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ORIGINAL ARTICLE

Comparison of Patients' Outcome Having Anterior Wall Myocardial Infarction with & without Right Bundle Branch Block Undergoing Primary Percutaneous Coronary Intervention in Terms of Major Adverse Cardiovascular Events at 30-Days Follow-up

MUHAMMAD AYAZ ARSHAD[1], MUHAMMAD AHSAN FAREED[1], MAHAM RIAZ[1], TARIQ SALEEM[1]
[1]Faisalabad Institute of Cardiology, Faisalabad, Pakistan
Correspondence to: Muhammad Ayaz Arshad, Email: drayaz285@yahoo.com

ABSTRACT

Background: Acute anterior wall myocardial infarction (AWMI) is frequently complicated by a number of complications, and right bundle branch block (RBBB) is an uncommon association leading to higher morbidity and mortality rates.

Objectives: To compare the 30-day outcomes of MACE in participants presenting with anterior wall MI having RBBB pattern versus patients presenting with non-RBBB pattern on ECG undergoing primary PCI.

Study Design: In-hospital, prospective, comparative, and observational study.

Duration and Setting: Faisalabad Institute of Cardiology (FIC) between January and December 2022.

Methodology: A total of 204 patients with AWMI undergoing pPCI were recruited. Post-PCI follow-ups of the patients were carried out as by direct observation and telemonitoring of the patients and one-to-one interviews if required, during the hospital stay and after discharge patients were requested for a follow-up visit in the OPD, and in case the patient was unable to come, a telephone call was made for follow-up. SPSS v26 was utilized for data analysis. Among 204 patients, 68 (33.3%) had RBBB and were relatively younger. AWMI was more common in males (86.3%). RBBB was more frequent in males (88.2%), while females more often had AWMI without RBBB (14.7%). Smoking was the leading risk factor with RBBB (47.1%, p=0.045), hypertension without (47.1%, p=0.094). In-hospital (5.9%) and 30-day (10.29%) mortality, Re-MI (17.6%), and heart failure (35.3%) were higher in RBBB. CVA was higher without RBBB (2.9%).

Conclusion: We inferred that in the patients with AWMI undergoing pPCI, there is an increased risk of 30-day mortality if the RBBB complicates the AWMI.

Keywords: Anterior Wall Myocardial Infarction, Right Bundle Branch Block, Primary Percutaneous Coronary Intervention, Major Adverse Cardiovascular Events, 30-day Follow-up

INTRODUCTION

The most common cause of death worldwide is cardiovascular disease (CVD), including males and females.[1,2] Persons presenting with a doubt of acute coronary syndrome (ACS) account for more than 20 million European and North American presentations to the emergency department.[3] In Pakistan, the reported frequency of ACS was found in 46.8% of patients presenting in an emergency.[4]

ACS is a collective group of disorders that depending upon the presenting signs and symptoms and in association with 12-lead surface electrocardiogram (ECG) changes as well as the cardiac troponin levels of patient classified as ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI) or unstable angina.[5] STEMI constitutes 40.5 % of ACS presentations.[6] Numerous studies and discussions have been conducted on bundle branch block (BBB) on a 12-lead surface ECG in the patients presenting to emergency department of the hospital with a definitive diagnosis of acute myocardial infarction (AMI) confirmed by ECG and/or cardiac troponins at the time of presentation. A number of studies examining the ultimate sequela and consequences of bundle branch block (BBB) the patients presenting with a working diagnosis of AMI have revealed that particular kinds of BBB may represent greater infarct areas, suggesting more significant benefits from an aggressive reperfusion strategy.[7,8] It has also been postulated that right bundle branch block (RBBB) in many patients of acute STEMI of anterior wall is due to the critical proximal occlusion of the left descending coronary artery resulting in the compromised circulation of the septal arteries supplying the bundle branches.[9]

