Original Article

SYMPTOMATOLOGY AND STRUCTURAL HEART ABNORMALITIES IN PATIENTS WITH LEFT BUNDLE BRANCH BLOCK

Imran Waheed[a*], Ahmad Masood Akbar[a], Syed Moazzam Ali Naqvi[a], Hafiz Abdul Mannan Shahid[a], Bilal Zakariah Khan[a]

ABSTRACT:

BACKGROUND AND OBJECTIVE: Left bundle branch block (LBBB) is a common Electrocardiographic (ECG) finding which may or may not be associated with overt heart disease at the time of diagnosis. This study was conducted to determine the pattern of clinical presentation and structural abnormalities in heart as diagnosed on Transthoracic Echocardiography in patients with left bundle branch block.

METHODS: This cross sectional observational study was conducted at Punjab Institute of Cardiology, Lahore over a period of six months in 2013-14. Adult patients of either sex with LBBB, symptomatic or asymptomatic were enrolled from outpatient department of the hospital and were subjected to Transthoracic Echocardiographic examination (TTE) on elective basis after obtaining demographic / clinical data and informed consent. Findings of TTE were recorded and presented as frequencies and percentages.

RESULTS: One hundred patients were studied; 67 males. Mean age of the study population was 51.2±1.3 years. History revealed breathlessness in 16(16%) cases, atypical non-specific chest pain 15(15%) and dizziness / pre-syncope in 22(22%) of the patients. Nine (9%) patients had normal echocardiograms. Structural abnormalities noted were abnormal septal motion in 91(91%), mitral incompetence in 13(13%), dilated left ventricle in 20(20%) and low LV Ejection Fraction in 23(23%).

CONCLUSION: There is a high likelihood of structural heart abnormalities on echocardiography in patients with LBBB.

KEYWORDS: Left Bundle Branch Block (LBBB), Transthoracic Echocardiography, Structural heart disease.

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INTRODUCTION:

The presence of left bundle branch block (LBBB) has important prognostic implications even when it is found in asymptomatic individuals.[1] Anatomically left branch of the bundle of His divides into an anterior and a posterior fascicle. There is no widening of the QRS complex if either of these fascicles is damaged (hemiblock). The duration of QRS complex is > 0.12 seconds in LBBB. Since the initial depolarization of the left septum is dependent on left branch of bundle of His, so in cases of LBBB the normal septal depolarization is deranged resulting in varying and diverse patterns of LBBB. There is a delay of normally dominant left ventricular vectors resulting in a deranged QRS morphology. There is loss of septal Q wave in standard leads 1, V5, and V6 with secondary T wave abnormalities. Complete LBBB, though rarely observed in healthy individuals; it is usually a complication of some other cardiac disease. In Framingham study,[2] 5209 individuals with LBBB were analysed and an 18- year follow up revealed development of clinical coronary heart disease in (48%) patients.

A study conducted at Royal Canadian Air force revealed that the five year incidence of sudden cardiac death in those who developed LBBB was ten times greater than in those subjects without the occurrence of LBBB. [3] The objective of this study was to determine frequency of various symptoms and structural heart abnormalities by Transthoracic Echocardiography in Pakistani population.

MATERIAL AND METHODS:

This cross sectional study was conducted at Punjab Institute of Cardiology Lahore over a period of six months in 2013-14. Adult patients of either sex with LBBB, symptomatic or asymptomatic were enrolled from outpatient department of the hospital. Diagnosed cases of Ischaemic Heart Disease (IHD), valvular heart disease and Heart Failure were excluded from the study. LBBB was diagnosed in the presence of classic ECG findings of QRS duration > 120 ms and notched or slurred R wave in any of the left sided leads i.e., I, aVL, V 5, V6.

