Original Article

Comparison of Complications in Patients of Inferior Wall Myocardial Infarction with and without Right Ventricular Infarction

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ABSTRACT

Objective: To compare in-hospital complications in terms of complete heart block and mortality in patients of inferior wall myocardial infarction with or without right ventricular infarction and to see the frequency of right ventricle infarction in patients of inferior wall myocardial infarction.

Study Design: Cross-sectional comparative study.

Place and Duration of Study: The study was conducted at Chaudary Pervez Elahi Institute of Cardiology, Multan from 7th August 2009 to 6th February 2010.

Materials and Methods: 73 patients with inferior ST-segment elevation myocardial infarction were distributed into two groups; one with IWMI only and second with IWMI with RV infarction. Patients with prior MI, pre-existing heart failure, valvular heart disease, pericardial disease, acute pulmonary embolism, significant pulmonary diseases were excluded from the study. The data was analyzed by using software SPSS. The difference in frequencies of complications in two groups was compared using chi square test and a p value of < 0.05 was considered significant.

Results: Mean age was 51.95 ± 11.8 years in group 1 and 54.17 ± 12.0 years in group 2. Patients in group 2 had more complications as compared to group 1. The incidence of Complete AV block was 7 (38%) in group 2 vs. 6 (12%) in group 1. (p=<0.001).In-hospital mortality rate was 4 (23%) in group 2 vs. 3 (5%) in group 1 (p=<0.001).The incidence of right ventricular infarction in patients of inferior wall myocardial infarction was noted to be 26%.

Conclusion: RVI results in increase in the frequency of complete heart block and mortality in patients of inferior wall myocardial infarction with right ventricular infarction and the incidence of right ventricular infarction in inferior wall MI was 26%

Key Words: Inferior Wall MI, Right Ventricular Infarction, complete hear block, Mortality.

INTRODUCTION

Acute myocardial infarction (AMI) is the prototype of a real emergency. In fact, the most frequent complication of AMI is sudden death which still occurs within the first hour after symptoms onset[1]. Right ventricular infarction (RVI) complicates approximately 25% of acute inferior wall myocardial infarction (IWMI) [2]. Early recognition of RVI, namely by means of right sided electrocardiography (ECG) leads in acute IWMI has prognostic value[3]. RV infarction contributes markedly to hemodynamic instability, atrioventricular (AV) conduction blocks and in-hospital mortality in patients with inferior MI. Patients with inferior MI, who have RV infarction, appear to have a worse prognosis than those who don't have RV infarction.[4]

RVI diagnosis is based on clinical signs (hypotension and increased jugular venous pressure while pulmonary fields are clear), ECG (ST elevation by ≥ 1 mm in lead V4R), echocardiography and technetium pyrophosphate scanning. The clinical triad of hypotension, raised jugular venous pressure (JVP) and clear lung fields in patient with inferior MI is virtually pathognomonic for RV infarction.

The precordial ECG is the most readily available, simplest, objective, non-invasive and cost effective technique for diagnosing RV infarction.[5] ST segment elevations greater than or equal to 1 mm in leads V3R, V4R, V5R, and V6R is a reliable sign of right ventricular involvement. ST segment elevation greater than or equal to 1 mm in lead V4R was found to have the greatest sensitivity (93%) and predictive accuracy (93%). The diagnostic value of a QS pattern in lead V3R and V4R or ST elevation greater than or equal to 1 mm in lead V1 was much lower [6] . ST-segment depression in precordial leads has been associated with large infarction, worse wall motion abnormalities, lower ejection fraction and high short and long term complications and mortality.[7]

RV infarction can lead to serious complications. In-hospital complications were more in RVI i.e. cardiogenic shock, complete atrioventricular (AV) block, bradycardia and death.[8]It has been seen that patients with RV infarction have unfavorable prognosis. When IWMI is complicated by RVI, the in hospital mortality may be as high as 33% as compared to 3 % for patients of IWMI without RV infarct and incidence of RV infarct was 28%[9].