In Pakistan and other low-income countries, the traditional way of treating acute STEMI is by thrombolysis using Streptokinase due to the unavailability of human resources for primary PCI round the clock and the higher cost associated with the primary PCI; however, the internationally published guidelines have unambiguous consensus for primary PCI as the gold standard management STEMI patients unless obvious contraindications are present.[3]

Prior studies have been done both internationally and locally to evaluate the sequel of STEMI of anterior wall in patients with RBBB compared to those patients that present as STEMI of anterior wall but without RBBB.[10-12] Still, none of the studies has been carried out in Faisalabad. The study aims to use an electrocardiogram pattern of the RBBB for determining MACE in the persons with STEMI of anterior wall. This comparative study will help us to provide a new perspective for planning health policies and early risk stratification of patients for revascularization strategies.

METHODOLOGY

This prospective, comparative study was carried out between January and December 2022 at FIC. The hospital serves as the region's principal referral site for STEMI patients for primary PCI. After getting acceptance by the research ethic board, we enrolled 204 patients using non-probability, consecutive sampling technique. The sample size was calculated by using the following formula for 2 proportions, from openepi.com, considering expected proportion of outcomes in patients without RBBB = 9.9% and expected proportion of outcomes in patients with RBBB = 25.9%.[14] based on 95% confidence interval, (α): 0.05 (two-tailed), and power: 90%. We included patients of both genders with age range of 20 to 80 presenting in an emergency with anterior wall MI having RBBB or non-RBBB pattern on ECG and fulfilling the criteria for primary PCI. We excluded patients having documented pre-existing RBBB before the index hospital admission. (determined by history and medical record), any pattern of BBB other than the typical RBBB or non-RBBB pattern, patients with a previous history of MI/PCI/CABG, advanced heart failure, chronic kidney disease.

Group A comprised of patients with RBBB pattern and Group B of patients with non-RBBB pattern. Written informed consent was taken using an easy-to-understand proforma in the local language. Demographic data regarding age, gender, duration of symptoms, smoking, diabetes, hypertension, obesity, and family

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history of CAD were noted. Patients were revascularized for anterior wall STEMI as per hospital protocol with primary percutaneous coronary intervention (pPCI). pPCI procedures were performed by the Judkins technique, using the standard Seldinger technique through a percutaneous femoral/radial artery puncture by a consultant cardiologist on duty on a Siemens Artis Zee system. After administration of 5000 IU of heparin and 600 mg clopidogrel loading dose, conventional wire crossing, and direct stenting of the culprit (infarct related) artery was done. After 30 days a telephonic interview conducted to determine the outcomes in discharged patients. All the data were entered in proforma.

Data was entered on the Windows 10 platform using software SPSS version 26. Quantitative data like age and duration of symptoms was presented by mean and standard deviation while qualitative data like gender, diabetes, hypertension, smoking, obesity, and in-hospital mortality was presented by frequency and percentages. Both groups were compared for mortality using the Chi-square test with a p-value≤ 0.05 as significant. Data was stratified for the variables i.e. age, gender, BMI (> 30 Kg/m^2, < 30Kg/m^2), diabetes, hypertension, smoking, and family history of ACS. Statistical significance was achieved with a p-value≤ 0.05.

We aimed to compare the 30-day outcomes of MACE in participants presenting with anterior wall MI having RBBB pattern versus patients presenting with non-RBBB pattern on ECG undergoing primary PCI.

RESULTS

In our study 204 cases of AWMI who underwent pPCI. Among them 68 patients (33.3%) had RBBB. Table 1 depicts the baseline clinical and demographic variables for patients with and without RBBB.

Table 1: Baseline Characteristics of Patients with AW-STEMI with & without Right Bundle Branch Block.

