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Prospective cohort study of coronary vascular diseases leading to left bundle branch block and its relationship with the age after follow up of five years

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Abstract

Background: Left bundle branch block (LBBB) may be due to conduction system degeneration or in the background of myocardial infarction. It can be due to aortic valve disease Myocardial disease may be reflected in the left bundle branch block, or it may be the result of conduction system degeneration. It may also develop due to heart surgery or aortic valve dysfunction, left bundle branch block may occur.

Introduction: It is due to a defect in the conduction system of left bundle branch leading to delay or blockade of along the pathway that electrical impulses travel to make the ventricles to beat.

Aims and objectives

- To find out the percentage of people developing LBBB.
- To find out the relationship of age and coronary artery disease leading to LBBB.
- To find out the survival of LBBB in various age groups.

Methodology: We obtained the data of 294 patients from Rahman Hospital using a questionnaire and evaluated it using SPSS software. The data was gathered according to inclusion and exclusion criteria that determined whether a major cardiac condition like CAD was present or not. Subsequently, SPSS conducted an analysis of the data and determination was drawn.

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Results and Conclusion: Patients identified and studied were 297 and followed for 5 years, the study revealed that 14 percent of patients had age less than 29, 21.4 % of patients having LBBB were around age 30 to 40 years, 26.9% people of CVD had LBBB aged 50-60 years and people above 60 years having CVD had 32.2% LBBB showing that with increase in age of patient having CVD there is more risk of developing LBBB significantly. The LBBB being carrying poor prognosis, the patients were followed for 5 years, revealed that 40 out of 297 (13%) lived for 6 months, 72 out of 297 (25%) lived for 1 year approximately, 44 out of 297 (15%) lived for more than 2 years, approximately 78 out of 297 lost to follow up or died from another cause shown in the graph, which explains that approximately half of patient dies in the first 6 months of diagnosis, so this has to be taken serious and treated adequately. This research gives us a thorough foundation for comprehending how age and cardiac anomalies interact, allowing for early risk assessment of individuals and a decrease in the disease-to-ratio ratio. This initiative helps us lower risk factors, enhance the local health system, and improve patient lives by promoting routine monitoring.

Keywords: Left bundle branch block; Coronary artery disease; Cardiomyopathies; Heart blocks

1. Introduction

The Koch triangle contains the atrioventricular node. The atrioventricular portion of the membranous septum resides at the apex of the triangle, which is bordered by the tricuspid valve's septal attachment and the tendon of Todaro. The atrioventricular node and the bundle branches are connected by a cylindrical fascicle called the His bundle (1). Histologically, it is made up of big Purkinje type cells that are arranged longitudinally because collagen separates them. The His bundle travels beneath the atrial portion of the membranous septum after passing through the annulus fibrosus and through the central fibrous body. Following that, it transports fibers over the interventricular septum's crest; the majority of these fibers first pass through the left bundle branch (LBB) and subsequently the right bundle branch (RBBB) (2). At the base of the interleaflet triangle formed by the right and noncoronary aortic leaflets, the inferior border of the membranous septum gives rise to the LBB (3). This then splits into anterior and posterior fascicles, which travel in different directions to the anterior and posterior papillary muscles of the left ventricle (LV). There has also been a description of a septal division, which can originate from the main LBB or the anterior/posterior fascicle. In order to create Purkinje networks that aid in terminal electrical conduction into the ventricular tissue, the bundle branches diffusely split and expand outward along the subendocardium of the ventricles. Both the septal perforator of the left anterior descending artery and the atrioventricular nodal artery supply blood to the His bundle. The right and left coronary arteries both supply blood to the left branch of the brain (LBB), whereas the septal perforators supply practically all of the blood to the right branch of the brain (RBBB). A dromotropic condition called left bundle branch block (LBBB) is becoming more and more well-known as a vital diagnostic tool for choosing patients for cardiac resynchronization therapy (CRT) (4). It is found in people whose normal cardiac conduction via the His-Purkinje system's anterior and posterior left fascicles is impaired. While myocardial damage, strain, or hypertrophy is frequently the cause of LBBB, which is frequently linked to major cardiac disease, it can also occur in patients who don't have any specific clinical disease. When LBBB is present alone, it does not raise any particular clinical issues or have an impact on prognosis. But in the right clinical setting, LBBB can have a significant impact, particularly in patients presenting with syncope, acute chest discomfort, and heart failure with a reduced ejection fraction (HFrEF). A common ECG anomaly seen in patients with impaired normal cardiac conduction is left bundle branch block (LBBB) (5). Particularly in a population with unconventional presentations, new-onset LBBBcoupled with concerning clinical features should be considered suggestive of myocardial infarction. Numerous studies have found that after acute heart failure (AHF) admission, the majority of migrant groups or minorities had a poorer prognosis than the native population, and that the occurrence of LBBB in those patients' ECGs is associated with this (6). Furthermore, it is observed that individuals of South Asian(Indian subcontinent) heritage exhibit a high frequency of comorbidities, contributing to a higher incidence of heart failure (HF) and the existence of LBBBin this demographic category. Moreover, there may be variations in the genesis and treatment of HF and LBBB patients from ethnic minorities .The Middle East is home to a sizeable portion of the South Asian population, however relative to the Middle East population, little is known about the etiology, presentation, management, and prognosis for this group (7). Middle Eastern Cardiovascular disease patients, irrespective of their ethnic background, tend to appear at comparatively younger ages and have a higher prevalence of comorbidities, according to a prior retrospective single-center research from Qatar. Gulf CARE(acute heart failure registry) is a prospective, multicenter, international registry of patients hospitalized to 47 hospitals across 7 Middle Eastern countries with AHF diagnosis accompanied by the presence of abnormal ECG findings like LBBB (8).This report compares the clinical features, treatments, and results of AHF vand LBBB patients participated in the Gulf CARE trial between Middle Eastern Arabs and Indian subcontinent patients.