A study conducted by Khan et al revealed that RV infarction was found in approximately one-third of inferior MI patients and RV infarction was associated with considerable morbidity and mortality, and its presence defines a higher risk subgroup of patients with inferior wall infarction[10]. Complete atrioventricular (AV) block occurred in up to 42 % of patients of IWMI with RVI as compared to 29 % in patients of IWMI alone.[11]

This study was designed to see if RV infarction in patients with inferior MI increases the risk of in-hospital mortality and frequency of complete heart block.

MATERIALS AND METHODS

The study was conducted from 7 August 2009 to 6 February 2010 at Chaudary Pervez Elahi institute, in patients admitted to the emergency department with inferior ST-segment elevation myocardial infarction diagnosed by typical chest pain lasting more than 30 minutes but less than 24 hours, ST-segment elevation of ≥ 0.1 mV in two or more of leads II, III and aVF .Detailed history of the patient was taken and 12 lead ECG and right sided precordial leads was recorded. The patients were distributed into two groups.

- **Group 1:** It included patients with inferior wall MI only
- **Group 2:** It included patients of inferior wall MI associated with right ventricular infarction.

Patients were be followed by the researcher in emergency ward and coronary care unit (CCU) for up to 72 hours for the development of mentioned complications (complete AV block and in hospital mortality) through serial ECG and continuous ECG monitoring. All information was recorded on Proforma for each patient.

In-hospital outcome was studied in terms of following complications in patients of IWMI with and without RVI the development of complete heart block ,mortality.Patients of both genders with acute inferior ST-segment elevation MI, with and without RV infarction were included in this study having received the thrombolytic (streptokinase) therapy. Patients with prior MI, pre-existing heart failure, valvular heart disease, pericardial disease, acute pulmonary embolism,significant pulmonary diseases were excluded from the study.

The data was analyzed by using software SPSS 11. Numerical variables like age were presented as mean and standard deviation. Qualitative variables like gender, risk factors (DM, hypertension, smoking, hyperlipidemia, and family history of IHD) and complications (complete hear block and mortality) were presented as frequency and percentage.

The patients with inferior wall MI were compared with patients of inferior wall MI with right ventricular infarction for the mentioned complications. The two groups were compared using chi square test. A p value of ≤ 0.05 was considered significant.

RESULTS

The total study population (n=73) was divided into two groups. Group 1 comprised of patients with inferior wall MI only and group 2 comprised of patients of inferior wall MI with right ventricular infarction. Out of 73 patients, 54 (74%) were in group 1 and 19 (26%) were in group 2. There were 44 (81%) male and 10 (19%) female patients in group 1 and in group 2, there were 14 (76%) male and 5 (24%) female patients. The age in group 1 varied between 32-85 years (mean=54.91 ± 11.8) and in group 2, it was 35-80 years (mean=55.17 ± 12.0).

Table No.1: Distribution of Risk Factors Among Patients of Inferior MI With & Without RV Infarction

Risk Factor		IWMI (n=54)	IWMI + RVI (n=19)
Age (mean)		54.91 ± 11.8	55.17 ± 12.0
Sex	Male	43 (79%)	16 (83%)
	Female	11 (21%)	3 (17%)
Diabetes Mellitus		15 (29%)	6 (33%)
Hypertension		21 (39%)	10 (51%)
Smoking		31 (58%)	10 (51%)
Hyperlipidemia		4 (07%)	02 (10%)
Family History		14 (25%)	05 (29%)

Table No.2: In-Hopital Complications in Patients of Inferior MI with & without RVI

Complication	IWMI (n=54)	IWMI + RVI (n=19)	P value
Complete AV block	06 (12%)	07 (38%)	<0.001
Mortality	03 (05%)	04 (23%)	<0.001

