Cardiogenic Shock in an Elderly Woman: A Diagnostic and Therapeutic Challenge

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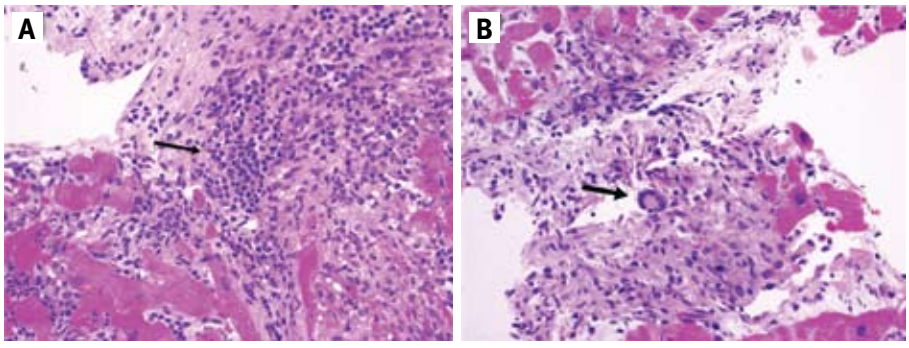
The diagnosis and treatment of acute heart failure and cardiogenic shock as the initial presentation of acute fulminant myocarditis can be very challenging, particularly in elderly patients with previous ischemic heart disease. We present such a case and discuss the diagnostic dilemma and the appropriate diagnostic and treatment strategies.

PATIENT DESCRIPTION

A 76 year old woman was admitted following a few days of excertional dyspnea, chest discomfort, fatigue and a short-lasting fever. Two weeks earlier she experienced right facial weakness followed by ptosis of the right eyelid which gradually subsided. Her medical history included an anterior myocardial infarction in 1993 that was treated with streptokinase with reperfusion. Due to angina she underwent a coronary angiogram in 2000 that demonstrated a long diffuse atheroma in the mid-left anterior descending artery with near complete occlusion and good collateral flow. She was treated conservatively. Echocardiography at the time demonstrated preserved left ventricular function with apical hypokinesis. She was physically active with good functional capacity until the present admission. She also suffered from well-controlled hypertension, mild diabetes mellitus, hyperlipidemia and chronic atrial fibrillation. Her medications included atenonol 50 mg twice daily, aspirin 100 mg hydrochlorozide 25 mg, simvastatin 80 mg, twice daily and coumadin. On physical examination she was afebrile, had mild dyspnea, blood pressure of 111/75 mmHg and irregular pulse of 102/min. Oxygen saturation on room air was 92%. She had distant irregular heart sounds, her lungs were clear to auscultation, and the extremities were without edema. Electrocardiogram revealed atrial fibrillation, right bundle branch block, Q waves and ST-T changes in the inferior leads. The electrocardiogram was not significantly different from a previous ECG. Troponin-T was elevated to 5.5 ng/ml (normal < 0.1) and creatine phosphokinase was 346 U/L (normal < 170). Lactate dehydrogenase reached 1525 U/L (normal < 420), C-reactive protein was elevated to 13.5 mg/dl (normal < 1); the white blood count was normal.

On admission, she developed cardiogenic shock with severe dyspnea, reduced blood pressure and congestion on X-ray. Troponin-T rose to 7.5 ng/ml. Aggressive treatment with an intraaortic balloon pump, inotropes and intravenous diuretics stabilized her condition. Echocardiography revealed severe biventricular failure, diffusely decreased left ventricular contraction with significant mitral regurgitation and no pulmonary hypertension. Mitral regurgitation was not due to a flail leaflet or a ruptured chord. Left and right coronary catheterization revealed no significant change in coronary anatomy from a previous examination with the same severe stenosis in the mid-left anterior descending artery. There was no pulmonary hypertension and no pulmonary artery branch cutoffs. Cardiac index was measured at 1.5 L/min/m^2. Endomyocardial biopsy was performed [Figure]. The biopsy demonstrated severe diffuse myocyte necrosis, a predominantly



Histological specimen (hematoxylin & eosin staining) from the right ventricle demonstrating severe, diffuse necrotizing lymphocytic myocarditis. **[A]** Areas of diffuse myocardial necrosis with large infiltrates of lymphocytes (arrow). **[B]** Severe myocardial necrosis and a nucleated giant cell can be seen (arrow)

lymphocytic infiltrate with sparse giant cells. She was treated with an angiotensin-converting enzyme inhibitor, beta blockers and furosemide. The patient was weaned from the intraaortic balloon pump after 3 days. Repeat echocardiogram 5 days later demonstrated significant improvement in left ventricular function. A comprehensive immunological and infectious workup was negative. The pathology diagnosis was severe, diffuse necrotizing lymphocytic myocarditis. Follow-up 16 months after the event revealed the patient to be free of heart failure, with preserved left ventricular function on echocardiography.

