

ORIGINAL ARTICLE

Prevalence of new Onset Right Bundle Branch Block in Acute Myocardial Infarction and its Coronary Angiographic Findings in Patients Attending NICVD

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ABSTRACT

Background and Aim: Acute myocardial infarction patients with left and right bundle branch block significantly contributes to higher risk of mortality. Right bundle branch block (RBBB) has clinical implications in acute myocardial infarction setting. The present study aimed to determine the prevalence of new onset RBBB in acute myocardial infarction and its association with coronary angiographic findings.

Methodology: This cross-sectional study was conducted on 82 acute myocardial infarction (AMI) patients in National Institute of Cardiovascular Diseases (NICVD), Karachi from January 2022 June 2022. Study protocol was approved from the institution research and ethical committee. All the patients of either gender with an age range 25 years to 85 years having acute myocardial infarction were included. Written informed consent was taken. Patients with previous RBBB, had implanted pacemaker, and presentation of symptoms >24 hours were excluded. Detailed history and clinical examination of each individual was done. Patients' angiographic findings after eligibility based on coronary angiography was done and recorded. All the data were entered into pre-designed proforma. SPSS version 26 was used for data analysis.

Results: Of the total 82 AMI patients, there were 48 (58.5%) male and 34 (41.5%) females. Age-wise distribution of AMI patients were as follows; 17 (20.7%) 25-45 years, 28 (34.2%) 46-65 years, and 37 (45.1%) 66-85 years. The overall mean age was 54.62±6.82 years. The prevalence of new onset RBBB and without RBBB was 17 (20.7%) and 65 (79.3%) respectively. Of the 17 AMI with RBBB patients, the incidence of single vessel disease, double vessel disease, triple vessel disease, and left main stem disease was 3 (17.6%), 5 (29.4%), 6 (35.3%) and 3 (17.6%) respectively. Majority of patients aged 46 years to 65 years had RBBB in 9 (32.1%), followed by 6 (16.2%) in patients 66-85 years and 2 (11.8%) in patients aged 25-45 years.

Conclusion: The present study concluded that the prevalence of new onset RBBB was 20.7% among acute myocardial infarction patients. The incidence of triple vessel disease was prominent in acute myocardial infarction patients with RBBB followed by double vessel disease. Also, elderly patients of acute myocardial infarction patients were more susceptible to RBBB than younger one.

Keywords: Right bundle branch blockage, Acute myocardial infarction, Coronary angiography

INTRODUCTION

Acute myocardial infarction patients with left and right bundle branch block significantly contributes to higher risk of mortality [1]. According to European Society of Cardiology (ESC) guidelines, left bundle branch block (LBBB) was considered as an indicator for imperative reperfusion therapy [2]. However, new onset of RBBB in acute myocardial infarction could be indicated based on coronary angiographic findings. A previous study reported that the occurrence rate of new-onset RBBB was 6.3% [3]. Numerous studies reported that the prevalence of RBBB in acute myocardial infarction varies from 3% to 29% [4-6]. Heart failure and ventricular arrhythmia are caused by large infarct size in anterior acute myocardial infarction patients with RBBB due to blood supply in conduction system. Though, the incidence and tenacity of RBBB had affected by thrombolytic therapy introduction [7, 8], but reduced the mortality rate and enhanced the function of left-ventricular in acute myocardial infarction patients [9, 10].

Right bundle branch block is still an indicator of higher mortality in the thrombolytic era [11, 12]. The lack of angiography prior to thrombolytic therapy was the reason and still dependency of RBBB on infarct-related artery perfusion status to be determined. Recent studies recommended that coronary intervention should be preferred over thrombolytic therapy in terms of early and late clinical outcomes [13, 14]. In anterior acute myocardial infarction, RBBB implications might be change by introduction of coronary intervention. A previous study reported that left main stem disease was present in 26% patients of acute myocardial infarction with RBBB determined on coronary angiography [15]. Likewise, another study reported that the incidence of single vessel, double vessel, and triple vessel disease

was 29.1%, 27.5%, and 35.1% respectively in acute myocardial infarction with RBBB on angiography [16]. The present study was carried out to assess determine the prevalence of new onset RBBB in AMI patients on coronary angiography.