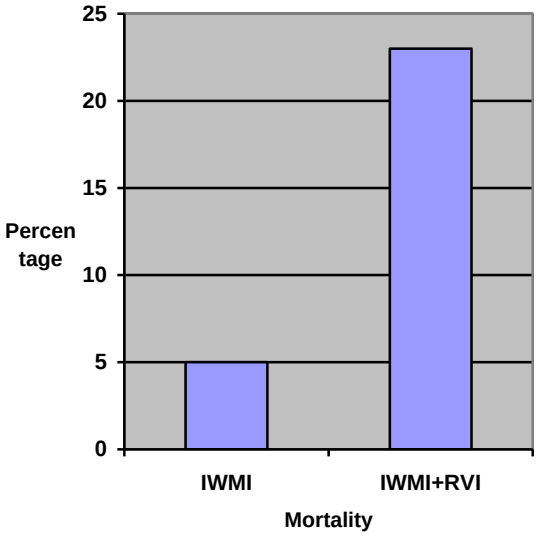

Figure No.1: Mortality in IWMI with and without RVI

The distribution of risk factors at presentation in group 1 (n=54) as compared to group 2 (n=19) was diabetes mellitus 15 (29%) vs. 6 (33%), hypertension 21 (39%) vs. 10 (51%), smoking 31 (58%) vs. 10 (50%), Hyperlipidemia 4 (7%) vs. 2 (10%) and family history 14 (25%) vs. 5 (29%). The prevalence of diabetes mellitus, hypertension, Hyperlipidemia and family history was higher in patients in group 2 while that of smoking was higher in group 1. (Table 1).

Regarding the incidence of complications, 7 (38%) patients in group 2 vs. 6 (12%) in group 1 suffered complete AV block (p=<0.001). In-hospital mortality was 4 (23%) deaths in group 2 vs. 3 (5%) in group 2 (p=<0.001), (Table 2). The major causes of death in group 2 were cardiogenic shock, AV blocks and ventricular arrhythmia.

DISCUSSION

The incidence of RV infarction can range from 10 to 50% as evidenced from previously conducted studies. The hemodynamic consequences associated with right ventricular infarction result in decreased pre-load and impaired atrioventricular conduction.

In this study patients with acute inferior wall myocardial infarction with right ventricular infarction had a relatively bad prognosis compared to those without right ventricular infarction. The presence of RV infarction is a strong indicator of in-hospital death and is associated with a higher incidence of complete AV block. These finding are consistent with studies by Zehender et al.[12]

The prevalence of RV infarction with inferior wall MI was 26% in this study as compared to prevalence of right ventricular infarction in study by Cintron et al.[13] Similarly right ventricular infarction was present in 32% patients in study by Zeymer et al by using electrocardiogrphic (ECG) criteria for diagnosis.[14] Piotr Kukla et al. reported an incidence RV infarction of 35.9% by using ECG criteria.[15]

Various studies conducted in Pakistan on inferior wall myocardial infarction and RV infarction showed incidence of 28% by Ali et al [9], incidence of 30% by Akber et al[16] and 34% by Khan et al.[10] A very high incidence of 97% of RV infarction in inferior wall MI was documented by Asano et al [17] by using dual energy single photon emission computed tomography (SPECT) with Thallium-99m pyrophosphate and Thallium-201.

In this study, mortality is considerably high in inferior wall MI with RV infarction group as compared to patients who have inferior wall MI only i.e. 23% vs. 5% (p=<0.001) (Figure 1). Zahender et al showed 31% mortality in patients with inferior wall MI with RV infarction as compared to 6% for those with inferior wall MI only.[12] Ali et al reported a mortality rate of 33.3% in patients with right ventricular infarction compared with 2.6% without right ventricle infarction in inferior wall MI.[11] The causes of death were cardiogenic shock, AV blocks and ventricular arrhythmias which was higher in RV infarction group.

The frequency of complete AV block was higher in inferior wall MI with RV infarction group than without RV infarction. In above two groups the incidence of complete AV block was 38% vs. 12% (p=<0.001) respectively. Samadikhah et al described incidence of arrhythmia and conduction disorders in acute inferior wall MI with RV infarction vs. inferior MI without RV infarction. Incidence of AV blocks was 36% vs. 25% in two groups respectively.[11] In a study, Malla et al showed incidence of sinus node dysfunction of 20% vs. 6% in two groups respectively. In this study, incidence of sinus bradycardia, AV dissociation and ventricular arrhythmia was not significant and no case of RBBB in inferior wall MI with RV infarction was recorded as compared to 3.5% cases in inferior wall MI only.

CONCLUSION

It can be concluded from this study that patients with inferior MI who also develop RV infarction are of older age group, more haemodynamically unstable and are at increased risk of morbidity and mortality.

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