Objectives

We can analyze the relationship between the presence of LBBB and COMORBIDS, related illnesses like CAD, CCF, AWMI etc. The existence of LBBB enables us to correlate demographic variables as well as age categories.

2. Methodology

This study looked into risk variables and symptom patterns connected to age individuals with Left Bundle Branch Block (LBBB). The Rehman Medical Institute Of cardiology patient records provided the data used in the study. The required data was gathered by a questionnaire, and SPSS (Statistical Package for the Social Sciences) software was utilized to conduct the statistical analysis.

2.1. Inclusion and Exclusion Criteria

2.1.1. Inclusion Criteria

- Patients having an LBBB diagnosis
- Patients whose medical data were accessible at Rehman Medical Institute of cardiology department
- Individuals of every gender

2.1.2. Exclusion Criteria

- Patients with missing or incomplete records
- Individuals with previous history of concurrent cardiovascular illnesses
- Patients with substantial co-morbidities that can skew the results
- Individuals with incomplete survey responses

2.2. Data Collection

The information was gathered from Rehman Medical Institute of cardiology patient records.

- The latest five years were included in the data gathering phase.
- To gather pertinent data from the medical records, a questionnaire was created.
- The survey encompassed pertinent diagnostic test findings, symptoms, medical history, risk factors, and demographic information.
- Trained staff members retrieved the necessary data from the patient documents and filled out the questionnaire in accordance.
- Data input was carried out using a dependable and secure database system.

2.3. Variables of Interest

- Chronological: A categorical variable that is segregated into pre-established ageranges, such as 30-49, 50-69, and 70+.
- The existence or non-existence of recognized risk factors, such as blood testing for lipid profile, smoking, high blood pressure, diabetes, high cholesterol, a family history, etc.
- Results of diagnostic tests: EKG, ECG, coronary angiography etc.
- Other pertinent variables: gender, medical history, and any other details thought to be required.

2.4. Statistical Analysis

- The SPSS program was used to enter the acquired data and perform statistical analysis.
- The study population's risk factors, symptoms, and demographics were compiled using statistical techniques.
- A logistic regression analysis may have been conducted to find independent predictors of LBBB in various age groups.
- The link between age groups and symptoms/risk factors was studied using the chi- square test, also known as Fisher's exact test.
- The significance threshold was established at $p < 0.05$.

