ORIGINAL ARTICLE
DOI: 10.55958/jcvd.v20i2.176

THE FREQUENCY OF LBBB AND COMMON CLINICAL OUTCOMES ASSOCIATED WITH IT IN PATIENTS WITH ACUTE ANTERIOR MYOCARDIAL INFARCTION

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Date of Submission: 18-10-2024; Date of Acceptance: 06-11-2024; Date of Publication: 15-02-2025

ABSTRACT:

BACKGROUND: *Coronary Artery disease (CAD) is a health problem that affects global men and women population and presents as the principal cause of mortality in 1st world countries. Heart blocks, such as atrioventricular (AV) nodal blocks (1st, 2nd, and 3rd degree) and intraventricular blocks (right or left bundle branch block), are included in the electrical disturbances of paramount importance which takes place after occurrence of acute myocardial infarction (AMI). In patients where an acute MI is present, bundle branch block (BBB) might point towards acute damage to proximal conducting system or to ventricular myocardium that leads to delay in the conduction.*

AIMS & OBJECTIVE: *To determine the frequency of the left bundle branch block and its common clinical outcome in the patients suffering from acute anterior myocardial infarction.*

MATERIAL & METHODS: *The current study was carried out in the in the Department of Cardiology, Punjab Institute of Cardiology Lahore Pakistan in the duration of May 04, 2021 to November 03, 2021. Using Descriptive Cross Sectional Study Design, 230 patients of acute myocardial infarction (MI) in total were made part of this study in consecutive manner ECG and Echocardiography was performed for the detection LBBB and all patients of LBBB were followed up till one month to determine the clinical outcome.*

RESULTS: *In current study 230 patients were made part of it, 60.9% males and 39.1% females. Value of mean age for the patients was 52.8 years whereas standard deviation of 7.8 years. LBBB was detected in 18.3% of patients and on follow up cardiogenic shock was seen in 13% of patients, in hospital death in 4.3%- and 30-day mortality 6.1%.*

CONCLUSION: *LBBB is frequent occurrence in our population, and it must be enthusiastically diagnosed and treated to reduce the burden of shock and mortality.*

KEY WORDS: *Left bundle block, Outcome, Acute anterior wall MI*

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Author's Contribution: GA: Design and Coordination. **NKK:** Data collection. **SA:** Data analysis. **SA:** Data analysis. **MA:** Data analysis. **ZH:** Drafting.

INTRODUCTION:

Coronary Artery disease (CAD) is a health problem that affects global men and women population and presents as the principal cause of mortality in 1st world countries. Heart blocks, such as atrioventricular (AV) nodal blocks (1st, 2nd, and 3rd degree) and intraventricular blocks (right or left bundle branch block), are included in the electrical disturbances of paramount importance which takes place after occurrence of acute myocardial infarction (AMI). In patients where an acute MI is present, bundle branch block (BBB) might point towards acute damage to proximal conducting system or damage to ventricular myocardium that leads to delay in the conduction.

OBJECTIVE:

To determine the frequency of the left BBB and common clinical outcome associated with it in patients with acute anterior myocardial infarction.

MATERIALS AND METHODS:

This descriptive cross-sectional study was carried out at the Cardiology Unit, Punjab Institute of Cardiology, Lahore over a period of six months from May 2021 to November 2021. Sample size was 230 keeping 5.7%1 proportion of 30 days mortality in patients with MI and LBBB, 95% confidence interval and 3% margin of error using WHO sample size calculator. Non-probability consecutive sampling technique was used.

DIAGNOSTIC CRITERIA OF LBBB ACUTE MI:

- Concordant ST elevation ≥ 1 mm in ≥ 1 lead
- Concordant ST depression ≥ 1 mm in ≥ 1 lead of V1-V3
- Proportionally excessive discordant STE in ≥ 1 lead anywhere with ≥ 1 mm STE, as defined by ≥ 25% of the depth of the preceding S-wave.

Both male and female presenting with acute anterior MI. Age group between 35 years and above was included in the study. Patients with previous MI on history, patients with already diagnosed conduction abnormalities including BBB on medical records and patients with history of cardiac interventions were excluded from the study.

DATA COLLECTION PROCEDURE:

The study was perform following an approval from ethical and the research committee of the hospital. All patient noted with newly diagnosed acute anterior MI according to the operational definitions mentioned above was made part of study and their admission was carried out for additional evaluation in the ward. The provided benefits along with the purpose of this study was mentioned to patients and their consent was acquired.

All patients were subjected to detailed history. A detailed clinical examination with ECG was performed to detect the left bundle branch block. Follow up of every patient was done for the period of 7 days following the time of their admission in hospital and till 30th day after admission to determine the clinical outcome regarding cardiogenic shock, in hospital death and 30-days mortality.

All these observations and measurements was performed by me under direct supervision of expert cardiologist who had a minimum of five years of the experience and every patient was managed as per the decided protocols of the ward under direct supervision of the same cardiologist and all the exclusion and inclusion criteria were followed in a strict manner so that any biasness in the data can be avoided effectively.

