Original Article

Clinical Profile and Predictors of Mortality of Myocarditis in Tertiary Care Hospital

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Abstract

Introduction: Clinical profile of myocarditis has not been well characterized in our local population.

Aims and Objectives: To study the clinical profile and predictors of mortality of myocarditis in a territiary care hospital.

Materials and Methods: It was a prospective single-center observational study done from November 2010 to October 2012. All patients who were diagnosed and admitted as myocarditis were included in the study.

Results: A total of 30 patients were diagnosed as myocarditis. Mean age of the patients was 35 ± 13.1 years, with male to female ratio of 1.3:1. The most common presenting symptom was breathlessness and chest pain while as most common sign was tachycardia. Two-third of patients had congestive heart failure and one-half had left ventricular (LV) dysfunction. Inpatient hospital mortality was 16.6%. Advanced New York Heart Association (NYHA) Class IV (P = 0.0004), hypotension (P = 0.0026), and LV ejection fraction <35% (P = 0.0018) were found to be significantly higher in non-survivors as compared to survivors.

Conclusion: Patients presenting with advanced NYHA Class, hypotension and those having severe LV dysfunction are more likely to die; hence, need very careful and aggressive management.

Key words: Congestive heart failure, Mortality, Myocarditis

INTRODUCTION

Myocarditis refers to the inflammation of the heart muscle occurring as a result of exposure to external agents (viruses, bacteria, and toxins) or internal triggers such as autoimmune activation. Some studies have reported myocarditis as third leading cause of sudden death after hypertrophic cardiomyopathy and coronary artery disease.[1] The clinical manifestation of myocarditis, ranging from asymptomatic courses over presentations with signs of myocardial infarction with cardiogenic shock.[2-5] Clinical course in acute myocarditis can vary. It can be monophasic with spontaneous recovery after several days of congestive heart failure.[6] While some patients develop cardiogenic shock and have fatal outcome.[6] Serious complications include ventricular arrhythmias, cardiogenic shock, or cardiac arrest.[7] Patients who suffer from myocarditis may recover or develop dilated cardiomyopathy with heart failure and the need for heart transplantation.[8,9] Some patients may progress into subacute or chronic forms who have poor long-term prognosis.[6] There are very few studies on the prognostic markers in myocarditis. Predictors of mortality in myocarditis have not been fully established. Besides there are hardly any studies on our local population. This study was carried out to meet this unmet need of identifying the clinical profile and predictors of mortaility in patients admitted with acute myocarditis.

Aims and Objectives
To study the clinical profile and predictors of mortality in myocarditis patients.

MATERIALS AND METHODS

It was a prospective single-center observational study done from November 2010 to October 2012. All patients who

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were diagnosed to have suspected myocarditis on the basis of clinical features, Troponin T, and echocardiographic features were included in the study.[10] Each patient underwent a good clinical history, physical examination, hemogram, kidney function test, liver function test, and echocardiography.

RESULTS

A total of 30 patients were diagnosed as myocarditis. Mean age of the patients was 35 ± 13.1 years. Age distribution is shown in Table 1. Male to female ratio was 1.3:1. The baseline characteristics are shown in Table 2. The main symptoms included breathlessness (20/25, 66.6%), chest pain (21/30, 70%), fever (18/30, 60%), viral prodrome (20/30, 66.6%), cough (12/30, 40%), and lastly by vomiting (6/30, 20.00%). The main clinical signs included tachycardia (22/30, 73%), left ventricular (LV) third heard sound in 20/30 (66.66%). 19 patients (63.3%) were in congestive cardiac failure. Six patients (20%) had hypotension at presentation. 17 patients (56%) had LV systolic dysfunction. 12 patients (40%) had aspartate transaminase and alanine transaminase more than 3 URL. 26 patients (86.6%) had erythrocyte sedimentation rate (ESR) more than 20. 12 (40%) patients had leukocytosis with white blood cell count more than 12000. Inpatient hospital mortality was 16.6%. Advanced New York Heart Association (NYHA) Class IV ($P = 0.0004$), hypotension ($P = 0.0026$), and LV ejection fraction (EF) <35% ($P = 0.0018$) were found to be significantly higher in non-survivors as compared to survivor as shown in Table 3.