[a] Punjab Institute of Cardiology, Lahore-Pakistan
* Corresponding author:
Email: cardiovascularpic@gmail.com

All selected patients were subjected to Transthoracic Echocardiographic (TTE) examination on elective basis. After informed consent demographic and clinical data was obtained with particular attention to symptoms of breathlessness, chest pain, dizziness or syncope and precordial examination. TTE was scheduled at the earliest possible date and all standard modes of echocardiography (2-D, M- mode, colour Doppler, continuous wave Doppler, pulsed wave Doppler) were used to detect structural abnormalities commonly associated with LBBB like abnormal septal motion (ASM) and cardiomyopathy. Abnormal septal motion was defined as early abrupt posteriorly directed motion of interventricular septum (IVS) during pre ejection period and later followed by abnormal anterioriorly directed motion during the ejection phase.[1] Left ventricular ejection fraction (LVEF) was estimated by Simpson's biplane method. All TTE studies were performed by a single operator. Findings of TTE were recorded and presented as frequencies and percentages. The collected was analysed using SPSS-16 for Windows.

RESULTS:

One hundred patients were studied; 67 males and 33 females. Mean age of the study population was 51.2±1.3 years, range (21-87) years. History of the patients revealed that mild breathlessness (NYHA class I-II) was present in 9(9%) patients and severe breathlessness (NYHA class III-IV) in 7(7%) cases. History of atypical non-specific chest pain was found in 15(15%) patients and 22(22%) patients reported dizziness and pre-syncope at some time. Only 9(9%) patients had normal echocardiograms. Structural abnormalities noted were abnormal septal motion in 91(91%), mitral incompetence in 13(13%), dilated left ventricle with Left ventricular End-diastolic dimension > 60 mm in 20(20%). LVEF was normal (>50%) in 77 (77%) of the cases; 14 (14%) had LVEF 25- 35% and 9(9%) had LVEF 35-50%.

DISCUSSION:

Abnormality of the interventricular septal motion in patients with LBBB was first described echocardiographically by McDonald more than four decades ago.[4] By meticulous observation of M- mode echocardiograms, three types of septal motion have been described in patients with LBBB: Type A- early, abrupt posterior motion of IVS during pre-ejection period followed by anterior motion, B- early, abrupt posterior motion of IVS during pre-ejection period followed by posterior motion, C- akinesis or dyskinesis of IVS during whole of systole.[5]

This single centre observational data showed that most of the patients (91%) with LBBB had abnormal echo study and most frequent abnormality observed was abnormal septal motion. This observation is consistent with many previous studies. Abbasi et al[6] reported that 14 out of 17 cases (82%) with LBBB had ASM and none of the patients had abnormality of posterior wall motion. Grines et al found that 89% (16/18) of patients had abnormal septal motion.[7]

Martin[8] reported the significance of bundle branch block in an Afro Caribbean population and compared echocardiographic findings in patients with right bundle branch block (RBBB) and LBBB. Echocardiogram was abnormal in 89% of the patients with LBBB as compared to 33% of those with RBBB.

We observed that 23% of our patients had some degree of LV dysfunction (LVEF<50%). Lee et al9 found that in a cohort of patients with isolated LBBB LVEF diminished by -7.3 +/- 12% per year over a mean follow up of 52 +/- 45 months. We did not interrogate about duration of LBBB in our study as most of our patients had no previous ECGs available, it is very likely that our patients with LV dysfunction had LBBB for quite a long period of time and dyssychronic LV contraction eventually resulted in measurable LV dysfunction. Another important observation was history of dizziness / pre syncope in 22% of the patients. It has been shown in a study on middle aged Swedish men that LBBB is strongly associated with future risk of high-degree atrioventricular block: hazard ratio = 12.89 (99% confidence interval 4.13-40.24).10 It is possible that dizziness and pre-syncope in our patients was due to transient intermittent high-degree atrioventricular block. One fifth of our patients had LV dilatation and it is reported that LBBB may be an early stage of dilated cardiomyopathy in some patients meaning thereby that our dilated LV group had already passed that early stage. We observed mitral regurgitation (MR) in 13% of our study group. Association of LBBB with MR in patients with normally contracting hearts12 and poorly contracting hearts has been reported.13 It has been proposed that LBBB may alter function of papillary muscle with deranged time sequence of activation of the mitral valve apparatus, and hence impaired coaptation of mitral leaflets.7,14 Cardiac resychronization therapy (CRT) is known to reduce severity of functional MR in patients with poor LV systolic function by partly abolishing LV

dyssynchrony related with LBBB. [15,16]

In conclusion LBBB is associated with structural heart abnormalities in most of the patients with LBBB and is an indication for taking measures to prevent possible future events.

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