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FREQUENCY OF BUNDLE BRANCH BLOCK IN PATIENTS WITH REDUCED EJECTION FRACTION HEART FAILURE

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Abstract

Objective: To determine the frequency of bundle branch block (Left and Right) in patients with Reduced Ejection Fraction (Heart Failure) and association with hypertension, duration of heart failure and ischemic heart disease presenting to cardiology department of Hayatabad Medical College.

Methodology: After approval from the hospital ethical committee, a total of 176 patients were observed to determine the frequency of bundle branch block (Left and Right) in patients of Reduced Ejection Fraction Cardiac Failure presenting to cardiology department from January 2021 to June 2021. It was a cross-sectional study and the approach of consecutive non-probability sampling was applied to get data from the patients. After admission in ward these patient were investigated and ECG and ECHO was done.

Results: Among 176 patients, age wise distribution was analyzed. Among 176 patients as n= 30-40 Years 6 (3.4%), 41-50 Years 29 (16.5%), 51-60 Years 75(42.6%) 61-70 Years 66 (37.5%). The mean age was 56.95 years ± 1.176 SD. Gender wise distribution was n= 115(65.3%) were male and 61(34.7%) were females. Frequency of BBB in this study was 30.1%.Hypertension was present in 139(79.0%) and absent in 37(21.0%) and 114(64.8%) were Diabetics. History of ischemic heart disease was seen in 92(52.3%).117 patients (66.5%) had a left bundle branch block, while 59 patients (33.5%) had a right bundle branch block.

Conclusion: BBB is a strong and independent predictor of worse outcome measures in patients with HF and lower LVEF. BBB is an unfavorable prognostic marker .52% had history of ischemic heart disease and BBB onset within 3 months of heart failure and strong association with hypertension seen in 92% patients

Keywords: Bundle branch block (Left and Right), Reduced Ejection Fraction Heart Failure

INTRODUCTION

Heart failure is the inability of the heart to pump necessary blood to the body, leading to the accommodation of fluid in extracellular space and lungs. All type of chronic heart failure (CHF) has been shown to affect about 22 million people around the globe and is further rapidly expanding[1]. Its prevalence rate has been shown to be from 4.7 to 13.3%[2]. Within United States about 5.7 million people were effected in 2011 and 0.87 million people are diagnosed as new cases of heart failure each year[3].

In Korean peninsula the CHF was predicted to be 1.53%[4] while in Japan it is 0.8% of total populations[5]. Comparing with other countries the heart failure rate is further higher in South Asia compared to rest of the world[6]. The mortality from heart failure has been estimated to be 23-31%[7]. The prevalence of Congestive heart failure (CHF) in Pakistan is 2.8 million patients, sadly though there are no prior published demographics of this patient population 8. It has been observed to be more prevalent among patients having bundle branch block[,9].

People who are diagnosed with RBBB had a higher risk of death from any cause compared to those who did not (log-rank x2= 9.400, P0.05). RBBB was a significantly independent predictor of all-cause death in patients with dilated cardiomyopathy (hazard ratio: 2.898; 95% CI: 1.201-6.995) 8. Patients with LBBB with either heart failure (hazard ratio, 1.70; 95% confidence range, 1.41 to 2.05) or sudden death (hazard ratio, 1.58, 95% confidence interval, 1.21 to 2.06) had a higher probability of dying within a year[9].

Heart failure patients often exhibit bundle branch block. BBB (QRS length > 120 ms) has been proven to be of help in 34% of patients with chronic heart failure. 25.2%9 of heart failure patients in one research had LBBB. Patients with a broad QRS complex tended to be older and had diminished left ventricular systolic performance (72.2 v 69.3 years[10]. The rationale of my study is to find out the frequency of right and left bundle branch block in patient with reduced ejection fraction heart failure as this causes increased mortality and there is scanty of data on the subject in Pakistani population.

My study will provide the burden of this risk in heart failure patients. Result of study can be used for proper management of the heart failure patient early and in time admission of such patient for decreasing the mortality in such patients.

METHODOLOGY

It is a cross sectional study conducted from January 2021 to June 2021 in Department of Cardiology, after Ethical board approval. Sample size of 176 patients with reduced ejection fraction was selected according to WHO criteria. The patient included in study were those patients who have reduced ejection fraction heart failure, both gender, age above 30 years and willing to give consent. All those who are having acute or chronic kidney injury or drug induced kidney failure obvious from previous record or increased creatinine or more than 1.5mg/d1, Known cardiac valvular abnormality patients like, Rheumatic Heart Disease, congenital heart anomalies, permanent pacemaker insertion, documented history of chronic liver disease were excluded to avoid Bias in the study

After taking ethical approval for this study from the institute ethical committee the study were started. Written Informed consent (Annexure 11) to participate in the study were taken from each participate presenting to cardiology department fulfilling the inclusion and exclusion criteria. All the pros and cons were explained and confidentially were maintained. Demographic data like age, sex, and address were taken. All the baseline investigation including urea/creatinine and echocardiography were done. Previous history of diabetes (previously using anti-diabetics drugs), hypertension (previously history of using any type of antihypertensive medications) and duration of heart failure since developing the first symptoms of heart failures were noted in the proforma.