METHODOLOGY

This cross-sectional study was conducted on 82 acute myocardial infarction (AMI) patients in National Institute of Cardiovascular Diseases (NICVD), Karachi from January 2022 June 2022. Study protocol was approved from the institution research and ethical committee. All the patients of either gender with an age range 25 years to 85 years having acute myocardial infarction were included. Written informed consent was taken. Patients with previous RBBB, had implanted pacemaker, and presentation of symptoms >24 hours were excluded. Detailed history and clinical examination of each individual was done. Patients' angiographic findings after eligibility based on coronary angiography was done and recorded. Acute myocardial infarction was diagnosed based on chest pain with ischemia, serum creatine value, and presence of culprit lesions. Chest pain with persistent myocardial ischemia for ≥30 min, twice increase in serum creatine, and presence of culprit lesion in left anterior descending artery referred to acute myocardial infarction. Peak serum creatine Kinase value was recorded based on its measured value after 3 hours for more than 24 hours. Within 24 hours of the onset of AMI, one or more typical chest pain episodes lasting 30 minutes at rest or on effort were defined as prodromal angina. All the data were entered into pre-designed proforma.

Data analysis was carried out in SPSS version 26. Quantitative variables such as age were described as mean and

standard deviation. Qualitative variables such as angiographic findings in terms of vessel diseases and gender were described as frequencies and percentages. Coronary angiography findings were stratified for gender and age to see effect modification. Chi-square test was used for Post-stratification using 95% confidence interval and 5% level of significance.

RESULTS

Of the total 82 AMI patients, there were 48 (58.5%) male and 34 (41.5%) females. Age-wise distribution of AMI patients were as follows; 17 (20.7%) 25-45 years, 28 (34.2%) 46-65 years, and 37 (45.1%) 66-85 years. The overall mean age was 54.62±6.82 years. The prevalence of new onset RBBB and without RBBB was 17 (20.7%) and 65 (79.3%) respectively. Of the 17 AMI with RBBB patients, the incidence of single vessel disease, double vessel disease, triple vessel disease, and left main stem disease was 3 (17.6%), 5 (29.4%), 6 (35.3%) and 3 (17.6%) respectively. Majority of patients aged 46 years to 65 years had RBBB in 9 (32.1%), followed by 6 (16.2%) in patients 66-85 years and 2 (11.8%) in patients aged 25-45 years. Gender's distribution is illustrated in Figure-1. Figure-2 depicts the age-wise distribution of all the patients. The incidence of new onset RBBB and without RBBB in AMI patients are shown in Figure-3. The distribution of new onset RBBB in terms of vessel diseases are shown in Figure-4. Table-I and II represents the stratification of angiography findings against age and gender respectively.

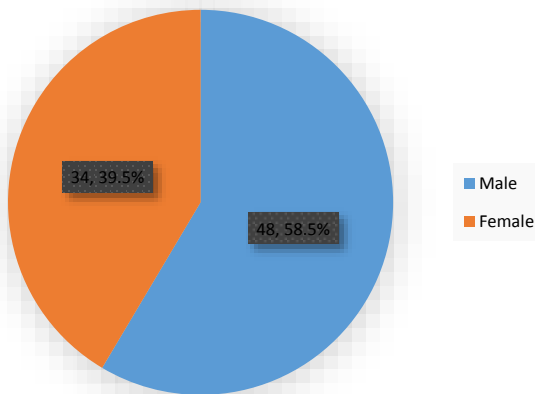


Figure-1: Gender's distribution of AMI patients (n=82)

