

A DESCRIPTIVE STUDY TO CORRELATE LEFT VENTRICULAR FUNCTIONS AND AETIOLOGY IN LEFT BUNDLE BRANCH BLOCK PATIENTS

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ABSTRACT

BACKGROUND

Left bundle branch block (LBBB) is a common ECG finding. Common causes of LBBB are coronary artery disease (CAD), dilated cardiomyopathy (DCM) and hypertension. The objective of this study was to correlate left ventricular function and aetiology in LBBB patients coming to our rural hospital.

MATERIALS AND METHODS

This is a descriptive study. All patients with complete LBBB who attended Rajarajeshwari Medical College and Hospital (Cardiology Unit) from January 5, 2015 to January 20, 2017 were included. The detail history was taken and examination was done. Echocardiography was done in all patients.

RESULTS

188 patients with LBBB were studied. Mean age was 63 yrs. 99 were male (52.65%) and 89 were female (47.34%). 76 patients presented with dyspnoea (40.40%) and 60 with chest pain (31.91%); 36 patients were asymptomatic (19.14%); 94 were hypertensive (50%) and 18 were diabetic (9.5%). Left ventricular hypertrophy (LVH) was present in 64 patients (34%) with 47 having diastolic and 12 systolic dysfunction; 47 patients had DCM (25%) and 16 patients had evidence of myocardial infarction (8.5%); 28 patients had normal echocardiography (14.89%); 81 patients had systolic dysfunction (43%).

CONCLUSION

Hypertension was a major risk factor for LBBB. Commonest presentation in patients with LBBB was dyspnoea followed by chest pain. LVH was the commonest echocardiographic finding followed by global hyperkinesias and regional wall motion abnormality. More than 50% patients had left ventricular systolic dysfunction.

KEYWORDS

LBBB, Risk Factors, Echocardiography.

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BACKGROUND

LBBB usually appears in patients with underlying heart diseases, the most frequent cause is CAD.^[1] The presence of LBBB correlates with more extensive disease, more severe left ventricular dysfunction and reduced survival rate.^[2] The abnormal activation patterns of LBBB was induced haemodynamic perturbations including abnormal systolic function with dysfunctional contraction pattern, reduction of ejection fraction and stroke volume and abnormal diastolic function.^[3,4]

Incidence in patients referred to ECG department was found to be 1%.⁽⁵⁾ We studied the left ventricular (LV) functions in patients with ECG evidence of LBBB.

Objective

To correlate left ventricular function and aetiology in LBBB patients coming to our rural hospital.

MATERIALS AND METHODS

This is a descriptive study; 188 consecutive patients with ECG evidence of complete LBBB coming to our hospital with various complaints were studied. Detailed history was taken. Thorough physical examination was carried out. All were subjected to detailed echocardiography. Special attention was given for wall motion abnormality. Depending upon the presentation, some were admitted and some were followed on OPD basis. The treatment as per diagnosis was started. Coronary angiography (CAG) was done in patients when there was doubt about the aetiology, especially to differentiate dilated cardiomyopathy (DCM) from ischaemic LV dysfunction. CAG was also done in patients undergoing

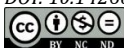
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primary PTCA or patients having angina. Acute MI was diagnosed when patient came with chest pain suggestive of myocardial infarction (MI), new LBBB, rise in troponin levels and presence of new regional wall motion abnormality (RWMA). Sgarborra et al^[6] developed criteria for diagnosis of Myocardial Infarction (MI) in patients with LBBB-

1. ST segment elevation of at least 1 mm concordant with the QRS complex.
2. ST segment elevation of at least 5 mm discordant with the QRS complex.
3. ST segment depression in leads V1 - V3.

In cases of doubt, CAG was done. Coronary artery disease was diagnosed by presence of acute MI, old records of MI or old CAG report, record of PTCA or bypass grafting. Duration of QRS was measured in each patient.

Inclusion Criteria

All consecutive patients coming to our OPD/ IPD in our hospital with ECG changes of complete LBBB.

Exclusion Criteria

Patients are not willing for consent and study.