Patients were treated as per hospital protocol. ECG (Electro Cardio Graph) were done of each patient and patient were labeled as bundle brand block (also left and right) as in operational definition. All the data were collected by the researcher himself and were noted in proforma (Annexure I). IBM's Statistical Package for the Social Sciences, version 23 (SPSS 23) was used for the data analysis Frequency and percentages were presented for Qualitative variable like gender,

presence of diabetics, hypertension, presence of bundle branch block and each type of block. Mean + SD were calculated for age, ejection fraction and duration of heart failure. Effect modifiers like age, gender, presence/absence of diabetes/hypertension, type of cardiomyopathy (ischemic, dilated others), previous history of ischemic heart disease (documented medical history) and Ejection fraction were controlled through stratification and then were compared with the onset of bundle branch block. After this, Chi square test were applied and p value of <0.05 were taken significant. All the data were presented using tables and graphs[78].

RESULTS

Age wise distribution was among 176 patients was analyzed as n= 30-40 Years 6 (3.4%) 41-50 Years 29 (16.5%) 51-60 Years 75(42.6%) 61-70 Years 66 (37.5%). The mean age was 56.95 years + 1.176 SD. Association of different ages with types of bundle branch block is seen in table 1 Gender wise distribution is seen as n= 115(65.3%) were male and 61(34.7%) were females.

Table No 1: Stratification Of Types Of Bundle Branch Block

*** Age Of The Particpants (N=176)**

Age of the participants	Types of Bundle branch block		Total	P. Value
	Left bundle branch block	Right bundle branch block		
30-40 Years	6	0	6	.017
	3.4%	.0%	3.4%	
41-50 Years	25	4	29	.017
	14.2%	2.3%	16.5%	
51-60 Years	47	28	75	.017
	26.7%	15.9%	42.6%	
61-70 Years	39	27	66	.017
	22.2%	15.3%	37.5%	
Total	117	59	176	
	66.5%	33.5%	100.0%	

When bundle branch block type was seen in gender distribution, 74 male had left BBB and 41 male had right BBB. In females, 43 were having left BBB and 18 had Right BBB with p value 0.411. About 139(79.0%) patients were hypertensive. Stratification of hypertension with types of BBB table 2. Distribution of Diabetes was seen in 114(64.8%) p value was p 0.352.

Table No 2: Stratification Of Types Of Bundle Branch Block

***Hypertension Status (N=176)**

Hypertension Status	Types of Bundle branch block		Total	P. Value
	Left bundle branch block	Right bundle branch block		
Yes	98	41	139	.028
	55.7%	23.3%	79.0%	
No	19	18	37	.028
	10.8%	10.2%	21.0%	
Total	117	59	176	
	66.5%	33.5%	100.0%	

History of Ischemic Heart Disease among 176 patients were analysed as n= Yes was found 92(52.3%) and No was found 84(47.7%) (table no. 3) Types of Bundle Branch Block among 176 patients were analysed as n= left bundle branch block was 117(66.5%) and Right bundle branch block was 59(33.5%).

Table No 3: Stratification Of Types Of Bundle Branch Block

*** Duration Of Heart Failure (N=176)**

Duration of Heart Failure	Types of Bundle branch block		Total	p value
	Left bundle branch block	Right bundle branch block		
less than or equal to 3 months	93	50	143	.339
	52.8%	28.4%	81.2%	
More than 3 months	24	9	33	.339
	13.6%	5.1%	18.8%	
Total	117	59	176	
	66.5%	33.5%	100.0%	

When crosstab was applied and relationship between heart failure and type of BBB (table 4). About 81.2% of these patients of heart failure had symptoms within 3 months and 18.8% patient had more than 3month. Approximately 3 months ± 2.156 Standard Deviation was the mean time span. Ejection Fraction (EF) 35% in 22.2%; EF 35%–39% in 40.3% (p = 0.00) There are around 37.5% of patients who have an ejection fraction (EF) of 40% to 50%.

Table No 4: Stratification of Types Of Bundle Branch Block

*** PREVIOUS HISTORY OF ISCHEMIC HEART DISEASE (n=176)**

Previous history of Ischemic heart disease	Types of Bundle branch block		Total	P.Value
	Left bundle branch block	Right bundle branch block		
YES No	69	23	92	.016
	75.0%	25.0%	100.0%	
	39.2%	13.1%	52.3%	
	48	36	84	.016
	57.1%	42.9%	100.0%	
	27.3%	20.5%	47.7%	
Total	117	59	176	
	66.5%	33.5%	100.0%	
	66.5%	33.5%	100.0%	

