Acute Myopericarditis Mimicking Acute Inferolateral Myocardial Infarction, and Complete Response to Intravenous Immunoglobulin and Corticosteroids: A case Report and Review of Literature

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Abstract:
A 38 years Indonesian female presented to the Emergency Department, accompanied by Police, complaining of chest pain of one week duration which was worse for four days. Based on the ECG findings she was diagnosed to have an Acute Inferolateral Myocardial Infarction.

She did not receive fibrinolysis due to time lag and was admitted to Coronary Care Unit (CCU). In the CCU, based on the ECG and Echocardiogram findings suggestive of Myopericarditis she received high dose Immunoglobulins and Methylprednisolone, as per a protocol. She had a complete resolution of ECG abnormality and Echo findings also improved, and she no longer needed inotropic support which was started on admission because of cardiogenic shock. Management of such patients presents a problem because no clear cut guidelines for treatment are available short of Endomyocardial biopsy. The treatment strategies of management are discussed.

Introduction:
Acute myopericarditis has a varied presentation, ranging from a mild form to a severe one, presenting with either heart failure or cardiogenic shock or both (1). Sudden cardiac death can be one of the presentation, possibly due to ventricular arrhythmias (1,3).

Clinical course can also range from complete recovery to cardiomyopathy in a matter of weeks. So the initial management of such cases always poses a special problem. Various strategies are mentioned in the literature including immunosuppressive drugs, immunoglobulins and of course corticosteroids based on the results of endomyocardial biopsy as also clinical picture. (2,7)

History and Physical Examination:
The patient, a 38 years old Indonesian female was brought to our Emergency Department by police as she was found on roadside in distress. She gave a history of chest pain of a weeks duration which became worse four days prior to admission. The pain was initially epigastric in location, later radiated to the chest and left shoulder region. It was constant and not particularly worse with movement and breathing, was associated with sweating and feeling unwell.

She was not a known diabetic, hypertensive or a smoker. In the CCU her blood sugars were high. Ten days before the patient had a history of fever which was moderate grade with dry cough and received only symptomatic therapy. Since then she was not doing well.

Examination revealed a pale lady, moderately built with a BP of 100-80/60 mm of Hg, her pulse was 100-113/minute and Oxygen Saturation 98% on room air.

Jugular Venous Pressure was around 5cm, with no clinical cardiomegaly but an S3 was heard and next day a triphasic pericardial rub was also heard.

Ches was clear on auscultation. There was no edema or hepatomegaly. Chest X-ray showed mild cardiomegaly with mild pulmonary congestion. ECG shown in Fig 1 revealed ST elevation in inferolateral leads and ST depression in AVR,V1, with ST elevation showing concavity upwards. Ctni 1.05  later 1 only, but CK, CK-MB, LDH showed serial elevation from 139,315,663, and 1379 with MB,13,15, and 60. Her liver functions showed normal AST but ALT was 161. Echo showed thickening of septum with severe hypokinesia of inferior and posterior walls and hypokinetic septum and lateral wall. Ejection Fraction was around 35-40%. Pericardial effusion was mild to moderate, an average one cm around the heart.
She had a leucocytosis of 12000 with normal differential. Initially normal renal functions but mild deterioration on 3rd day to 114 mmol/l. Her cholesterol was 2.02, Triglycerides 1.033 and LDL 1.04 only. Collagen vascular disease profile, HIV, and HbsAg were all negative. Thyroid and other hormonal profile was also normal. Blood workup showed anemia of iron deficiency with hemoglobin of 8 gm/dL. Coxsackie and other viral studies were normal. ESR was 18mm first hour. Mantoux skin test was negative.

**Management**

Treatment of myocarditis includes supportive therapy for symptoms of acute heart failure with use of diuretics, nitroglycerin/nitroprusside, and angiotensin-converting enzyme (ACE) inhibitors, Inotropic drugs (e.g. dobutamine, milrinone) may be necessary for severe decompensation although they are highly arrhythmogenic. Long-term treatment follows the same medical regimen, including ACE inhibitors, beta blockers, and aldosterone receptor antagonists. However, in some instances, some of these drugs cannot be implemented initially because of hemodynamic instability.

Our patient needed dobutamine/dopamine infusion for 2 days till her BP was stabilized. She was started on IV Immunoglobulin 1G/Kg/day for 2 days only as per a protocol (4). She received Methylprednisolone 10 mgs/Kg/day also for 2 days (5) followed by oral prednisolone 1 mgs/Kg/day for 2 weeks and then in a tapering fashion over next ten days. Within four days the patient started improving clinically and ECG normalized in a week (Fig 3).
Repeat Echo after 10 days revealed markedly improved wall motion abnormality, EF 60% and minimal pericardial effusion; she became ambulatory in about 10 days. Marked enzyme elevation returned to normal. CK 103 and Ctni 1 only. She did not receive any other treatment.