DATA ANALYSIS PROCEDURE:

All the collected data was analyzed by making use of SPSS version-16. Frequencies and percentages for the categorical variables such as gender,

LBBB and common clinical outcome (cardiogenic shock, in hospital death and 30-days mortality) while means + SD was calculated for numerical variable like age. Chi-square test was applied for statistical significance. Graphs and tables were used to demonstrate all the results keeping P value ≤0.05 which was significant.

RESULTS:

The current study was performed with 230 patients presenting with acute myocardial infarction. The mean age in our experimental sample was 52.8 years whereas the standard deviation was noted to be 7.8 years. Division of the patients was carried out in 3 groups based on age and it was noted that individuals in the 50 year age group had 43.5%, in the 50.01 to 60.00 years age group we had 33.9% and in the group with 60.01 years and above we had 22.6%, patients. (Table 1).

Out of 230 patients, there were 60.9% males and 39.1% females (Table 2) According to definition LBBB was observed in 18.3% of patients (Table 3) and all were followed till one month. Any type of common clinical outcome was observed in all LBBB patients (Table 3, Table 4).

On follow up cardiogenic shock was seen in 13% of patients, in hospital death in 4.3%- and 30-day mortality in 6.1%.

We stratified the individual clinical outcome with regards to different age groups. (For details see table 3)

We also stratified the individual clinical outcome with regards to gender. (For details see table 4).

DISCUSSION:

LBBB in patients depicts the crucial minority where ACS is suspected. Contemporary recommendations as per the American College of Cardiology/American Heart Association 2 and European Society of Cardiology 3 imply that the patients where LBBB is presumed or newly diagnosed should opt for reperfusion therapy (PCI or fibrinolytics) early, given that this phenomenon is a rarity.[4-5] Nevertheless,

Table-1: Demographic

		Frequency (n=230)	Percentage
Age Groups	Upto 50.00 years	100	43.5
	50.01 to 60.00 years	78	33.9
	60.01 years & above	52	22.6
Gender	Male	140	60.9
	Female	90	39.1
	LBBB	42	18.3
	Cardiogenic Shock	30	13.0
	In Hospital Death	9	3.9
	30 Days Mortality	14	6.1

Table 2: Age and gender wise stratification of LBBB (n = 230)

		Left Bundle Branch Block	p value
Age Groups	Upto 50.00 years	14 / 100 (14%)	**0.114**
	50.01 to 60.00 years	20 / 78 (25%)	
	60.01 years & above	8 / 52 (15%)	
Gender	Male	24 / 140 (17%)	**0.584**
	Female	18 / 90 (20%)	

Table 3: Age group wise stratification of patients with LBBB.				
		Cardiogenic Shock	In Hospital Death	30-days Mortality
Age Groups	Upto 50.00 years	14/14 (100%)	4/14 (28%)	10/14 (71%)
	50.01 to 60.00 years	8/20 (40%)	5/20 (25%)	4/20 (20%)
	60.01 years & above	8/8 (100%)	0/8	0/8
Total		30/42(71.42%)	9/42(21.42%)	14/42(33.33%)
p value		0.000	0.252	0.001

Table 4: Gender wise stratification of patients with LBBB.			
	Cardiogenic Shock	In Hospital Death	30-day Mortality
Male	12 / 24 (50%)	7 / 24 (29%)	4 / 24 (16%)
Female	18 / 18 (100%)	2 / 18 (11%)	10 / 18 (55%)
Total	30/42(71.42%)	9/42(21.42%)	14/42(33.33%)
p value	0.000	0.158	0.008

reperfusion therapy earlier might not prove suitable for every patient with the new LBBB as only a small portion gets diagnosed with the MI.[6-8] Contrary to that, objective criteria for the ECG might help in identification of the patient in whom MI is larger and the it is more likely that the treatment will be more beneficial.[9-10]

Short term prognosis for the patients who present with the BBB after acute MI is not well established[11]. Additionally, majority of the studies that report the BBB following the acute myocardial infarction were carried out prior to the fibrinolysis or primary PCI and follow up of the patients was performed for a period of time (till the period of one year).[12-13]

In the patients who present with acute MI, bundle branch block might point towards acute damage to proximal conducting system damage to ventricular myocardium that leads to delay in the conduction. The group mentioned latter usually has ventricular dysfunction and dilation. Patients with LBBB might get benefited from the implementation of CRT or with defibrillator called as CRT-D machine even though suitable delay before the intervention is yet to be determined.[14-15]

This study was conducted in a tertiary care hospital. Mean age of our patients was 52 years. Slightly similar mean age group was described by Bhalli MA et all in a local study conducted at Abbott Abad which shows that mean age of patients with acute Myocardial infarction in this era is around 59 years[16] There were 56.3% male in our study population. Same male, female ratio was found in other studies for acute ant wall MI, like one study did by Khan Set al[17].

