

FREQUENCY OF ACUTE RIGHT VENTRICULAR MYOCARDIAL INFARCTION IN PATIENTS WITH ACUTE INFERIOR MYOCARDIAL INFARCTION

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Contribution

All the authors contributed significantly to the research that resulted in the submitted manuscript.

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ABSTRACT

Objective: To determine the frequency of acute right ventricular myocardial infarction (RVMI) in patients with acute inferior myocardial infarction.

Methodology: This prospective case series study was conducted at Cardiology Department in a period from May to October 2009. A total of 174 patients with acute inferior myocardial infarction were evaluated for the presence of acute right ventricular myocardial infarction (RVMI).

Results: Male patients were 135 (77.6%) and females 39 (24.4%). Patient's age ranged from 28 to 82 years with majority in the age group 40 to 60 years. Frequency of RVMI was 27% among patients presenting with acute inferior myocardial infarction. Among patients presenting with acute RVMI, 64 % patients received thrombolysis. Overall 65% patients of RVMI had hospital stay of more than 4 days.

Conclusion: Frequency of RVMI among inferior MI patients was 27 % with longer hospital stay.

Key Words: Right ventricular infarction, Acute inferior myocardial infarction, Frequency.

INTRODUCTION

Cardiovascular diseases are the leading cause of death all over the world.¹ In the year 2000, ten million people had an acute myocardial infarction world over.² Although the death rate from acute myocardial infarction has declined by 30% over the last two decades,³ it still has a fatal outcome in approximately one third of patients.¹

Pakistanis are part of an ethnic group which suffers from the highest prevalence rates of coronary artery disease compared to any other country throughout the world. CAD manifests at a younger age and is known to take a much more aggressive course with wide-spread vessel involvement, large infarct sizes and higher subsequent mortality in this country.⁴ On average national mortality in Pakistan from coronary artery disease (CAD) is 410/10,000.⁵ The established modifiable risk factors for these CAD patients are: hypertension, diabetes, hyperlipidemia, smoking, obesity and physical inactivity.⁶⁻⁸

Acute inferior myocardial infarction has better short and long term prognosis with mortality of about 8%.^{9,10} When inferior myocardial infarction is complicated by acute RVMI, mortality rises to 28%. In hospital mortality is even higher in elderly patients and reaches up to 50%.¹⁰

Acute RVMI complicates 20-50% of acute inferior myocardial infarction reported by different studies.^{11,12} Gumina et al,¹³ showed an increased rate of cardiac arrest (17.9%vs.7.3%), hemodynamic compromise (14.7%vs.7%), ventricular arrhythmias (13.7%vs.7.5%) and mechanical complications (3.9%vs.0.84%) when inferior myocardial infarction was complicated by RVMI.

Thus RVMI complicating inferior myocardial infarction have worse prognosis and increased in-hospital morbidity and mortality and it is an independent predictor of major complications and mortality.¹⁴

Early recognition of right ventricle infarction is essential because its management is different from anterior or isolated inferior myocardial infarction and usually requires volume loading with intravenous fluids. Therapy with nitrates and morphine is associated with precipitation of complications such as hypotension and not usually indicated.¹⁵

Few studies have been conducted in Pakistan on acute RVMI. The aim of this study was to find out the frequency of acute RVMI in patients with inferior myocardial infarction in our set up.

METHODOLOGY

This prospective case series study was conducted at cardiology department, from 1st May to 31st October 2009. Sample size was 174 using 33% prevalence¹¹, 95% confidence coefficient and 7% margin of error under WHO

sample size estimating soft ware.

Patients of all ages and both genders using non probability purposive sampling were included in the study. Informed consent was taken from all the patients. Patients with chest pain of more than 30 minutes duration and/ or elevated cardiac enzymes (CKMB or Troponin I) above the upper level of normal. (Normal value CK-MB: up to 25 U/L , Troponin- I :upto0.4 ng/ml) with ST segment elevation of more than 1 mm in any lead of V3 , V4,V5 or V6 on right sided precordial chest leads and / or evidence of right ventricle akinesia / hypokinesia / dilatation or new tricuspid regurgitation on echocardiography were considered as acute RVMI. Exclusion criteria were patients with associated anterior or lateral myocardial infarction, left or right bundle branch block, recurrent myocardial infarction on presentation. Patients with valvular heart disease and cardiomyopathy were also excluded from the study.

Right-sided precordial leads were taken on arrival of the patients along with standard ECG leads. Cardiac enzymes (CKMB or Troponin I) sent to laboratory for measurement whenever required for diagnosis. Echocardiography was obtained for the diagnosis as well as detection of complications with standard parasternal long and short axis, apical and sub costal chamber views.

Data was entered and analyzed using statistical package for social sciences (SPSS) version13.0. Mean \pm standard deviation were calculated for continuous variables like age of the patient. Frequencies and percentages were calculated for qualitative variables such as gender, acute right ventricular infarction, thrombolysis and duration of hospital stay.

