Amiodarone-induced bone marrow granulomas: an unusual cause of reversible pancytopenia

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Abstract

Bone marrow infiltration by granulomas rarely presents with cytopenias and is usually a result of atypical infections, lymphomas, or sarcoidosis. Drugs are also an important but often overlooked causative agent of bone marrow granulomas. Although rare, amiodarone has been associated with bone marrow granuloma formation. This case report describes a 73-year-old man who presented with pancytopenia during a preoperative evaluation. Amiodarone therapy was suspected to be the causative agent after diagnostic evaluation and exclusion of other causes. After cessation of amiodarone, the patient's pancytopenia gradually resolved over a period of several months. Our report illustrates an often overlooked yet important cause of reversible pancytopenia owing to suspected amiodarone-induced bone marrow granuloma formation, and guides clinicians in an expected timeline for blood count improvement after cessation of this drug.

Case Report

A 73-year-old man with severely symptomatic ischemic and valvular cardiomyopathy was found to have moderately severe pancytopenia (white blood cells, 2.4×10^9/L; absolute neutrophils, 1.39×10^9/L; platelets, 65×10^9/L; hemoglobin, 9.8 g/dL with a normal MCV) during a preoperative evaluation, prior to planned tricuspid valve replacement surgery. The physical examination was consistent with tricuspid valve regurgitation, but notably splenomegaly and lymphadenopathy were absent. A peripheral blood smear confirmed thrombocytopenia but was otherwise unremarkable. A bone marrow biopsy was performed to clarify the etiology of the pancytopenia prior to surgical intervention. The bone marrow biopsy revealed normal trilineage hematopoiesis. Cytogenetics and flow cytometry were likewise normal. Surprisingly, multiple small non-caseating granulomas were present (Figure 1). Special stains, cultures, and serological testing for associated infectious causes of bone marrow granulomas, including mycobacterial, fungal (Aspergillus, Cryptococcus, Histoplasmosis, Sporothrix, Coccidioides, Blastomyces), aero- and anaerobic bacteria (particularly Brucellosis and Q-fever), were negative. There was no clinical evidence for a viral infection such as HIV, Epstein-Barr virus, or cytomegalovirus, nor for an autoimmune disorder such as rheumatoid arthritis or systemic lupus erythematosus. Inflammatory markers including sedimentation rate and C-reactive protein were both normal. Computed tomography of the chest and angiograms converting enzyme levels were also unremarkable.

A review of our patient's history revealed that amiodarone had been started several years earlier for ventricular tachyarrhythmias, and mild cytopenias had been noted several months after initiation of this drug. Careful review of all other medications failed to reveal an obvious temporal association with his cytopenias. As such, amiodarone was thought to be a potential causal agent for the bone marrow granuloma formation and pancytopenia, and was discontinued.

Within six weeks after stopping amiodarone, with no other medication changes, our patient's blood counts improved significantly. He then underwent successful tricuspid valve replacement without postoperative complications related to cytopenias, despite the initiation of warfarin anticoagulation. At the four month follow-up, our patient’s complete blood count returned to near normal levels (white blood cells, 4.2×10^9/L; absolute neutrophils, 2.36×10^9/L; platelets, 106×10^9/L; hemoglobin, 12.8 g/dL; Table 1) and he remained asymptomatic at the last outpatient follow-up.

Discussion

Amiodarone is a commonly prescribed class III antiarrhythmic medication that increasingly has been recognized in sporadic case reports as a potential cause of bone marrow granulomas.1-3 In several reports, amiodarone was not stopped because the treating physicians determined that the cardiac benefits outweighed the potential hematologic risks.3,11,12 Boutros et al.5 and Moran and Manoharan10 observed an improvement in cytopenias that paralleled a partial or complete resolution of bone marrow granulomas by three to eight months after cessation of amiodarone. Mohamed et al.3 reported a patient with leukopenia and thrombocytopenia that improved by six months after discontinuation of amiodarone. Similarly, our patient’s hemoglobin, white blood cells, and platelets began to increase at six weeks after cessation of this drug and all three cell lines reached near-nor-
mal levels by four months. Close follow-up and regular blood count monitoring allowed us to define the expected temporal association between amiodarone, bone marrow granuloma formation, and resultant pancytopenia.

### Conclusions

Our case implicates amiodarone as a cause of bone marrow granulomas with associated pancytopenia, and helps guide clinicians in an expected time course for improvement after drug cessation. Although reversible, the long half-life of amiodarone did result in a protracted duration of our patient’s pancytopenia. Early recognition and diagnosis might limit the severity of the associated cytopenias, and mitigate the subsequent bleeding and infectious complications, and potentially reduce the need for transfusions. Amiodarone should be included in the differential diagnosis of patients who present with bone marrow granulomas and secondary cytopenias, and pancytopenia should be added as an additional reversible side effect of this commonly prescribed antiarrhythmic drug.

### References


### Table 1. Timeline of complete blood count recovery following cessation of amiodarone.

<table>
<thead>
<tr>
<th>Weeks after cessation</th>
<th>Hg* (g/dL)</th>
<th>WBC°(×10⁹/L)</th>
<th>Platelets (×10⁹/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 weeks</td>
<td>9.8</td>
<td>2.5</td>
<td>69</td>
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<tr>
<td>6 weeks</td>
<td>10.8</td>
<td>3.0</td>
<td>86</td>
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<td>11 weeks</td>
<td>11.6</td>
<td>3.3</td>
<td>97</td>
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<td>16 weeks</td>
<td>12.8</td>
<td>4.2</td>
<td>106</td>
</tr>
</tbody>
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*Hg, hemoglobin; °WBC, white blood cell.