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Impact on outcome following to thrombolytic therapy in acute myocardial infarction and left bundle branch block

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Abstract: *Background:* Prompt diagnosis of Acute Myocardial Infarction (AMI) and Left Bundle Branch Block (LBBB) is a clinical challenge, as massive anteroseptal myocardial infarctions occur in the background of left bundle branch block. Selection of the patients for thrombolytic therapy is debatable. *Materials and Methods:* The study is conducted in Al-Ameen Medical College Hospital, Bijapur in the period from December 2011 to September 2013. 45 patients with left bundle branch block and acute myocardial Infarction are included in the study, 25 patients received thrombolytic therapy, 20 patients have not received and are observed for a period of 28 days. *Design of the study* is hospital based randomized control trial. *Results:* In 25 patients subjected for thrombolytic therapy, 1 (2.2%) died during the hospital stay and in 20 patients who did not receive thrombolytic therapy, 5 patients (11.1%) died during hospital stay. *Conclusion:* Thrombolytic therapy is proved to be beneficial and if denied are at high risk for acute complications like Arrhythmias, Cardiac arrest.
Keywords: Acute Myocardial Infarction, Left Bundle Branch Block, Thrombolytic Therapy.

Introduction

Patients with an acute myocardial infarction (AMI) who present with left bundle-branch block (LBBB) have greater in-hospital mortality (22.6%) than patients without LBBB (13.1%) yet are less likely to receive medications or interventions known to improve survival [1-4]. Physicians are especially reluctant to utilize reperfusion therapy (thrombolytic therapy or primary angioplasty) in patients with LBBB [5].

The reason given by physicians for not utilizing reperfusion in LBBB patients with MI was "non-diagnostic electrocardiogram (ECG)" in over half of the patients denied treatment. A recent study confirmed that the ECG is indeed unable to distinguish effectively AMI from other diagnoses among symptomatic patients with LBBB [6]. This inability to diagnose AMI reliably in LBBB patients with the ECG results in delays in the recognition of the infarction and inhibits the delivery of optimal care. Furthermore, the insensitivity of the ECG criteria that have been proposed for patients with LBBB may give clinicians a false sense of security toward the LBBB patient with AMI whose ECG does not fit the criteria [7-8].

In a sub study of 681 patients from the Global Utilization of Streptokinase and TPA for Occluded Arteries (GUSTO)-1 and Thrombolysis and Angioplasty in Myocardial Infarction (TAMI)-9 trials, LBBB was encountered in 8% of the patients and thrombolytic therapy was credited with reducing the mortality associated with persistent bundle branch block (both RBBB and LBBB), but persistent block still conferred a higher mortality [9]. In a much larger review of data from the National Registry of Myocardial Infarction, 6.7% of 297,832 patients had LBBB, and was associated with higher rates of co-morbidity and had a worse prognosis in comparison to those without conduction delay.

In comparison to patients with ST-segment elevation without bundle branch block, RBBB was a stronger predictor of in-hospital mortality and LBBB was less predictive [10]. In an evaluation of the previously mentioned criteria in a community-based cohort of 83 patients with 103 presentations of suspected AMI, the criteria proposed by Sgarbossa et al [11] performed poorly because of a low sensitivity of 10%, although the specificity

was high at 82%. The investigators concluded that a sensitivity of 80% and a specificity of 90% would be required for electrocardiographic criteria in the presence of LBBB to be useful in the selection of patients to receive thrombolytic therapy [12]. Patients with chest pain and LBBB therefore pose a diagnostic and therapeutic dilemma to which the decision of whether or not to administer thrombolytic therapy is central. Authors have described the guidelines in early distinguishing Acute Myocardial Infarction and Left bundle branch block, and the benefits of thrombolytic therapy. There yet remains paucity in its literature. The study opens the corridors of thoughts amongst the emergency clinicians for early diagnosis and lifesaving thrombolytic therapy.

Objectives of the study:

1. Prompt recognition and diagnosis of acute myocardial infarction and Left bundle branch block.
2. To study the impact on outcome following thrombolytic therapy in Acute myocardial infarction and Left bundle branch block.

Material and Methods

The study was conducted in Al-Ameen Medical College Hospital, Bijapur between December 2011-September 2013. 45 patients with left bundle branch block and acute myocardial infarction were included in the study out of which 25 were thrombolysed and 20 were not thrombolysed. Patients were selected randomly irrespective of age and sex. All cases will be observed for a period of 28 days after acute event.

Period of Study: December 2011 - September 2013.

Design of Study: Hospital based Randomized control trial.

Inclusion Criteria: Prompt recognition and diagnosis of Acute MI in LBBB was based on

1. Clinical criteria: Patients with acute chest pain radiating or non-radiating/epigastric pain or without chest pain (silent myocardial infarction), breathlessness and associated nausea, vomiting, diaphoresis.
2. ECG criteria: Left bundle branch block is defined as presence of a QRS duration of > 120 mS, A QS or rS complex in lead V1 and an R wave peak time of at least 60 mS in the absence of q waves in leads I, V5 or V6.