A total of 297 patients (159 men and 138 women) since the last five years In Rehman Hospital with any cardiac issues like CAD, CHF, AV BLOCK, HTN, etc were studied and their data was collected. Their data was interpreted in the SPSS (Statistical Package for Social Sciences) and they were analyzed in detail.The confirmatory tests for LBBB like ECG, EKG,

Angiography were performed in those patients and the data was interpreted to note the presence of LBBB . Out of 297 cardiac patients with different comorbidities we found a total of 85 patients in the last 5 years which were diagnosed by LBBB (Left Branch Bundle Block). Out of 85 patients suffering fromLBBB 40 were men and 45 were women.it means 25% (40 out of 159) of the total men suffering from any cardiomyopathies were also the patient of LBBB following it we also noted that 33% of women suffering from any cardiac comorbidity were also suffering from LBBB. Then we studied the relation of morbidity and cardiovascular disorders, we found out that 62 patients with cardiovascular disorders were expired in this 5 years and out of those 62, 46 patients were male and 16 were female patients. So the death ratio of patients suffering from cardiovascular diseases in males is 29% and in females is 12%. The overall death ratio among cardiovascular patients in our 5 year survey is 21%. Another 118 patients were alive and out of it 91 were enjoying good life as 26 of them weren't in sound state of health which has been discussed in Table no.1.

Table 1 Patients with CAD having LBBB, gender wise mentioned separately

Serial No.		LBBB Suffering Patients	Expired patients	Alive Patients	Patients with good health	Patient with bad health	Total patients
1	Overall no. of patients	85	62	118	91	26	297
2	Percentage	29%	21%	40%	31%	9%	100%
3	Males	40	46	57	46	10	159
4	Percentage	25%	29%	36%	29%	6%	100%
5	Female	45	16	61	45	16	138
6	Percentage	33%	12%	44%	33%	12%	100%

if we have a look on the age groups of the patients suffering from cardiomyopathy and LBBB we come across interesting results which are quite obvious. Most of the cases which are encountered in the 5 years study of cardiology section of Rehman hospital are mostly of age more than 60 years. In our study we got 177 out of 294 patients with cardiovascular disorders aged 60 or more than 60 years of age. 63 patients were of age 50 to 59 years and 33 patients were of age group 40 to 49 years. After this study we came across a result that mostly the patients with advancing age are more prone to the cardiac diseases like CAD, MI, Ischemia, AV Block, etc. Most of the cases of LBBB are also associated with the age so we can conclude that the age is directly proportional to the disease association. The patients with advanced aged CVS issues are the most likely to have Left Bundle branch Block.

2.5. Relationship of LBBB with age and coronary vascular diseases:

Patients identified and studied were 294 and followed for 5 years, the study revealed that 14 percent of patients had age less than 29, 21.4 % of patients having LBBB were around age 30 to 40 years, 26.9% people of CVD had LBBB aged 50-60 years and people above 60 years having CVD had 32.2% LBBB showing that with increase in age of patient having CVD there is more risk of developing LBBB significantly. The data have been presented in graphical form in graph no.1. and table no. 2.