**Discussion**

- **Endomyocardial biopsy (EMB):** This is the standard criterion for diagnosis of myocarditis, although it still has limited sensitivity and specificity, as inflammation can be diffuse or focal. Routine EMB in establishing diagnosis of myocarditis rarely is helpful clinically. However since histologic diagnosis seldom has an impact on therapeutic strategies, unless giant cell myocarditis is suspected, the risk of adverse events approaches 6% (including complications with 2.7% on sheath insertion and 3.3% on the biopsy procedure), as well as 0.5% probability of perforation.(6,7,8)

- A population study in Finland found that in nearly a study of 700,000 healthy young male military recruits, 98 cases had myocarditis mimicking myocardial ischemia. One case presented as sudden death and nine cases presented as recent-onset dilated cardiomyopathy(1,2) Approximately 50% of the time, myocarditis is classified as idiopathic, although the aforementioned report by Klugman et al found that 82% of the pediatric cases studied were considered idiopathic.(13) The investigators also determined that 3% of cases in the study had a known bacterial or viral etiology and that 6% of cases were related to other diseases. Routine immunosuppressive therapy is not recommended because of neutral findings from the Myocarditis Treatment Trial and the Intervention in Myocarditis and Acute Cardiomyopathy (IMAC) study(5). There is no FDA approved regimen for the treatment of acute and chronic myocarditis. Considerations are reserved for new onset, rapidly deteriorating heart failure with suspicion of Giant cell, sarcoid or eosinophilic myocarditis etc.(5,6). In the previously mentioned study by Klugman et al(13), treatment rates among pediatric patients were as follows
  - Intravenous immunoglobulin (IVIG) - 49.1% of patients(11)
  - Milrinone - 45% of patients
  - Epinephrine - 35% of patients
  - Mechanical ventilation - 25% of patients
  - Extracorporeal membrane oxygenation - 7% of patients
  - Cardiac transplantation - 5% of patients
Klugman and colleagues also found that IVIG did not affect survival rates, even in patients with extreme illness scores.

The use of immunosuppressive agents for the treatment of viral myocarditis is still controversial. Some animal studies revealed an exacerbation of viral cytotoxicity when treated with immunosuppressive agents. Other small series in humans have shown that the conditions of patients improve when the patients are treated with these agents. The Multicenter Myocarditis Treatment Trial aimed to establish differences in outcome among 3 treatment modalities (6). A total of 111 patients were randomized into one of the 3 following groups:

- Prednisone/azathioprine
- Prednisone/cyclosporine
- Conventional therapy without immunosuppression

Findings revealed left ventricular function and survival were not significantly different among the 3 groups.

Intravenous gamma globulin may be important in the treatment of acute myocarditis. It has been associated with improved left ventricular function and improved survival (5, 9, 10, 15, 16). Our case showed a remarkable improvement on the above regimen. May be we have to explore this treatment modality in a large group of patients. This patient needs to be followed up closely, starting 4 weeks from discharge to detect any change in LV function (11).

**Surgical Care**

- Left ventricular assistive devices (LVADs) and extracorporeal membrane oxygenation (ECMO) may be indicated for short-term circulatory support if needed for cardiogenic shock (14).
- Cardiac transplantation. Survival rates have not been shown to be decreased in patients with acute myocarditis, although retrospective observations have been made that more posttransplant acute rejections and subsequent posttransplant vasculopathy may occur in these patients. Transplantation has been shown to be particularly beneficial to those with biopsy-proven giant cell myocarditis; the 5-year survival rate after transplantation was 71%, despite a 25% incidence of post-transplantation recurrence, as seen in 9 of 34 patients in the Multicenter Giant Cell Myocarditis study. High clinical suspicion of acute myocarditis is required for young and otherwise healthy individuals who develop heart failure with a rapid deteriorating course (6).

Young patients presenting with cardiogenic shock with classic ECG changes of myocardial infarction but febrile may suffer from pseudomyocardial infarction, which is consistent with myocarditis (2). These people certainly need cardiac catheterization to rule out ischemic causes, despite the possibility of myocarditis. Close follow-up care is needed for patients who survive acute myocarditis, despite full initial recovery, as persistent chronic inflammation may lead to subsequent dilated cardiomyopathy and heart failure. Giant cell myocarditis has a more aggressive course and may require prompt surgical support (LVAD, transplant.)

**References:**

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Conflict of Interest: None

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