Clinical trials which were based on LBBB patients have noted the MI rate confirmation to be lower significantly in the LBBB patients compared to patients with ST elevation. In ASSENT 2 and 3 trials10, is spite of the meticulous criteria of entry, 38% out of total participants who got admitted with LBBB did not confirm for the MI.

Even though presence of the new LBBB provides the idea of identifying patients present with AMI and it is recommended that emergent reperfusion is performed, data is limited that supports such criteria. References are absent in the current guidelines. Some of the studies[7], but not all of them,[8] depict an association of the new LBBB with the increase in the MI rate. Nevertheless, even for the new LBBB patients, diagnosis of MI is rarely made. An example is, Chang et al[8] noted MI in 7.2 percent, and Li et al7 found MI in 16 percent of the present with LBBB of duration that is not known or new LBBB patients.

This criteria is apparently not sufficient in selection of the patients where reperfusion therapy is to be performed earlier.

Lower diagnostic accuracy associated with the ECG along with increase in the number of the atypical presentations alongside higher rate of the comorbidities[4-5] in LBBB patients could contribute to lower rate and the diagnostic confusion[4-5] and increase in the time of emergent reperfusion in such patients. In the analysis from National Registry of the acute MI, patients present with LBBB were noted to be significantly less likely that they undergo reperfusion treatment earlier[3,4]; in the patients who did, time of door to drug was noted to be longer compared to patients with STEMI. Likewise, recently collected data in the patients who underwent PCI, from ACTIONGWTG registry noted rates of primary PCI to be lower significantly and having association with greater delay compared to that of the STEMI patients.[5]

Growing data points that the patients present with LBBB and the MI presenting to ED depict patients belonging to a heterogenous group: minority group having STEMI equivalent, who are more likely to get benefited from the acute reperfusion treatment: patients present with the non-STEMI equivalent, present with myocardial necrosis but with the absence of complete occlusion of vessel: and, with the increase in using assays with greater sensitivity, patients present with the acute CHF exacerbation with the minor myocardial necrosis which sometimes gets mistaken as MI. Even though everyone might get benefitted from an invasive evaluation, but emergent reperfusion treatment only proves beneficial for the first group. Thus, it is important that patients present with LBBB where chances of vessel occlusion are high, must be correctly identified.

The principal finding was that LBBB was related to an adverse patient prognosis with the preserved MI. Mortality risk factors were found associated with LBBB and RBBB in form of the HF and MI history, complications in the hospital like reduced LVEF, atrial fibrillation, ventricular fibrillation, and increased age. But these factors failed to explain the associated increased risk with the RBBB upon multivariate analysis.

LBBB serves as indicator of a poor HF and MI prognosis primarily in medium and short term follow up. Lately, LBBB has been depicted as independent predictor for the mortality in a long term follow up (1 year) without admission to hospital for severe HF in case of acute HF[12]. Another study published recently examined impact BBB incurs on the mortality type by utilizing ECG admission in the patients who got admitted with the HF systolic and their follow up was done for 4 consecutive years[18]. The authors revealed RBBB to be a significant mortality predictor, compared to both LBBB and non-BBB. Up until now, the biggest study that investigated the BBB prognosis type in the patients with the acute MI (AMI), integrated RBBB significance as mortality predictor, but only for short term.

The reason behind the elevated mortality in not innate for the BBB. No explanation can be furnished for the conduction abnormality. The degree of damage to the myocardial muscle might be linked to BBB generation. So, BBB might serve as the marker for size of MI in AMI setting, that shares similarities with the troponin values and consequently as reliable risk factor for the developing HF[19]. Nevertheless, BBB served as the marker for the smaller infarcts when latter were estimated by peak creatinine kinase myocardial band value. Thus, MI size cannot demonstrate worsened clinical condition related to the BBB.

In deciphering BBB as well other factors of prognosis settings serve an important value. Non-ischemic background for the BBB, as shown by the dilated cardiomyopathy, did not exhibit any difference in the mortality as per BBB type, but BBB was depicted as a predictive factor for transplantation of heart and death caused by HF[20]. Difference between the MI type has also shown RBBB as mortality predictor for the STEMI21. Here, the setting were only NSTEMIs and the STEMI in the RBBB and LBBB or patients with no BBB with the MI. Differences in the underlying pathology as well as treatments in the trials that assessed risk factors for the BBB could make generalization hard for the take home message.

Nevertheless, a limitation was long term

follow up, because acute MI treatment has seen changes in this period. However, the study population we had, had received thrombosis as per the recommendation and relevant population for the consecutive MIs. Although, thrombosis was applied broadly, treatment recommendation is primary PCI for patients of MI nowadays. Nonetheless, it is mandatory to mention that BBB patient are excluded frequently from the trials that evaluate primary PCI[21].

CONCLUSION:

LBBB is frequent occurrence in our population, and it must be enthusiastically diagnosed and treated to reduce the burden of shock and mortality. We also recommend more studies on prevention and treatment of LBBB after MI and also on its risk factors before making future recommendations.

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