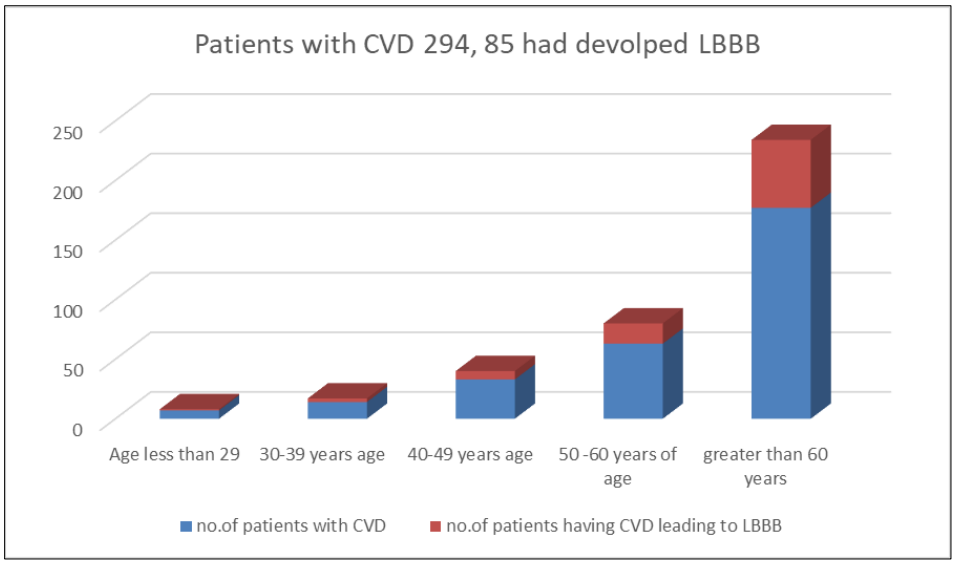

Figure 1 Relationship of LBBB with age, coronary vascular disease

Table 2 Different age groups and different percentages of LBBB

AGE RELATIONSHIP WITH CARDIOVASCULAR DISEASES			
AGE GROUP OF THE PATIENTS	**NO. OF PATIENTS WITH CVD**	**NUMBER OF CVD PATIENTS WITH LBBB IN THIS AGE GROUP**	**PERCENTAGE OF CVD PATIENTS WITH LBBB IN THIS AGE GROUP**
< 29 years	7 patients	1 patient	14%
30 to 39 years	14 patients	3 patients	21.42 %
40 to 49 years	33 patients	7 patients	21.21 %
50 to 59years	63 patients	17 patients	26.98 %
> 60 years	177 patients	57 patients	32.20 %
TOTAL	**294 patients**	**85 Patients**	**28.91 %**

Considering the use of our data gathered over the last five years and our study conducted in light of the data, we are able to test the preliminary hypothesis that reads, "The risk of developing LBBB and other cardiomyopathies increases with the increase in the age of the patient." We used the Chi Square test on our data in the manner described below in order to evaluate our preliminary hypothesis and statically test the relationship between two variables (Age and LBBB). The LBBB being carrying poor prognosis, the patients were followed for 5 years, revealed that 40 out of 284 (14%) lived for 6 months, 72 out of 284 (25.3%) lived for 1 year approximately, 44 out of 284 (15.5%) lived for more than 2 years,

approximately 78 out of 284 lost to follow up or died from another cause shown in the graph, which explains that approximately half of patient dies in the first 6 months of diagnosis, so this has to be taken serious and treated adequately discussed in graph no. 2.

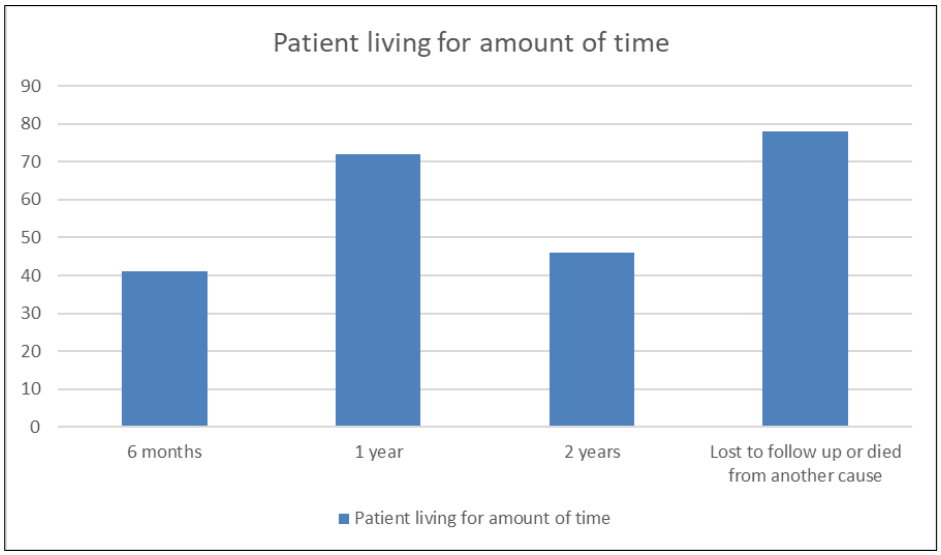

Figure 2 Survival analysis of LBBB determining the prognosis

In the pursuit of evaluating our preliminary hypothesis and establishing a statistical relationship between two crucial variables, namely patient age and Left Bundle Branch Block (LBBB), we employed the Chi Square test methodology. Our meticulous analysis revealed a significant probability value of 0.217, signifying a noteworthy correlation between age and LBBB. Furthermore, the obtained likelihood ratio of 0.028, which falls below the probability value, reinforces our findings.

