

Gelatinous bone marrow in an HIV-positive patient

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Gelatinous bone marrow transformation has been identified in patients with anorexia, malignancy, malabsorption, and HIV/AIDS. This represents a deposition of gelatinous material within the bone marrow, along with atrophy. We report the case of an HIV-seropositive man who presented with low back pain related to his gelatinous bone marrow changes.

Bone marrow biopsies are utilized in patients with HIV/AIDS to evaluate peripheral cytopenias and to identify systemic infections (such as histoplasmosis and *Mycobacterium avium* complex) and malignancies. Cellular abnormalities found in patients with HIV/AIDS include dysplasia, myeloid maturation, dyserythropoiesis, erythroid hypoplasia, megakaryocytic dysplasia, changes in cellularity (normocellular or hypercellular), plasma cell changes, paraproteinemia, and changes in the bone marrow matrix (1).

Gelatinous transformation of the bone marrow is characterized by fat cell atrophy, loss of hematopoietic cells, and the deposition of extracellular gelatinous substances (2, 3). While it is not a specific disease, it is a sign of a generalized severe illness in a patient. Disease states that have been associated with gelatinous transformation are anorexia nervosa, alcoholism, malignancies, chronic heart failure, and HIV/AIDS (2–5).

We report the case of an HIV-seropositive man who complained of back pain and received a vertebral biopsy that demonstrated a gelatinous change of the bone marrow.

CASE STUDY

A 42-year-old man presented to our clinic with an 8-week history of low back pain after helping a neighbor move furniture. The pain had significantly increased over this time period, and he rated it as an 8 of 10 on a subjective pain scale. He had been taking morphine orally, which was prescribed 2 weeks prior, and it offered little relief.

His past medical history was significant for a diagnosis of HIV with progression to AIDS for 7 years and was complicated by infections with disseminated histoplasmosis 24 months prior to presentation and *Mycobacterium avium* complex 18 months

prior to presentation. His most recent HIV-associated laboratory results were a CD4⁺ count of 138 cells/ μ L and a viral load of <400 copies/mL 2 months earlier. He had been taking emtricitabine 200 mg/tenofovir 300 mg (Truvada) daily, efavirenz 600 mg (Sustiva) daily, sulfamethoxazole 800 mg/trimethoprim 160 mg daily, cyclobenzaprine 10 mg three times daily, and morphine 15 mg every 4 hours as needed.

On physical examination the patient was afebrile and denied any weight change. He complained of shortness of breath due to the pain in his lower back. He experienced back spasms, and the pain increased with movement. No other abnormalities were found.

A complete blood count and complete metabolic profile were performed, and no abnormal values were identified. A magnetic resonance imaging (MRI) scan of the lumbar spine identified abnormal enhancement at the L3 vertebral body (*Figure 1*). The radiologist was concerned that this enhancement could indicate neoplasm, and so a computed tomography–guided biopsy of L3



Figure 1. Sagittal MRI of the lumbar spine reveals abnormalities of the L3 vertebral body with signal elevation on (a) inversion recovery [STIR], (b) diffuse signal hypointensity on precontrast T1, and (c) avid enhancement on fat-suppressed post–gadolinium contrast (arrowhead).

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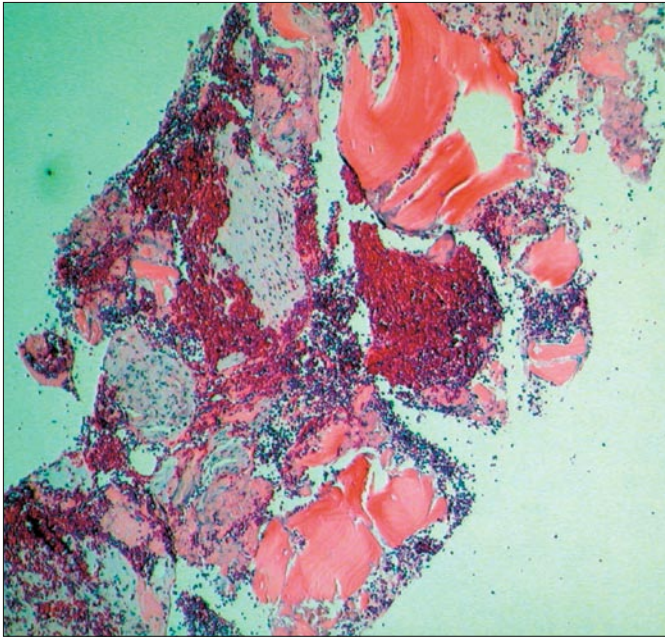


Figure 2. A biopsy specimen of the L3 process shows bone marrow with prominent gelatinous transformation and occasional hematologic elements (hematoxylin-eosin stain, $\times 40$).

was performed. The biopsy results revealed gelatinous degenerative change with focal necrosis (Figures 2 and 3). Results of cultures and stains for bacterial, fungal, and acid-fast organisms were all negative. No metastatic tumor was identified. Flow cytometry revealed no evidence of plasma cell dyscrasia or B-cell lymphoproliferative disorder.