COMMENT

The patient presented with an acute event and it was not clear if the patient was suffering from an acute coronary syndrome or from acute myocarditis. Since the patient was an elderly woman with significant risk factors and a history of ischemic heart disease, the diagnosis of acute coronary syndrome versus myocarditis can be difficult. While myocarditis occurs more frequently in young people, it is not uncommon in the elderly. The diagnosis is often dismissed or overlooked in the elderly due to coexistent coronary disease. Inflammatory indices as well as echocardiography can be helpful in making the diagnosis; however, they are not always conclusive. Even performing a coronary angiogram may not give a definite diagnosis, particularly in a patient with previous complex coronary disease, as in our patient. Fortunately, in the present case we could compare the coronary anatomy to a previous angiogram and conclude that there was no change, suggesting that the coronary lesion was most probably not the cause of the present insult. Indeed, the diagnosis of myocarditis versus ischemia frequently necessitates a myocardial biopsy to prove or disprove the diagnosis. Unexplained, new-onset heart failure of less than 2 weeks duration associated with hemodynamic compromise is a class I indication for endomyocardial biopsy according to recent American Heart Association/American College of Cardiology/European Society of Cardiology guidelines and was indicated in the present case. Even a myocardial biopsy may be inconclusive due to the patchy nature of myocarditis and the considerable sampling error associated with establishing the diagnosis of myocarditis. The use of magnetic resonance T2 imaging and early gadolinium contrast enhancement as well as late enhancement that detects small areas of myocardial necrosis associated with active myocarditis may increase the diagnostic yield of endomyocardial biopsy by guiding the site of tissue sampling [1]. Recent data suggest a promising role for MRI in discriminating myocarditis from myocardial infarction [2]. MRI can demonstrate evidence of acute active inflammation by increased T2 imaging signal, while infarction or fibrosis can be detected by late gadolinium enhancement.

Our patient rapidly deteriorated into cardiogenic shock. This is a classical presentation of fulminant myocarditis: patients are critically ill, with acute severe left ventricular dysfunction and hemodynamic instability. However, these patients have a good long-term outcome [3]. This differs significantly from patients with acute or subacute myocarditis who are initially less ill but have a progressive course that leads to death or the need for cardiac transplantation. Since the prognosis of patients with fulminant myocarditis is excellent if they survive the initial insult, these patients should be treated aggressively in the intensive care unit [3]. They should receive full hemodynamic support including vasopressors and mechanical support by an intraaortic balloon pump or a left ventricular assist device. Standard heart failure therapy should also be started as soon as possible. However, immunosuppressive therapy is not indicated in patients with fulminant myocarditis as this was not shown in the Myocarditis Treatment Trial to improve prognosis [4].

Another acute myocardial inflammatory disease that can resemble fulminant myocarditis is giant cell myocarditis. Although rare, this disease is rapidly progressive and leads to progressive congestive heart failure, frequently associated with refractory ventricular arrhythmia and conduction disturbances. Patients with this disease frequently have other autoimmune diseases. The diagnosis is based on identifying the typical nucleated giant cells on myocardial biopsy in addition to lymphocytes, histiocytes and eosinophils. This disease, in contrast to fulminant myocarditis, carries a poor prognosis. Treatment should consist of steroids with immunosuppressive therapy including cyclosporine and/or azathioprine that significantly improves prognosis [5]. Transplantation can also be an alternative despite the possibility of recurrence in the transplanted heart.

Our main therapeutic challenge in the present case was the possibility of giant cell myocarditis and whether to initiate immunosuppressive therapy. The fact that only a few giant cells were found without eosinophils and histiocytes in the biopsy, together with the rapid clinical improvement with supportive therapy, led us to the conclusion that we are dealing with a case of fulminant lymphocytic myocarditis and not giant cell myocarditis. The patient's immediate and long-term clinical course also supported this diagnosis.

While acute heart failure in myocarditis can be a life-threatening event and the diagnosis can be elusive, timely action with rapid diagnostic tests including a myocardial biopsy and rapid aggressive treatment can help improve the outcome of patients with this disease.

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References

1. Skouri HN, Dec GW, Friedrich MG, Cooper LT. Noninvasive imaging in myocarditis. *J Am Coll Cardiol* 2006; 48: 2085-93.
2. Assomull RG, Lyne JC, Keenan N, et al. The role of cardiovascular magnetic resonance in patients presenting with chest pain, raised troponin, and unobstructed coronary arteries. *Eur Heart J* 2007; 28: 1242-9.
3. McCarthy RE 3rd, Boehmer JP, Hruban RH, et al. Long-term outcome of fulminant myocarditis as compared with acute (nonfulminant) myocarditis. *N Engl J Med* 2000; 342: 690-5.
4. Mason JW, O'Connell JB, Herskowitz A, et al. A clinical trial of immunosuppressive therapy for myocarditis. The myocarditis treatment trial investigators. *N Engl J Med* 1995; 333: 269-75.
5. Cooper LT Jr, Berry GJ, Shabetai R. Idiopathic giant-cell myocarditis – natural history and treatment. Multicenter giant cell myocarditis study group investigators. *N Engl J Med* 1997; 336: 1860-6.