RESULTS

Overall, 188 patients were studied. Table 1 shows the clinical characteristics of the patients. Mean age was 63 yrs. 99 were male and 89 were female. Commonest presentation was dyspnoea in 76 patients; 60 patients presented with chest pain and 6 patients presented with syncope; 36 patients had LBBB without symptoms; 28 of these had referral for ECG changes after pre-anaesthetic checkup before surgery or other interventions.

Table 2 shows the diagnosis after echocardiography and other investigations. Commonest abnormality in echocardiography was left ventricular hypertrophy (LVH) seen in 64 patients, 47 of whom had diastolic dysfunction and 12 had systolic dysfunction; 44 patients had coronary artery disease (CAD) with LV systolic dysfunction; 28 of these had old myocardial infarction (MI) and 16 had acute MI. Two patients had rheumatic heart disease with severe mitral regurgitation (MR) with severe aortic regurgitation (AR) with severe LV dysfunction; two had calcific aortic valve with severe AR with mild LV dysfunction and two had hypertrophic cardiomyopathy. Six patients presenting with syncope were found to have intermittent complete heart block. Left ventricular systolic dysfunction was present in 81 patients (43%), mild in 11 patients (13.5%), moderate in 18 patients (22.2%) and severe in 49 patients (64.1%). Twenty-eight patients were found to have normal cardiovascular system. Out of 36 asymptomatic patients 28 were found to have normal echocardiography, while 8 had DCM with mild LV dysfunction.

Table 3 shows the age distribution of LBBB patients. It can be seen that it is more common in older age group. Most of the patients were between 50 - 70 years of age.

Table 4 shows the age wise distribution of aetiology of LBBB. It can be seen that in less than 40 years of age, CAD and DCM are more common causes. After 40 years of age hypertensive heart disease, CAD and DCM are the common causes in almost equal proportion. Mean QRS duration was 133 ms. In patients with mild LV dysfunction QRS duration

was 128 ms, with moderate LV dysfunction it was 134 ms and in patients with severe LV dysfunction it was 138 ms. Coronary angiography was done in 21 patients due to various reasons. Ten had normal coronaries. Single vessel disease was present in 4 patients, two vessel diseases in 3 patients and three vessel diseases in 4 patients. Three patients underwent primary angioplasty and two patients underwent coronary artery bypass grafting.

| Sl. No. | Total Patients | 188 |
|---------|----------------|-------------|
| 1 | Male | 99 (52.65%) |
| 2 | Female | 89 (47.34%) |
| 3 | Mean Age | 63 yrs. |
| 4 | Hypertensive | 94 (50%) |
| 5 | Diabetic | 18 (9.5%) |

Table 1. Clinical Characteristics of the Patients

| Sl. No. | Dyspnoea | 76 (40.4%) |
|---------|--------------|-------------|
| 1 | Chest Pain | 60 (31.91%) |
| 2 | Palpitation | 10 (5.3%) |
| 3 | Syncope | 6 (3.1%) |
| 4 | Asymptomatic | 36 (19.14%) |

Symptoms

| Sl. No. | Total Patients | 188 |
|---------|-----------------------------------|------------|
| 1 | Left Ventricular Hypertrophy | 64 (34%) |
| 2 | Systolic Dysfunction | 12 (6.3%) |
| 3 | Diastolic Dysfunction | 47 (25%) |
| 4 | DCM | 47 (25%) |
| 5 | Coronary Artery Disease | 44 (23.4%) |
| 6 | Old Myocardial Infarction | 28 (14.8%) |
| 7 | Acute Myocardial Infarction | 16 (8.5%) |
| 8 | Intermittent Complete Heart Block | 05 (2.6%) |
| 9 | Misc. | 05 (2.6%) |
| 10 | Normal Cardiovascular System | 28 (14.8%) |
| 11 | Systolic Dysfunction | 81 (43%) |

Table 2. Echocardiographic Finding

| Sl. No. | Age (Yrs.) | Male | Female | Total |
|---------|------------|------|--------|-------|
| 1 | 18-40 | 2 | 5 | 7 |
| 2 | 40-49 | 8 | 10 | 18 |
| 3 | 50-59 | 15 | 23 | 38 |
| 4 | 60-69 | 36 | 30 | 66 |
| 5 | 70-79 | 28 | 14 | 42 |
| 6 | >80 | 10 | 07 | 17 |