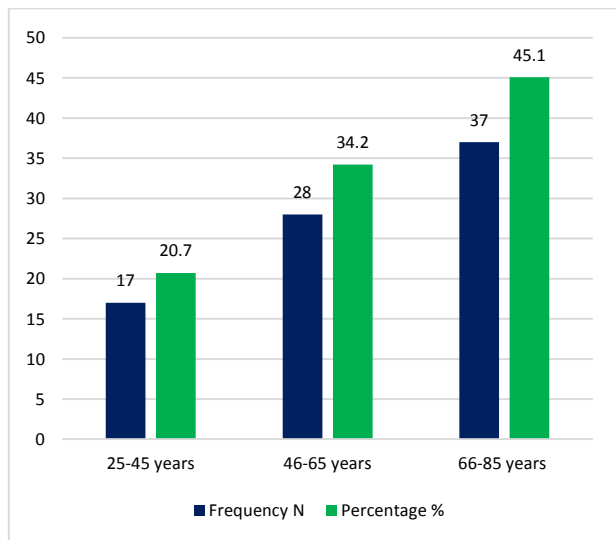


Figure-2: Age-wise distribution of AMI patients (n=82)

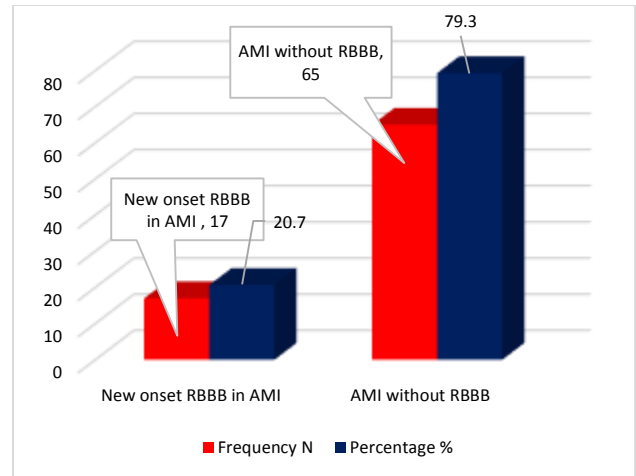


Figure-3: Prevalence of new onset RBBB and no RBBB in AMI (n=82)

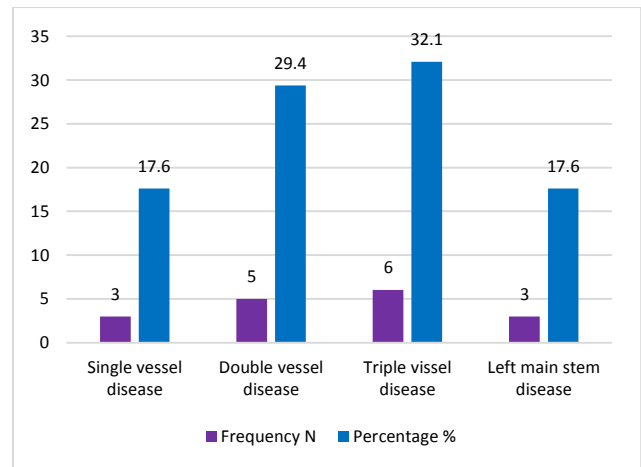


Figure-4: Distribution of new onset RBBB in terms of vessel diseases (n=17)

Table-1: Stratification of angiographic findings against age

AMI Diseases	Yes/No	25-45 years	46-65 years	66-85 years	p-value
		N (%)	N (%)	N (%)	
New onset RBBB	Yes	2 (11.8)	6 (16.2)	9 (32.1)	0.291
	No	15 (88.2)	22 (83.8)	28 (67.9)	
Single vessel disease	Yes	1 (5.6)	1 (3.6)	1 (2.7)	0.384
	No	17 (93.4)	27 (96.4)	36 (97.3)	
Double vessel disease	Yes	0 (0)	3 (10.7)	2 (5.4)	0.194
	No	17 (100)	25 (89.3)	35 (94.6)	
Triple vessel disease	Yes	0 (0)	4 (14.3)	2 (5.4)	0.232
	No	17 (100)	24 (85.7)	35 (94.6)	
Left main stem disease	Yes	0 (0)	3 (10.7)	0 (0)	0.265
	No	17 (100)	25 (89.3)	37 (100)	

