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# Utility of Left Bundle Branch Block as the Diagnostic Criterion for Myocardial Infarction in a Hemodynamically Stable Patient

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**Abstract**
Patients with suspected Acute coronary syndrome in the setting of presumably new onset LBBB is a diagnostic puzzle and the decision to initiate reperfusion therapy has to be taken with utmost caution. My study is to find the incidence of Acute Myocardial Infarction in patients with potential ischemic symptoms in relation to the presence of old or new onset LBBB and to analyze whether new onset LBBB predicts increased likelihood of Acute MI by monitoring with serial Troponin T and echocardiography. Data was collected from patients attending the Department of General Medicine of Sree Mookambika Institute of Medical sciences, kanyakumari, Tamil nadu, from march 2023 to March 2024. Inclusion criteria Patients of any gender above or equal to 30 years of age at the time of hospital admission, Patients presenting with typical anginal pain and suspected Acute coronary syndrome, Ecg shows Left Bundle Branch Block. Exclusion criteria are Patients below 30 years of age, Patients in acute Heart Failure, Hemodynamically unstable patient. We concluded that new or presumed Left bundle branch need not imply that the patient has a acute myocardial infarction. We conclude the incidence of MI in new onset LBBB is not significantly different from those that of people with old LBBB. Presence of LBBB whether new or old LBBB did not predict acute myocardial Infarction. Algorithmic approach towards a suspected Acute coronary syndrome should take into consideration hemodynamic status, whether patient is in acute heart failure AND whether ECG fits into Smiths criteria and if any of them is present, decision for reperfusion should be promptly taken.

## INTRODUCTION

Patients with suspected Acute coronary syndrome in the setting of presumably new onset LBBB is a diagnostic puzzle and the decision to initiate reperfusion therapy has to be taken with utmost caution. The logic behind using ST elevation as criteria for reperfusion therapy was for its specificity in picking up the patients with total occlusion of coronary artery and identifying the most probable candidates likely to gain from reperfusion[1]. In this regard new onset LBBB was also considered as STEMI equivalent. But the difficulty in LBBB is that during repolarization there is a deviation of ST segment away from the QRS complex. As a consequence the ECG manifestation of ST segment elevation in STEMI could be masked or mimicked by the secondary ST segment deviation of LBBB. Based on this diagnostic uncertainty there was recommendation in 1996 and 2004 American college of cardiology [ACC] and American heart Association [AHA] to consider new onset LBBB as Class Ia indication for emergent reperfusion therapy. These recommendation were based on the Fibrinolytic Therapist Review on several randomized control trials during the fibrinolysis era[2-4]. But Later studies using angiography concluded there is no documented coronary occlusion angiographically in majority of the people with new onset LBBB. Now there is a paradigm shift in the management of the patient with new onset LBBB and the new 2013 STEMI guidelines by American College of cardiology and American Heart Association has removed the previous recommendations that the new onset LBBB should be treated as STEMI equivalents. My study is to find the incidence of Acute Myocardial Infarction in patients with potential ischemic symptoms in relation to the presence of old or new onset LBBB and to analyze whether new onset LBBB predicts increased likelihood of Acute MI by monitoring with serial Troponin T and echocardiography.

**Aims and Objectives of the Study:**

- To study the relevance of LBBB as diagnostic criteria for Acute myocardial Infarction.
- To study the incidence of Acute Myocardial Infarction in patients with potential ischemic symptoms in relation to the presence of old or new onset LBBB. To analyze whether new onset LBBB predicts increased likelihood of Acute MI.