Variable		AWMI				
		With RBBB (n=68, 33.3%)		Without RBBB (n=136, 66.7%)		
		Count	n %	Count	n %	p Value
Age (mean)		52		55		0.004
Gender						<0.001
	Male	60	88.20%	116	85.30%	
	Female	8	11.80%	20	14.70%	
Diabetes Mellitus		16	23.50%	52	38.20%	0.005
Hypertension		24	35.30%	64	47.10%	0.094
Smoking		32	47.10%	48	35.30%	0.045
FH		20	29.40%	32	23.50%	0.144
Obesity		12	17.60%	48	35.30%	0.005

Baseline Demographic, Clinical and Treatment Characteristics: Abbreviations: AWMI = anterior wall ST-segment elevation myocardial infarction; CABG = coronary artery bypass grafting; CAD = coronary artery disease; CVA = cerebrovascular accident; HF = heart failure; MI = myocardial infarction; PCI = percutaneous coronary intervention; RBBB = right bundle branch block.

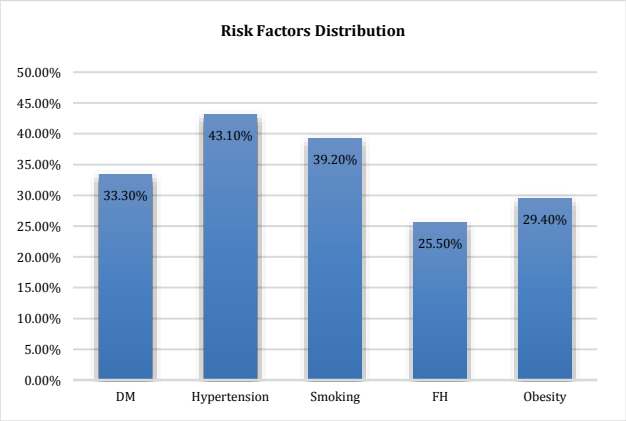

Figure 1: Abbreviations: DM = Diabetes Mellitus, FH = Positive Family History for CVD

Table 3: Risk Factors Distribution in AWMI with RBBB.

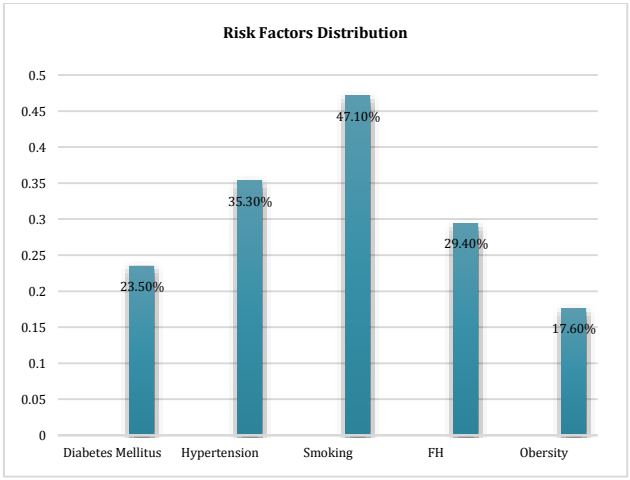

Figure 2: Abbreviations: DM = Diabetes Mellitus, FH = Positive Family History for CVD

Table 2: Outcomes of the Study

Variable		AWMI			
		With RBBB (n=68, 33.3%)		Without RBBB (n=136, 66.7%)	
		Count	n %	Count	n %
In-hospital mortality		4	5.90%	0	0.00%
Re-MI		12	17.60%	16	11.80%
CVA		0	0.00%	4	2.90%
HF		24	35.30%	28	20.60%
Revascularisation	PCI	8	11.80%	16	11.80%
	CABG	0	0.00%	0	0.00%
30-Day all-cause mortality		7	10.29%	1	0.014%

Abbreviations: CABG = Coronary Artery Bypass Graft, CVA = Cerebrovascular Accident, HF = Heart Failure, PCI = Percutaneous Coronary Intervention, Re-MI = Re-Myocardial Infarction.

RBBB participants were younger. AWMI (both with and without RBBB) was more frequent in males (86.3% vs. 13.7%), however, within same-sex RBBB was more frequent in males (88.2% vs. 85.3%) and females more frequently presented with AWMI without RBBB (14.7%vs. 11.8%).