The discerned results lead us to assert that there exists a substantive association between patient age and the incidence of cardiovascular disease (CVD) coupled with LBBB. Specifically, our data suggests that as patient age advances, the risk of encountering both CVD and LBBB proportionately escalates. This underscores the pivotal role age plays as a determinant factor in the manifestation of Left Bundle Branch Block. These findings contribute valuable insights to the broader understanding of the interplay between age and cardiac health, shedding light on the intricate dynamics of cardiovascular conditions.

3. Discussion

When cardiac disease fails to manifest, LBBB is uncommon in young patients (less than 30 years of age). We have seen it in our 294 patient study over the past 5 years. Regarding the pathophysiology and prognostic relevance of LBBB in young individuals without cardiac disease, nothing is known. There are several potential causes of idiopathic LBBB in young people, including myocarditis , hidden coronary artery disease, familial progressive cardiac conduction disorder (Lenegre Disease) and intrinsic dilated cardiomyopathy (9).

From the standpoint of cardiac resynchronization treatment (CRT) for patients with severe systolic dysfunction, the significance of LBBB identification has been highlighted (11). Patients with full LBBBappear to benefit more with CRT in terms of morbidity/mortality than patients with non-specific intraventricular conduction delay or right bundle branch block, according to pre-specified subgroup analyses of data gathered in major CRT studies (12). Current class I recommendations are limited to individuals with full LBBB based on this research. It was widely believed—but this is a widespread misconception—that an ECG could not be further analyzed when LBBB was diagnosed . Once LBBB has been confirmed, a few further important observations can be addressed. The reader must comprehend that the aberrant ventricular depolarization in LBBB causes a subsequent modification in the recovery process, which manifests as repolarization abnormalities on the ECG, in order to interpret these findings.as we have gone through our survey, Over the previous five years, a total of 297 patients (159 males and 138 women) Any cardiac conditions at Rehman Hospital, such as CAD, CHF, AV BLOCK, HTN, etc., were investigated, and data was gathered. The data were carefully examined and interpreted using the statistical package for social sciences, or SPSS. These individuals underwent confirmatory testing for LBBB, such as ECG, EKG, and angiography, and the results were interpreted to identify the existence of LBBB.

We observed that in the previous five years, 85 patients out of 297 cardiac patients with various comorbidities had an LBBB diagnosis (Left Branch Bundle Block). Forty Of the eighty-five patients with LBBB were male, and forty were female.This indicates that 40 out of the 59% of males with cardiomyopathies overall were also LBBB patients, or 25% of the total. After that, we discovered that 33% of women with any kind of cardiac comorbidity also had LBBB. Next, we looked at the connection between morbidity and cardiovascular Unfortunately, we discovered that 62 individuals with cardiovascular problems passed away throughout the course of these five years, including 16 female patients and 46 male patients. Accordingly, the mortality rate for individuals with cardiovascular disorders is 12% for women and29% for men. According to our 5-year survey, the total fatality rate for cardiovascular patients is 21%. Of the 118 patients who were still living, 91 were leading happy lives, while the remaining 26 were not in excellent health. Thus we can say that theage and cardiomyopathies like CAD CVD are the mainstay of the LBBB and the prognosis of betterment of LBBB in previous CVD patients is poor. There is no special therapy for LBBB per se. The illness is typically lifelong and necessitates treating underlying medical conditions. The ACC and AHA suggest cardiac resynchronization treatment for LBBB with QRS length longer than 150 ms and NYHA class II-IV heart failure, with the exception being HFrEF with sinus rhythm. CRT has been demonstrated to reduce mortality in this population by up to 37% when combined with appropriate medical care. Although it is a less strong suggestion, cardiac resynchronization should be taken into consideration in individuals who do not have sinus rhythm (EG atrial fibrillation) or a QRS length of 120 to 149. It should be mentioned that CRT uses a bi-ventricular pacemaker to pace the left and right ventricles concurrently rather than removing the LBBB (13). Through this mechanism, the conduction system of the ventricle is completely bypassed. In generally people in good health, there is no particular or extra danger associated with LBBB. For LBBB, the mortality hazard ratio (HR) is just 1.3 of the average. Nonetheless, the LBBB mortality HR is more than ten times normal in individuals with recent start. Patients with LBBB who come with chest discomfort and have new-onset LBBB—which is comparable to ST-segment elevation—are among the specific at-risk groups of patients with LBBB. Left bundle branch block is linked to worse cardiovascular outcomes and higher death rates in heart failure patients (14). But a recent study that looked for LBBB's only impact on outcomes discovered that LBBB contributes far less to bad outcomes when co-founder contributions are taken away. This is probably due to the fact that LBBB is more of a sign of dilated cardiomyopathy than a factor that causes the illness to worsen (15).

