reticulocytosis, mean corpuscular volume (MCV), and mean corpuscular hemoglobin content analysis, led to the initial etiological direction being proposed. The majority of cases of vitamin deficiency anemia are macrocytic and aregenerative, indicating their central origin. However, like in our patient's case, the MCV might fall within normal ranges. Elevations in bilirubin and LDH can cause hemolysis symptoms, which are typically not recorded in deficiency situations, as a result of inefficient erythropoiesis. The performance of an iron and hemolysis assessment as well as serum dosage of vitamins B12 and B9 is, therefore, an integral part of the initial assessment. The blood smear provides interesting although non-specific elements: anisopoikilocytosis with the presence of numerous macrocytes, dacryocytes and, in the case of vitamin B12 deficiency, schistocytes. Hypersegmented neutrophils are also observed [20]

Analysis of the myelogram is essential to determine the cellular richness and morphology of the elements. In the case of vitamin deficiency, bone marrow is often very rich, by excess of large erythroblasts (megaloblasts). The cell nucleus of these erythroblasts retains an immature appearance, while the cytoplasm continues to differentiate by enriching itself in hemoglobin (nucleocytoplasmic maturation asynchronism). The fragility of the erythroblasts leads to apoptosis and intramedullary hemolysis, inducing compensatory hyperplasia. The granulocyte line shows gigantism (giant metamyelocytes) and numerous nuclear form abnormalities. Megakaryocytes can be reduced in number [20]. In addition to a cytological examination, a bone marrow karyotype, a molecular biology study and an immunophenotypic analysis are required if myelodysplasia or leukemia is suspected.

The causes of pancytopenia are numerous and differ in presentation and severity; their prevalence varies greatly from one country to another [21]. Bone marrow invasion by tumor cells (hematological or metastatic) must be quickly ruled out; the diagnosis of acute leukemia is the first suggestion when faced with a situation of pancytopenia in children [21,22]. Once malignant hemopathies have been ruled out, infectious causes (Epstein–Barr virus, cytomegalovirus, parvovirus B19, influenza, hepatitis virus, human immunodeficiency virus, bacterial sepsis) are the first to be described in developed countries, followed by non-tumor hematologic pathologies within the foreground acquired aplastic or constitutional anemia [21]. Macrophage activation syndrome and paroxysmal nocturnal hemoglobinuria should be mentioned in the differential diagnoses. Vitamin deficiency causes are poorly represented in children in developed countries such as in Europe or the United States, unlike in developing countries. In these, deficiency origins predominate, followed by infectious etiologies whose pathogens (salmonella typhi, leishmania, plasmodium) differ [22]. The iatrogenic causes must be sought; some antiepileptics and antibiotics, among others, can induce aplastic anemia [20]. Although rare, hereditary metabolic disorders are to be mentioned before pancytopenia without obvious cause [22]. An alteration of the three blood lines can be found in organic aciduria or lysosomal disease. Megaloblastic anemia associated with hyperhomocysteinemia and homocystinuria suggests an abnormal metabolism of vitamin B12 and folate [22].

Cases of pancytopenia caused by vitamin B12 have been reported. The pediatric group has been the focus of these cases. The patients in these pediatric cases of vitamin B12 insufficiency had severe illness symptoms due to established, confirmed nutritional deficits, such as pancytopenia, hepatosplenomegaly, leukoerythroblastosis, and neurologic developmental retardation [17]. A lifetime vegetarian or vegan diet high in v

egetables, bread, and rice was found to be the main cause of the underlying vitamin deficit in cases identical to this one in the adult population [18].This is unlike our case in which past medical history, family history, and social history, even after a thorough review of the electronic medical record, were unremarkable in diagnosis. Moreover, cases in which nutritional origin could not be concluded as the attributing factor presented with chronic, severe signs and symptoms of vitamin B12 deficiency, including chronic anemia requiring blood transfusions, unintentional weight loss, and fatigue over a few months [19]

4.Conclusion:

Anemia is a common feature in older subjects, often leading to hospitalization. Vitamin B12 deficiency is recognized as a common cause of anemia, usually presenting with macrocytosis. Less frequent and less known is the presentation of B12 deficiency as pancytopenia (i.e., reduction in all three hematological lines without neurological manifestations). As recorded in patient, it is helpful to investigate the presence of autoantibodies against the intrinsic factor. The intrinsic factor is essential for the normal absorption of cyanocobalamin in the bowel tract. The presence of autoantibodies directed against the intrinsic factor and atrophic gastritis are the hallmarks of pernicious anemia. Autoimmune atrophic gastritis ranges from 0.1% to 1–2% in the general population; for women and people aged > 60, the prevalence is 2–3%, and the predominance is 2:1 for females over males.

Even in the presence of multimorbidity and/or severe hematological alterations, vitamin B12 supplementation quickly, effectively, and dramatically improves hemoglobin, WBC, and platelet levels.

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