Table-2: Stratification of angiography findings against gender

AMI Diseases	Yes/No	Male	Female	p-value
		N (%)	N (%)	
New onset RBBB	Yes	8 (16.7)	9 (26.5)	0.473
	No	40 (83.3)	25 (73.5)	
Single vessel disease	Yes	1 (2.1)	2 (5.9)	0.852
	No	47 (97.9)	32 (94.1)	
Double vessel disease	Yes	2 (4.2)	3 (8.8)	0.916
	No	46 (95.8)	31 (91.2)	
Triple vessel disease	Yes	2 (4.2)	4 (11.8)	0.125
	No	46 (95.8)	30 (88.2)	
Left main stem disease	Yes	3 (6.3)	0 (0)	0.265
	No	45 (93.7)	34 (100)	

DISCUSSION

The present study mainly focused on the new onset of right bundle branch block in acute myocardial infarction based angiographic findings and found that the incidence of new onset RBBB was 20.7%. Although the male patients were dominant but new onset RBBB was more prevalent in female patients in the present study. Elderly patients of acute myocardial infarction patients were more susceptible to RBBB than younger one. RBBB was more common in age group 46 years to 65 years compared to age group 25-45 years. Triple vessel disease was the most prevalent RBBB in AMI patients followed by double vessel disease. In our study, about 20.7% acute myocardial infarction patients had new onset RBBB whereas 79.3% AMI patients did not have RBBB.

In the present study, coronary angiographic findings diagnoses different types of artery diseases such as single, double, triple, and left main stem disease in acute myocardial infarction disease. The infarct of bundle branch block in AMI patient is observed in anterior territory near proximal bundle branches [17]. This demonstrates that bundle branch block in acute myocardial infarction is caused by anterior conduction system infarction triggered by disease of the proximal left anterior descending artery or septal perforators [18].

Numerous studies compared the thrombolytic therapy with coronary intervention and found that the later one is more effective in terms of reduced mortality rate, stroke, and reinfarction [19, 20]. In a study conducted by Han et al [21], increasing rate of mortality were observed in AMI patients with RBBB treated with angioplasty.

In the present study, RBBB in AMI patients were significantly associated with spontaneous anterograde flow, prodromal angina, and age. These factors are directly related to the mortality rate and infarct size in acute myocardial infarction patients. A previous study by Trullàs et al [22] found that lower prevalence of complete atrioventricular block is significantly associated to the prodromal angina in AMI patients, which is comparable to our findings.

Previous studies reported that overall prevalence of RBBB was 14.2% in AMI patients which was lower than 20.7% in the present study [23, 24]. Another study found that new onset RBBB in AMI patients were related to myocardial infarction anterior wall than other regions [25]. James et al reported that 90% cases of right coronary artery (RCA) supply blood to intravaginal slingplasty (IVS) upper portion comprised of atrioventricular (AV) node, two bundle branches upper part, and His bundle. Based on this division of the blood supply, we hypothesize that occlusion of the RCA may cause AV conduction disturbance rather than bundle branch block. As a result, disruption in the blood supply to the right bundle caused by RCA blockage was not thought to be a cause of RBBB. The right bundle branch is typically smaller in size and is supplied primarily by the LAD coronary artery and subsequently by the RCA. Only after irreversible damage to the myocardium and conduction pathways has occurred may collateral vessels develop [26].

CONCLUSION

The present study concluded that the prevalence of new onset RBBB was 20.7% among acute myocardial infarction patients. The incidence of triple vessel disease was prominent in acute myocardial infarction patients with RBBB followed by double vessel disease. Also, elderly patients of acute myocardial infarction patients were more susceptible to RBBB than younger one.

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