RESULTS

Out of patients who presented to cardiac care unit, 174 patients with inferior myocardial infarction were included in the study. There were 135 (76.6%) males and 39 (24.4%) females' patients; with ratio of 3:1. The age of patients ranged from 32 to 83 years, mean age \pm SD was 59.96 \pm 12.3 years. Majority of patients (81%) were in the age range of 41-70 years, 24 (12%) patients were in the age group above 70 years and 14 (7%) patients were in age group below 40 years (Table 1).

Among 174 patients of acute inferior myocardial infarction, 49 patients had acute RVMI. Percentage of RVMI was 27%. ECG was the diagnostic modality in 90 % of patients. V4R was the most sensitive lead with sensitivity of 78% followed by V3R which was positive in 72% patients. V5R and V6R were least sensitive leads with sensitivity for diagnosis of RV infarction and were positive in 65% patients.

Echocardiography was performed in all patients. RVMI was diagnosed in 16 (30%) patients. Tricuspid regurgitation was the most common finding on echocardiography in patients with RV infarction which was present in 10 (22%) patients.

Table 1: Baseline Patient's Characteristics

Characteristics	Frequency (%)
Mean age ± SD	59.96 ± 12.3
Below 40 years	14 (7%)
40-70 years	136 (81%)
Above70 years	24 (12%)
Male	135(75.6%)
Female	39(24.4%)
Risk factors	
Diabetes	36 (21%)
Hypertension	76 (44%)
High cholesterol	9 (5%)
Family history of CAD	52 (30%)
Smoking	40 (23%)
Obesity	35 (20%)
Previous history of angina	16 (9%)

Table 2: Sensitivity of Diagnostic Modalities

Modality	Sensitivity
ECG right sided chest leads	90%
V3R	72%
V4R	78%
V5R	65%
V6R	65%
Echocardiography	30%
TR	22%
RV motion abnormalities	12%
Right ventricular dilatation	8%

Wall motion abnormalities were present in 6 patients having RVMI; whereas right ventricular dilatation was present in 4 patients (8%). Sensitivity of ECG and Echocardiography findings for diagnosis of RVMI is shown in Table 2.

Thrombolysis was given to 129 (74.1%) patients in this study, while 45 patients (25.9%) were not thrombolysed. Hospital stay for RV infarction patients was longer as compared to those not complicated by RV infarction. Among patients with RVMI, 65% patients had hospital stay of more than 4 days.

DISCUSSION

South Asian population including Pakistan has the highest rate of coronary artery disease (CAD).^{16,17} The recognition of complications during acute phase of myocardial infarction remains a difficult dilemma.¹⁸

Prevalence of acute RVMI among acute inferior myocardial infarction is very common and frequency ranges from 20-50% according to different studies, depending upon the diagnostic criteria used for the diagnosis of RVMI.^{11,12}

A study conducted in National Institute of Cardiovascular Diseases Karachi¹ reported 34% prevalence of RVMI. They used right sided chest leads V4R-V6R with ≥ 1 mm ST segment elevation for the diagnosis of RVMI. Our criteria for the diagnosis of RVMI was the presence of 1mm \geq ST segment elevation in any right side chest leads or/ and echocardiographic evidence of right ventricle wall motion abnormalities or the development of new tricuspid regurgitation. In our study acute RVMI was present in 27% of patients with acute inferior myocardial infarction. Results of our study are consistent with this study as well as other local and international studies.^{1,9-12}

ECG is valuable, noninvasive, easily available and inexpensive modality of diagnosing RVMI. V4R is considered the most sensitive lead for the diagnosis of RVMI. Its sensitivity is 88% and specificity 78%.^{17,18} Echocardiographic evidence of akinesia, hypokinesia, dilatation of RV or new tricuspid regurgitation has also been used as diagnostic criteria for RVMI. However echocardiography is less specific and sensitive than ECG. Nevertheless echocardiographic measurements should be obtained in every inferior MI at the time of admission in order to diagnose RVMI and detect its complications.¹⁹

In our study V4R showed ST elevation in 78% patient's while V3R showed ST elevation in (72%) patients followed by V5R and V6R which were positive in 65% patients of RVMI. Echocardiography was diagnostic in only 30% patients with tricuspid regurgitation and it was the most common abnormality noted in RVMI. It was present in 22% of patients. Less sensitivity and specificity of echocardiography as diagnostic modality in our study could be because of delay in performing echo. Most of the echo studies in our study were performed on day 2 or 3. It was a time when wall motion abnormalities may have been reversed by most patients because of thrombolytic therapy.

Duration of hospital stay was longer in RV MI patients compare to those patients not having RVMI. The longer hospital stay can be because of high rates of complications in RVMI patients (77.6%).

CONCLUSION

Acute RVMI is present in 27% of patients with inferior myocardial infarction. There is higher percentage of complications. Significantly higher mortality and longer hospital stay in RVMI patients.

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