## MATERIALS AND METHODS

Data was collected from patients attending the Department of General Medicine of Sree Mookambika Institute of Medical sciences, kanyakumari, Tamil nadu, from march 2023-2024. Inclusion criteria Patients of any gender above or equal to 30 years of age at the time of hospital admission, Patients presenting with typical anginal pain and suspected Acute coronary syndrome, Ecg shows Left Bundle Branch Block. Exclusion criteria are Patients below 30 years of age, Patients in acute Heart Failure, Hemodynamically unstable patient. A total of fifty(n=50) patients who were hospitalized for suspected acute coronary syndrome as well as satisfied our inclusion and exclusion criteria were selected for the study. Data collected included Demographics, History, ECG and cardiac markers-Troponin T. Electrocardiograms were classified according to standard guidelines as Left Bundle Branch Block not known to be old [new or presumably new onset] and LBBB known to be old. Smoker is defined as one who has smoked within the previous one year irrespective of duration of smoking. Acute Heart failure is defined as the occurrence of acute decompensation of heart function for the first time in patient's life. A patient is said to be Hemodynamically unstable if the systolic blood pressure is below 90 mm hg or a decrease in mean blood pressure by 30mmhg. A patient is said to be hypertensive if he/she is already on anti hypertensives, and/or if he/she has a high blood pressure documented in the past and/or if there are signs of long standing hypertension in fundus, ECG, chest X-ray and echocardiogram. JNC VIII guidelines are followed for diagnosing systemic hypertension. A patient is said to be diabetic if he/she is already on oral hypoglycemic agents or insulin therapy and/or if he/she has a high random/fasting blood sugar value or has a high HBA1c value or has an abnormal oral glucose tolerance test documented in the past and/or if he/she has elevated blood sugar values during hospital stay. The 2014 guidelines of American Diabetic Association are followed for diagnosing diabetes mellitus. Statistical analysis was done using the statistical package for social sciences (SPSS). Different statistical methods were used as appropriate. Mean±SD was determined for quantitative data and frequency for categorical variables. The independent t-test was performed on all continuous variables. The normal distribution data was checked before any t-test. The Chi-Square test was used to analyze group difference for categorical variables. In logistic regression models, age was adjusted for estimation of each or all the independent effects of hypertension, ischemic heart disease and diabetes mellitus . A p-value <0.05 was considered significant.

## RESULTS AND DISCUSSIONS

**Table 1: Troponin Correlation in Old and New Onset LBBB in Suspected Acute Coronary Syndrome**

| | | LBBB | | |
|---|---|---|---|---|
| | | NEW | OLD | Total |
| TROPT | (+) | 2 | 2 | 4 |
| | (-) | 25 | 21 | 46 |
| Total | | 27 | 23 | 50 |

Troponin Correlation In Old And New Onset LBBB In Suspected Acute Coronary Syndrome. 8.7% of the people with new LBBB were troponin positive while

7.4% of the patient with old LBBB had Troponin positivity. No Significant Difference In Incidence Of MI in Both New onset And Old LBBB in suspected Acute coronary syndrome.

**Table 2: Diabetes Mellitus Association in New Onset and Old LBBB in Suspected Acute Coronary Syndrome**

| | LBBB | | |
|---|---|---|---|
| | **New** | **OLD** | **Total** |
| Diabetic | 16 | 17 | 33 |
| Non Diabetic | 7 | 10 | 17 |
| **Total** | **23** | **27** | **50** |

Diabetes mellitus association in new onset and old LBBB in suspected acute coronary syndrome.

**Table 3: Prior MI Association in New and Old LBBB in a Suspected Acute Coronary Syndrome**

| | | LBBB | | |
|---|---|---|---|---|
| | | **New** | **Old** | **Total** |
| Prior MI | Yes | 5 | 8 | 13 |
| | No | 18 | 19 | 37 |
| Total | | 23 | 27 | 50 |

Prior MI association in New and Old LBBB in a suspected acute coronary syndrome.

**Table 4: CAHD Association in New Onset and Old LBBB in Suspected Acute Coronary Syndrome**

| | | **New LBBB** | **Old LBBB** | |
|---|---|---|---|---|
| | Yes | 13 | 17 | 30 |
| CAHD | No | 10 | 10 | 20 |
| Total | | 23 | 27 | 50 |

CAHD association in new onset and old LBBB in suspected acute coronary Syndrome.

**Table 5: Hyperlipidemia Association in New Onset and Old LBBB in Suspected Acute Coronary Syndrome**

| | LBBB | | |
|---|---|---|---|
| | **New** | **Old** | **Total** |
| Hyperlipidemia Yes | 8 | 10 | 18 |
| No | 15 | 17 | 32 |
| Total | 23 | 27 | 50 |

Hyperlipidemia doesn't have significant influence on LBBB among this study group there is no significant difference two groups on relation between hyperlipidemia and LBBB 34.78% of patients with new LBBB had prior history of hyperlipidemia whereas 37.03% of with old LBBB had prior history of hyperlipidemia.