DISCUSSION

Our study was intended to study the clinical profile and predictors of mortality in patients admitted as myocarditis. We tried to elucidate the factors which can lead to worse outcome in these patients. The age of presentation in our study varied between 13 and 70 years which was comparable with the study conducted by Helin *et al.*[11] in which the age varied between 9 and 65 years. Male to female sex ratio in our study was 1.35 comparable with study conducted in Thailand by Dechkum *et al.* in 1987-1989 (M: F=1.24).[12] The main symptoms included breathlessness (20/25, 66.6%), chest pain (21/30, 70%), fever (18/30, 60%), viral prodrome (20/30, 66.6%), cough (12/30, 40%), and lastly by vomiting (6/30, 20.00%) which is comparable with other studies.[13] We noted that among the clinical markers, hypotension, and NYHA FC IV were strong predictors of mortality in myocarditis. This implies that patients who die are already in the condition of cardiogenic shock and congestive heart failure. Aggressive treatment should be initiated when patients show symptoms of hpotension and

Table 1: Age distribution

Age group (years)	Number (%)
10-30	11 (36.6)
31-50	16 (53.3)
50-70	3 (10)

Table 2: Baseline characteristics

Baseline parameters	Number (%)
Age (years) mean±SD	35±13.1
Male:female	1.3:1
NYHA functional class	
I	2 (6)
II	6 (20)
III	14 (46.6)
IV	8 (26.6)
Ejection fraction (%)	
EF: > 45	13 (43.3)
EF: 35-45	7 (23.3)
EF: < 35	10 (33.3)
Clinical features	
Chest pain	21 (70)
Viral prodrome	20 (66.6)
Fever	18 (60)
Cough	12 (40)
Vomiting	6 (20.0)
Hypotension	6 (20)
CHF	19 (63.3)
Died	5 (16.6)

SD: Standard deviation, EF: Ejection fraction, CHF: Congestive heart failure

Table 3: Comparison of survivors versus non-survivors

Parameter	Survivors 25 (83.33%)	Non survivors 5 (16.66%)	*P* value
Age mean (SD)	36±12	35±13	0.8
Males	13	12	1.0
NYHA Class 4	3 (12%)	5 (100%)	0.0004
Chest pain	18 (72%)	3 (60%)	0.6
Fever	15 (60%)	3 (60%)	1.0
Hypotension	2 (8%)	4 (80%)	0.0026
Signs of CHF	15 (60%)	4 (80%)	0.6
EF<35%	5 (20%)	5 (100%)	0.0018

SD: Standard deviation, EF: Ejection fraction, CHF: Congestive heart failure, NYHA: New York Heart Association

congestive heart failure. Advanced heart failure symptoms (NYHA Classes III or IV) and hypotension have also been reported to be associate with higher mortality.[14,15] We also noted that EF <35% is significantly associated with increased mortality ($P = 0.0018$). This has been shown by Schultz *et al.* and Magnani *et al.* who showed that prognosis for patients with acute myocarditis depends on EF.[16,17] Neutrophilic leukocytosis, and raised ESR was present in 40% and 86.6%;[15,16] however, increased ESR and neutophillic leukocytosis were not associated with increased mortality, which is consistent with other studies.[11] Liver enzymes were elevated more than three times in 40% of

patients. The elevation of liver enzymes has been quite variable in previous studies by Smith (14%)[18] and by Koontz and Ray (15%),[19] Sainani *et al.* (63%),[13] and Hashimoto *et al.* (100%).[20] The variation in elevation of liver enzymes depends upon the time at which the samples were taken and also upon the severity of the illness of the patients as explained by Hashimoto *et al.*[20] Our findings suggest that those patients who present with advanced NYHA Class, hypotension and have severe LV dysfunction should be aggressively and promptly treated and observed in intensive care settings. Limitations of our study included small sample size, endomyocardial biopsy, and cardiac magnetic resonance imaging were not done in patients. Besides patients who survived were not followed up to assess their long-term outcome.

CONCLUSION

Patients presenting with advanced NYHA Class, hypotension and those having severe LV dysfunction are more likely to die and hence need very careful and aggressive management. Long-term follow-up studies with larger sample size are required to fully establish the predictors of poor outcome of myocarditis patients.

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