Bone marrow necrosis- an unusual rare finding in multiple myeloma

Abstract

Bone marrow necrosis is a rare but important clinicopathological entity & is considered challenging to most of the pathologists. It is characterized by destruction of hematopoietic tissue with preservation of the bone. It presents as localized or diffuse generalized process. Many underlying diseases can lead to marrow necrosis, most commonly malignancies and rarely sickle cell disease. The prognosis in patients with bone marrow necrosis is poor. Clinicians must keep a high index of suspicion whenever there is fever, severe bone pain, elevated lactate dehydrogenase, and pancytopenia. Bone marrow biopsy remains the mainstay of the diagnosis. We describe here a case of 45-years old patient who presented with severe back pain and was found to have extensive bone marrow necrosis later. The Bone marrow necrosis was due to underlying plasma cell dyscrasia.

Keywords: sickle cell disease, vasoactive substances, TNF α, CD45, plasma cell dyscrasia

Abbreviations: HIV, human immunodeficiency virus; G-CSF, granulocyte-colony-stimulating factor; WBC, white blood cell; ESR, erythrocyte sedimentation rate; CK, cytokeratin; BMN, bone marrow necrosis

Introduction

Bone marrow necrosis is a syndrome first reported by Wade and Stevenso in 1941. The typical findings are necrosis of myeloid tissue and medullary stroma leaving an amorphous eosinophilic background, ill-defined necrotic cells, and preserved cortical bone. Bone Marrow Necrosis is usually an unrecognized finding in Routine Bone Marrow Biopsy. According to the extent of Involvement, Bone Marrow Necrosis is classified into Minor (Grade I) involving <20% of the BM and Intermediate (Grade II) involving 20-50% of BM, Sever (Grade III) involving more than 50% of BM.

The pathophysiology of bone marrow necrosis is still unclear. Failure of the microcirculation accompanied by hypoxemia causes damage to the cells. The toxicity and the release of toxins, cytokines, or vasoactive substances from the injured cells like TNF-α and Interleukin 6 lead to Bone Marrow Endothelial cell Injury with subsequent Micro vascular occlusion play an important role in the pathophysiology of bone marrow necrosis. The incidence of bone marrow necrosis is low. Etiologies are diverse. Numerous causes of bone marrow necrosis have been identified, including malignancy, radiation/chemotherapy, anorexia, human immunodeficiency virus (HIV)/AIDS, medication, infection, autoimmune disease, disseminated intravascular coagulation, antiphospholipid syndrome and other thrombotic disorders, granulocyte-colony-stimulating factor (G-CSF) exposure, and hemoglobinopathies.

Case presentation

45 years old Saudi male patient who was admitted to neurosurgery department because of severe persistent low back pain, on examination he was pale with no fever, no lymphadenopathy nor organomegaly. Peripheral blood count reveals pancytopenia WBC (white blood cell): 3.79X10^3/l ul (normal range is 4000-11,000/ul) HB: 9.3g/dl (normal range 12.5-18g/dl) platelets: 32,000/ul (normal range is 150-450,000/ul). While the Morphology of the peripheral blood shows mild leukoerythroblastic picture (immature myeloid precursors plus normoblasts). There are also 4% atypical large cells with round nuclei & abundant light blue cytoplasm. Biochemical profile reveals increased lacte dehydrogenase (LDH): 2126u/l (normal range is 100-200), increased alkaline phosphatase: 1018u/l (normal range is 50-136). Albumin level was mildly low 25g/l (normal range is 30-50). Ferritin level is increased 678ng/ml (normal range is 16-294).

Total protein is within normal range 71.8g/l (normal range is 62-75). Serum electrolytes including calcium, potassium & sodium are within normal range for age ESR (erythrocyte sedimentation rate) is 75 (normal range is 0-22mm/hr). Hepatitis & HIV human immunodeficiency virus serology are negative. MRI (magnetic resonance imaging) shows Bone marrow infiltration, diffuse low signal intensity of the bone marrow is identified, according to radiologist (Figure 1).

Figure 1 Mild leukoerythroblastic picture in the left picture, atypical large cell with rounded nuclei & bluish abundant cytoplasm in the right image.
Bone marrow necrosis (BMN) is regarded as an uncommon entity that is considered as an adverse prognostic factor. Whether it is an independent prognostic marker or whether it is a surrogate marker of underlying disease burden remains unclear. It is estimated that about 250 to 300 cases of BMN have been reported. Clinically, it is characterized by bone pain, fever, Elevated Alkaline Phosphatase, Markedly Elevated LDH Levels and Peripheral Cytopenias with a Leukoerythroblastic picture and typical findings of Necrosis on Bone Marrow.

The morphology of bone marrow necrosis is not easily recognized by many pathologists due to infrequent encountering of the cases. In a 10 years retrospective analysis of cases in our regional laboratory only two cases are diagnosed one was seen in an undiagnosed sickle cell

Discussion

Bone marrow necrosis (BMN) is regarded as an uncommon entity that is considered as an adverse prognostic factor. Whether it is an independent prognostic marker or whether it is a surrogate marker of underlying disease burden remains unclear. It is estimated that about 250 to 300 cases of BMN have been reported. Clinically, it is characterized by bone pain, fever, Elevated Alkaline Phosphatase, Markedly Elevated LDH Levels and Peripheral Cytopenias with a Leukoerythroblastic picture and typical findings of Necrosis on Bone Marrow.

The morphology of bone marrow necrosis is not easily recognized by many pathologists due to infrequent encountering of the cases. In a 10 years retrospective analysis of cases in our regional laboratory only two cases are diagnosed one was seen in an undiagnosed sickle cell
Bone marrow necrosis is a rare antemortem finding seen in wide variety of diseases including hematologic malignancies. Its presence obscures the diagnosis of the underlying diseases but is also indicates poor prognosis. In conclusion, if faced with a patient presenting with pyrexia, bone pain, pancytopenia, with leukoerythroblastastic features, bone marrow necrosis must also be considered. The morphology of bone marrow necrosis alone shouldn’t distract you from digging to find an underlying possible disease which is crucial in case of masked hematological malignancies. Extensive BMN associated with hematologic malignancies is almost invariably a fatal complication, however with prompt identification and treatment the prognosis of these patients can be improved.

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Conflict of interest

The authors declare that they have no conflicts of interest.

Author contribution

Dr. Mariam Al Ghazal, Dr. Mohammed Dastigir A H Khan were involved in the diagnosis. Dr. Alghazal defined the manuscript while Dr. Khan made the reviews with valuable input. All Authors read and approved the final manuscript.

References


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