In the US and the UK, patients with LBBB are not permitted to operate airplanes as pilots. This is because the full atrioventricular block may have its precursor in LBBB. Patients presenting with syncope or presyncope in the context of LBBB should undergo testing with an ECG and Holter monitor, since epidemiology studies corroborate this connection. It's conceivable that the left bundle branch block cannot be avoided (16). However, by maintaining your health and making wise decisions, you can reduce your chance of LBBB and other heart issues. Among the mare: Consume a diet low in fat. Engage in regular exercise. If your blood pressure is elevated, lower it (17). Sustain a healthy weight. Control your cholesterol. Consult your healthcare practitioner about giving up tobacco usage and smoking (18).

4. Results

In the current investigation, we examined 294 cases where LBBB was unexpectedly found during regular ECG. These cases were gathered over five years by our cardiology facilities in a Rehman institute of cardiology. A multitude of instrumental tests, such as ECG, ECG and coronary angiography, were performed on several of them to identify potential explanations of the conduction abnormalities. The prognosis appears to be affected adversely by conduction anomalies (10). In both the general population and heart disease patients, the right bundle branch block is linked to higher risk of fatality in the general population as well as in ischemic etiology- related cardiomyopathies, LBBB is yet another known risk factor for the advancement of HF. Isolated LBBB has been linked over time to an increase in cardiac death and the advancement of heart failure.

Patients identified and studied were 294 and followed for 5 years, the study revealed that 14 percent of patients had age less than 29, 21.4 % of patients having LBBB were around age 30 to 40 years, 26.9% people of CVD had LBBB aged 50-60 years and people above 60 years having CVD had 32.2% LBBB showing that with increase in age of patient having CVD there is more risk of developing LBBB significantly. The LBBB being carrying poor prognosis, the patients were followed for 5 years, revealed that 40 out of 284 (14%) lived for 6 months, 72 out of 284 (25.3%) lived for 1 year approximately, 44 out of 284 (15.5%) lived for more than 2 years, approximately 78 out of 284 lost to follow up or died from another cause shown in the graph, which explains that approximately half of patient dies in the first 6 months of diagnosis, so this has to be taken serious and treated adequately.

5. Conclusion

The care of patients who do not satisfy particular targeted areas for improvement may be severely jeopardized by the present quantitative approach to patient care in emergency departments. Emergency department professionals must be adept at identifying the clinical indicators of cardiovascular disease (CVD), but they also need to comprehend the significance of other related cardiac diseases, such as AV Block and LBBB. The people should be going for routine check-ups (ECG EKG) for early identification of any cardiac anomaly. The hospital staff should be trained enough to identify any associated cardiac issues of the old patients with CVD and this will prove to be lifesaving. Appropriate seminars are to be arranged to disseminate information regarding this matter, and each institution ought to keep an accurate record of its cardiology patients' presentations, circumstances that influence them, and the course of their care. Records ought to be gathered across the country, and local governments in addition to medical professionals and hospitals ought to take action to improve the circumstances. Furthermore, it is imperative that elderly people have routine ECG checks and that any abnormality be taken carefully in order to prevent co-morbidity and lower the death rate from cardiovascular illnesses.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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