The patient was seen again 8 weeks later, with no change in his pain, and he received a second biopsy of the L3 region. Repeat cultures for bacterial, fungal, and acid-fast organisms were negative. The biopsy was essentially unchanged, with findings of degenerative bone marrow and no evidence of tumor infiltration. The patient was maintained on his highly active antiretroviral therapy (HAART) regimen, received long-acting oral morphine for pain control, and has had monthly follow-up at the outpatient HIV specialty clinic.

DISCUSSION

Gelatinous transformation of the bone marrow in HIV/AIDS patients has been observed in previous studies (3, 6, 7). Mehta and colleagues observed that 29% of patients with AIDS in their study had gelatinous transformation or serous atrophy of the bone marrow (3). In that study, every patient with gelatinous change had evidence of at least one opportunistic infection (3). The most common presenting symptoms of their patients were fever (95%), weight loss (64%), lymphadenopathy (63%), and diarrhea (41%) (3). These study patients had anemia, and some presented with leukopenia (26%), thrombocytopenia (13%), and pancytopenia (26%) (3). Delacretaz and colleagues also observed that 38% of the patients with HIV in their study group had gelatinous changes in their bone marrow specimens (7).

The MRI findings in our patient raised concerns for potential neoplasm and prompted a biopsy of the site. In studies

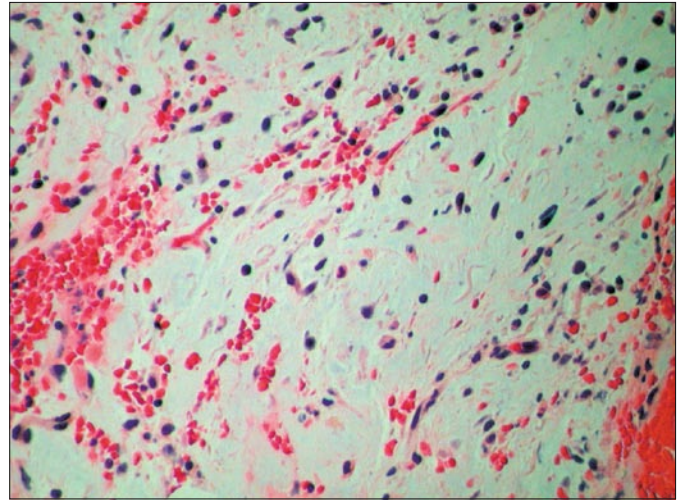


Figure 3. Gelatinous substance identified in the bone marrow biopsy specimen of the L3 process (hematoxylin-eosin stain, $\times 100$).

of patients with anorexia nervosa and serous atrophy of the bone marrow, the utilization of MRI has demonstrated signal changes in the regions of marrow atrophy related to the watery ground substance that accumulates (8). In patients with HIV, this substance appears to be composed of sulfated glycosaminoglycans and hyaluronic acid (3). MRI may be a useful modality in demonstrating the change from gelatinous to normal bone marrow while a patient is undergoing treatment of the underlying disease process (8, 9).

Bone marrow necrosis (BMN) due to AIDS was entertained as a possible diagnosis in this case in light of the presenting symptom of bone pain and findings of gelatinous change with necrosis on the bone marrow biopsy. The most common symptoms of BMN are bone pain (78%) and fever (68%), and the most common laboratory findings are anemia (91%), thrombocytopenia (78%), leukopenia (45%), elevated lactate dehydrogenase (51%), and elevated alkaline phosphatase (41%) (9). Histologic findings of BMN are a combination of gelatinous transformation and necrosis of the myeloid tissue (9). The necrosis is graded as extensive when $>50\%$ of the biopsy yields necrosis (9). Our patient had focal necrosis and had none of the common laboratory findings consistent with BMN.

Gelatinous transformation of the bone marrow is treated by identifying and treating the underlying cause. In patients with anorexia nervosa, normalization of nutritional status has been shown to reverse the gelatinous state (2). Treatment was also successful in a child with malnutrition and B₁₂ deficiency with the replacement of B₁₂ and proper nutrition (10). In patients with malignancy, postchemotherapy aplasia and gelatinous bone marrow changes correct when the hematopoietic recovery takes place (5). The therapies for bone marrow recovery in our patient were to control his HIV with HAART and to avoid opportunistic infections with effective prophylaxis. The patient presented in this case has not had a repeat biopsy at 6 months to observe whether the bone marrow has recovered.

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