We found that hypertension was the most common risk factor in patients with AWMI without RBBB (43.1%), followed by smoking (39.2%), DM (33.3%), obesity (29.4%), and a positive family history of CVD (25.5%) (Table 2).

Table 2: Risk Factors Distribution in AWMI without RBBB.

However, smoking was found to be the most common risk factor in patients with AWMI with RBBB (47.1%) (Table 3).

Outcomes: Table 4 depicts the outcomes of the study at 30-day follow-up. We found that both in-hospital (5.9% vs. 0%) and 30-day (10.29% vs.014%) mortality were higher in AWMI with RBBB. The frequency of Re-MI (17.6% vs. 11.8%), and heart failure (35.3% vs. 20.6%) were also higher in the RBBB group, whereas the rate of revascularization using PCI was similar in both groups. The rate of CVA was higher in AWMI patients without RBBB (2.9% vs. 0%).

DISCUSSION

When present with acute AWMI, new-onset RBBB complicates as much as 3%-11% of the cases [15-17] and is known to have a high mortality rate at 24 hours and 30days, significantly higher than that of other types of ventricular conduction delays, such as LBBB.[18-21] Hirolog Early Reperfusion/Occlusion (HERO)-2 data analysis established that patients with RBBB experienced more widespread MI, which has been connected with a worse clinical profile and greater 30-day mortality, compared to individuals with normal conduction.[21] In comparison to LBBB, RBBB has also been demonstrated to be related to a bigger anteroseptal scar.[22] These studies, however, lack exclusiveness to acute onset RBBB in patients of AWMI. Our study, however, focused solely on the outcomes in acute settings of AWMI with and without RBBB.

Paul et al. observed DM was the most frequent risk factor in both the AWMI with RBBB (55.9%) and without RBBB (44.0%).[7] Contrary to this, we observed that smoking was more frequent in AWMI with RBBB (47.10 %) and hypertension was more frequent in AWMI without RBBB (47.10 %).

We discovered that AWMI with RBBB had higher in-hospital death rates (5.9% vs. 0%). Heart failure (35.3% vs. 20.6%) and Re-MI (17.6% vs. 11.8%) were also more common in the RBBB group, but rates of revascularization by PCI were comparable in both groups. Patients with AWMI who did not have RBBB had a greater risk of CVA (2.9% vs. 0%). Similar trends of in-hospital complications have been described in earlier studies.[17,23]

The 30-day mortality observed in our study was 10.29% for patients of AWMI with RBBB and 0.014% for patients with AWMI but without RBBB. This high mortality rate is in concordance with previous studies.[14.17.24] Hence, this study demonstrates that patients with acute AWMI with RBBB have a higher incidence of early mortality and in-hospital adverse course than patients with non-RBBB AWMI, including Re-MI, heart failure, CVA, and in-hospital mortality. The in-hospital mortality rate seen in this cohort is about 6 times higher than that of patients who report to the same institution with anterior-wall MI without RBBB (5.9%% vs. 0%), which speaks to the entity's stand-alone unfavorable nature.

This study will help using ECG as a tool for predicting MACE at 30 days follow-up, identifying high-risk populations, prioritizing selected patients for early invasive strategies, thereby reducing the financial burden of hospitals and the state by prioritizing the patients for early intervention, thereby reducing morbidity and recurrent hospital admissions**.**

The main limitations of the study were a relatively smaller sample size, a single-centered study design, and hence a question on the credibility of generalization which requires large multi-center research projects, a shorter time frame to conduct the study, and lack of randomization.

To infer, it may not be an exaggeration to say that no one ECG indication indicates as much adversity in AWMI as RBBB in light of the study's findings. The general acceptance of RBBB as a STEMI analog and possibly as a sign of quick reperfusion therapy seems to be an unavoidable advancement in the field of acute coronary syndrome care.

CONCLUSION

We inferred that in the patients of AWMI undergoing pPCI, there is an increased risk of 30 days mortality if the RBBB complicates the AWMI.

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