**Table 6: Timi Score Association with New and Old LBBB in a Suspected Acute Coronary Syndrome**

| | | LBBB | | |
|---|---|---|---|---|
| | | **New** | **Old** | **Total** |
| TIMI Score | 0-1 | 7 | 7 | 14 |
| | 1-3 | 11 | 14 | 25 |
| | >-4 | 5 | 6 | 11 |
| Total | | 23 | 27 | 50 |

TIMI score association with new and old LBBB in a suspected acute coronary syndrome. TIMI score doesn't have significant influence on LBBB among this study group there is no significant difference two groups on risk of incidence of mi based of TIMI score

We concluded that new or presumed Left bundle branch need not imply that the patient has a acute myocardial infarction[5]. The previous studies which were the basis for the development of the guidelines before 2020-relied on patients enrolled in large randomized studies. It is therefore quite logical to conclude these patients enrolled in registries are different from actual patients presenting to casualty with acute chest syndrome. We conclude the incidence of MI in new onset LBBB is not significantly different from those that of people with old LBBB. But many studies predicted worse outcome in AMI with new LBBB than with old LBBB. Prior guidelines recommend reperfusion for new or presumed new LBBB. But it need not be as our study suggests the rate MI is not different in people with new or old LBBB. Primary PCI is a more reasonable approach because it will aid in both diagnosis and also in intervention if any is needed. New diagnostic methods are the need of the hour for selecting candidates for reperfusion. The need for new strategies are far more greater in centers with out primary PCI facility as the complication in fibrinolytic therapy is much greater than that of falsely activating cath lab. If the time interval between first medical contact and balloon is <120 minutes PCI is far superior to fibrinolysis given the dreaded complications of fibrinolysis. If the interval exceed 2 hours onsite fibrinolysis is beneficial. But this may not be applicable to patients with LBBB because many of them don't have MI and LBBB itself has inherent risk of bleeding [with preexistent heart disease, hypertension, heart failure]. For these patients PCI is the preferred strategy and fibrinolysis should be considered with utmost caution if the likelihood of MI is very high[6-8]. Testing cardiac biomarkers, specifically the cardiac troponins I and T, is promising in the diagnosis of AMI with LBBB. In recent years, the analytic sensitivity for troponin detection has improved hundred fold. Newer assays have improved sensitivity as well, which enables 2 troponin titres with a minute difference of few pictogram per milliliter to be reliably differentiated. This is significant because mere rise in cardiac troponin can be found in many chronic cardiac and nocardia conditions and thus not specific AMI, a fast rise in absolute levels of troponin strongly supports the diagnosis of an evolving AMI. A serial fast rise in troponin in a patient with LBBB, especially in the background of ongoing chest discomfort, may denote a hidden STEMI and may prompt further testing such as bedside echocardiography, primary PCI, or fibrinolytic therapy if PCI is not available. In contrast, a more slow rise and lower peak in troponin levels may signal an NSTEMI (in which case, transfer to a PCI-capable facility still would be recommended

typically), whereas a static troponin level would suggest a non-ACS cause. Although there are limited datas, it is necessary to hasten the timing of enzyme assessment, so that measurements are performed every 15 min, rather than every 60-90 min, in patients with LBBB and suspected AMI. Such an approach would shorten the delay in reperfusion in those ultimately determined to have STEMI equivalents. Assessment of serial rapid biomarker measure men, should be the focus of additional study in patients with suspected AMI and LBBB. A new diagnostic and triage algorithm has been proposed considering the new guideline recommendations for a suspected acute coronary syndrome patient in the setting of new onset LBBB. If the patient is in cardiogenic shock or in acute heart failure, Myocardial Infarction is strongly suspected and early reperfusion should be promptly started. Sgarbossa criteria has been extremely helpful in detecting myocardial Infarction because of its reduced false positive rates and high specificity[9-12]. If the sgarbossa score is 3 the patient can be confidently considered acute MI and reperfusion therapy can be started[13]. If the score is less than two, then the smiths criteria should be used an if the ST/S ratio is less than or equal to 0.25 then the patient is a candidate for reperfusion. If none of the criteria is met, Patient should be evaluated further with serial ECG monitoring, serial troponin levels and bed side echocardiography. If there is ST segment changes in serial electrocardiograms or rapid rise in troponin levels or there is any wall motion abnormalities without chronic changes in echocardiography, decision for cath lab should be promptly decided[14].

## CONCLUSION

There is no difference in the incidence of Myocardial Infarction in the patients with old LBBB and new onset LBBB. Hemodynamically stable Patients with suspected Acute Coronary Syndrome and new onset LBBB are not at increased risk of AMI. Presence of LBBB whether new or old LBBB did not predict acute myocardial Infarction. Algorithmic approach towards a suspected Acute coronary syndrome should take into consideration hemodynamic status, whether patient is in acute heart failure AND whether ECG fits into Smiths criteria and if any of them is present, decision for reperfusion should be promptly taken.

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