Discussion

In this study the frequency of BBB is 30% with highest frequency seen in age group 51-60yeras with 42.6% It prevalence rate has been shown to be from 4.7 to 13.3%[2] in different studies. Twenty-eight percent of patients with chronic heart failure had QRS durations of less than 120 ms in the Chronic Heart Failing and QRS Duration: Establishing Prognosis (CONQUEST) experiment [11]. Among over 3,000 patients hospitalized to the intensive care unit at Henry Ford Hospital, 20.5% had BBB (13.2% LBBB, 7.3% RBBB) [12]. The very same hospitals in the UK admitted 22% of patients with heart failure who had BBB (15% LBBB, 7% RBBB)[13] The number of our patients with BBB was similar to the proportion of respondents in the Euro Heart Failure survey who had QRS prolongation[14] Additionally, the frequency of 30.1% in our patient population with reduced LVEF is in line with three studies that found a greater prevalence of BBB in individuals with more severe LVSD [1,15,16]

Our results are in line with three studies that divided systolic performance in hospitalized individuals into two categories: 8% HF-PSF (heart failure Preserved systolic Function)versus 24% LVSD(left Ventricular Systolic diameter), pb0.001; US National Heart Failure (NHF) project)[6] VA Medical Center in Loma Linda (2% HF-PSF vs. 12% LVSD, pb0.0001));[5] and a subgroup of elderly patients who were admitted repeatedly (3% HF-PSF versus 26% LVSD, pb0.0001).[6] In accordance with this, we determined that BBB prevalence was considerably lower in HF-PSF patients (14.4%) compared to LVSD patients (Alternative 29.6%, Added 30.5%). Although the

frequency in our HF-PSF sample seemed to be greater, these earlier investigations only addressed LBBB and not entire BBB. Only one research has ever defined both conduction abnormalities,[5] Numerous investigations have found that the ejection percent and QRS duration are inversely correlated [11,12,14,17,18].

The BBB predictors, however, were determined via multivariate analysis [12] in study by Cohn. Cohn study found that ejection fraction (p0.0001), renal function (p=0.04), and age (p=0.04) were all substantial independent predictors of participants being admitted to an ICU with acute heart failure. They quantified the magnitude of this association, showed that LVEF is the primary driver (odds ratio 1.49 for 10% LVEF, p0.0001). Having a history of MI was a significant predictor of BBB, which is an established result of ischemia damage and associated with greater post-infarction mortality (odds ratio 1.55; p0.0001)[19,20]

Statistical power limits the ability to observe black racial origins as a predictor because of the low number of these patients. Prolonged QRS has been linked to increased mortality, which was originally discovered in many smaller investigations [21,22,23-25] Limited patient counts, particularly with ischemic heart disease, varying cutoffs identifying the conduction deficit, and discrepancies in multivariate analyses precluded interpretation and applicability to clinical practice. Recent large studies have shown that mortality increases gradually as QRS duration increases, without showing any indication of a threshold impact at 120 ms.[26,27]

Patients with LBBB (16.1% vs 11.9%) and not RBBB (11.9% vs 11.9%) in the IN-CHF registry had a significantly greater risk of death at 1 year. The results of a multivariate analysis showed that LBBB was an independent predictor of increased 1-year death (1.36 [1.15-1.61], p=0.0004; and sudden death (1.35 [1.05-1.73], p=0.0188). Patients in the IN-CHF registry who had LBBB (16.1% vs. 11.9%) but not RBBB (11.9% vs. 11.9%) were at a significantly greater risk of death at 1 year.[28]

LBBB was still a very effective independent predictor of higher 1-year mortality (1.36 [1.15-1.61], p=0.0004) and sudden death (1.35 [1.05-1.73], p=0.0188) after multivariate adjustments[1]. The preventive efficacy of QRS duration in predicting all-cause death in HF patients with LVSD was recently confirmed by a subgroup analysis from the German centers in Val-HeFT.[29] Results might also be affected by the ongoing association among QRS duration and prognosis. If outcomes were stratified based on the length of the QRS, it may have been shown that patients with intact LVEF had QRS complexes that were smaller and linked to a lower incidence of cardiovascular events. Due to the rarity of really normal systolic contraction, individuals with wide QRS complexes may not be included within the criteria of retained systolic function.

The biggest cohort of patients with intact LVEF to date was included, although additional subgroup analysis lacked adequate statistical power to make firm conclusions. The fact that several site investigators interpret ECGs rather than a single core lab using defined procedures is another drawback. Although the diagnostic criteria are simple, we think that individual investigators can nevertheless apply them to clinical practice. Patients in the "real world" tend to be older, very often female, and have more co-morbid conditions; hence, volunteers in clinical trials might not accurately represent those patients. This is truest for those whose systolic function has been maintained. Simple clinical diagnosis of BBB is associated with increased symptom severity and is a potent independent predictor of worse clinical outcomes in patients with heart failure, especially those with diminished LV systolic function. Patients with maintained systolic function are less likely to have this, and it has less of an impact on prognosis when it does occur. Drawing attention to the role that QRS duration plays in the selection of patients for cardiac resynchronization to improve prognosis and clinical outcomes. The ECG is still a practical and cost-effective tool for detecting high-risk cases of cardiovascular illness,

CONCLUSION:

BBB is a strong and independent predictor of worse outcome measures in patients with HF and lower LVEF. BBB is an unfavorable prognostic marker. 52% had history of ischemic heart disease and BBB onset within 3 months of heart failure and strong association with hypertension seen in 92% patients.

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