Table 3. Age Distribution of LBBB Patients

| Sl. No. | Aetiology | 18-39 (n-7) | 40-49 (n-18) | 50-59 (n-38) | 60-69 (n-66) | 70-79 (n-42) | >80 (n-17) |
|---------|-------------------------|-------------|--------------|--------------|--------------|--------------|------------|
| 1 | Coronary Artery Disease | 03 | 02 | 10 | 12 | 11 | 01 |
| 2 | DCM | 03 | 02 | 12 | 11 | 10 | 04 |
| 3 | Heart Block | - | 01 | - | 02 | - | - |
| 4 | HT with LV Dysfunction | - | 06 | 12 | 26 | 18 | 08 |
| 5 | Misc. | - | - | - | 06 | 01 | - |
| 6 | Normal | 01 | 07 | 04 | 09 | 02 | 04 |

Table 4. Age Distribution of Aetiology of LBBB

DISCUSSION

Although LBBB usually appears in patients with underlying heart disease, 12% of patients with LBBB have no demonstrable disease.⁽⁷⁾ In our study the incidence rate of LBBB was 1%, which was similar to a study performed by Rajeev et al.⁽⁸⁾ In the current study the mean age of the patient was 63 years, which was in agreement with other studies.^(9,10) Also, we found that LBBB was more prevalent in male than female. In support of our finding, other studies documented similar finding of male predominance.

The association between LBBB and cardiovascular morbidity has been investigated, but given the controversial result regarding the prognosis of LBBB persists. Fahy et al observed a higher rate of developing overt cardiovascular disease among people with isolated LBBB.⁽¹¹⁾

In 1979, the Framingham Study⁽¹²⁾ (5,209 subjects, 55 with LBBB) showed a clear association between LBBB and main cardiovascular diseases such as hypertension, cardiac enlargement and coronary heart disease. Our study showed that around 37% patients with LBBB had hypertension, 22% had DCM and around 20% had CAD. Systolic dysfunction of LV was present in about 43% patients. Only about 15% patients had normal echocardiography. How many of these develop cardiovascular disease on followup remains to be seen. Boyle and Fenton found that 69% of patients with LBBB had CAD and/or hypertension.⁽¹³⁾ 88% of their patients were aged 50 years or more. Similar was the case with our study, where 77% patients were 50 years or older; 30% of their patients were 70 years or older. Similarly, 31% of our patients were 70 years or older.

LBBB may occur in asymptomatic individuals, patients with extensive myocardial infarction, and in those with heart failure especially in dilated, non-ischaemic cardiomyopathies. In some patients LBBB (sometimes rate dependent) may be the first manifestation of heart disease, whereas the clinical presentation of a dilated cardiomyopathy develops only some years later.⁽¹⁴⁾ Early studies reported a mean survival of less than 5 years after documentation of LBBB.⁽¹⁵⁾ The aetiology of LBBB plays a role in determining the HV interval. Nearly all patients with congestive (dilated) cardiomyopathy exhibited a prolonged HV interval, whereas in other groups both normal and abnormal values occurred.⁽¹⁶⁾

Eighty one patients (43%) in our study had LV systolic dysfunction. Out of these, 52 patients had severe LV systolic dysfunction. Patients of severe LV dysfunction had mean QRS duration of 138 ms as against 128 ms in patients with mild LV dysfunction. In patients with dilated cardiomyopathy, a progressive increase in QRS duration and the presence of LBBB pattern were related to disease progression.⁽¹⁷⁾ In 14 of 18 patients with congestive (dilated) cardiomyopathy, progression of disease was accompanied by a movement of the QRS frontal plane vector from a normal axis to left axis deviation, which mainly occurred during the first 2 years after clinical manifestation of cardiomyopathy. From the prognostic point of view, increased QRS duration in patients with heart failure has been shown by several studies to be correlated to a poor prognosis.⁽¹⁸⁾

CONCLUSION

In conclusion, prevalence of LBBB increases with age. There is a highly significant association between coronary artery disease, hypertension, DCM and LBBB, and since the patients

with ECG evidence of LBBB have increasing risk of left ventricular dysfunction and reduced survival rate.

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