   Sgarbossa's criteria for recognition of AMI in LBBB

   Three criteria are included in Sgarbossa's criteria:
   - ST elevation ≥1 mm in a lead with upward (concordant) QRS complex - 5 points
   - ST depression ≥1 mm in lead V1, V2, or V3 - 3 points
   - ST elevation ≥5 mm in a lead with downward (discordant) QRS complex - 2 points

   ≥3 points = 90% specificity of STEMI (sensitivity of 36%).

3. 2D Echocardiography for RWMA
4. Cardiac enzymes:
   a) Troponin I
   b) CPK-MB

Exclusion Criteria:

1. Rate dependent Left bundle branch block (LBBB)
2. Right ventricle (RV) paced rhythm
3. Aortic stenosis
4. Dilated and hypertrophic Cardiomyopathies
5. Chronic renal failure

Statistical Analysis: The information collected regarding all the selected cases will be recorded in a Master Chart. Data analysis will be done with the help of computer using Epidemiological Information Package (EPI 2002). Using this software, frequencies, percentage, mean, standard deviation, x2 and 'p' values will be calculated.

Results

The study was conducted in Al-Ameen Medical College Hospital, Bijapur. 45 patients with LBBB and AMI were included in the study. Detailed history was taken and clinical examination was done as per proforma.

Association of Age with LBBB and AMI: In the present study, 29 (thrombolysed 15, non thrombolysed 14) patients (64.4%) were above the age of 60 while 16 (thrombolysed 10, non thrombolysed 6) patients (35.6%) were below the age or equal to 60 years of age.

Male – Female Distribution: In the present study, there were 31(thrombolysed 16, non thrombolysed 15) males (68.9%) and 14 (thrombolysed 9, non thrombolysed 5) females (31.1%).

Association of Prior Cad and LBBB with AMI: 15 (thrombolysed 8, non thrombolysed 7) patients (33%) had prior CAD while 30 (thrombolysed 17, non thrombolysed 13)(67%) had no prior CAD. [p value-1.0]

Association of Diabetes Mellitus and LBBB with AMI: In present study 22 (thrombolysed 12, non thrombolysed 10) patients (48.9%) had diabetes mellituswhile 23 (thrombolysed 13, non thrombolysed 10) patients (51.1%) had no diabetes mellitus.[p value-0.05]

Association of Hypertension and LBBB with AMI: Out of 45 patients, 33 (thrombolysed 18, non thrombolysed 15) patients (73.3%) had hypertension associated with LBBB and AMI while 12 (thrombolysed 7, non thrombolysed 5) patients (26.7%) had no hypertension. [p value 0.05].

Association of Smokingand LBBB with AMI: 16 (thrombolysed 8, non thrombolysed 8) patients (35.6%) with LBBB and AMI had history of smoking while 29 (thrombolysed 17, non thrombolysed 12) patients (64.4%) had no smoking history [p value- 0.12].

Association of Hyperlipidemia and LBBB with AMI: 15 patients (thrombolysed 9, non thrombolysed 6) (33.3%) with LBBB and AMI had hyperlipidemia while 30 (thrombolysed 16, non thrombolysed 14) patients (66.7%) had no hyperlipidemia. [p value-0.15]

Association of Liquorand LBBB with AMI: 6 (thrombolysed 4, non thrombolysed 2) patients (13.3%) with LBBB and AMI had history of alcoholism while 39 (thrombolysed 21, non thrombolysed 18) patients (86.7%) had no history of alcoholism. [p value-0.24]

Association of Symptoms with LBBB and AMI: Chest pain was the most common symptom with 25 patients (55.6%) presenting to the hospital with LBBB and AMI followed by breathlessness 17 patients (37.8%), sweating 7 patients (15.6%) and palpitation 4 patients (8.8%) [Table-1].

Association of Heart Rate and LBBB with AMI: Tachycardia i.e. heart rate more than 100 was seen in 20 (thrombolysed 10, non thrombolysed 10) patients with LBBB and AMI while 25 (thrombolysed 15, non thrombolysed 10) patients had heart rate less than 100.

Association of Systolic BP and LBBB with AMI: 28 (thrombolysed 19, non thrombolysed 9) patients (62.2%) had Systolic BP above or equal to 100 while 17 (thrombolysed 6, non thrombolysed 11) patients (37.8%) had systolic BP below 100.

Association of Killip's Class and LBBB with AMI: 22 patients (49%) of LBBB and AMI presented with Killip's class 3 heart failure while 9 patients (20%) presented with class 1, 10 patients (22.2%) with class 2 and 4 patients (8.8%) with class 4. [p value-0.05] [Table-2].

Table-1: Association of symptoms with LBBB and AMI

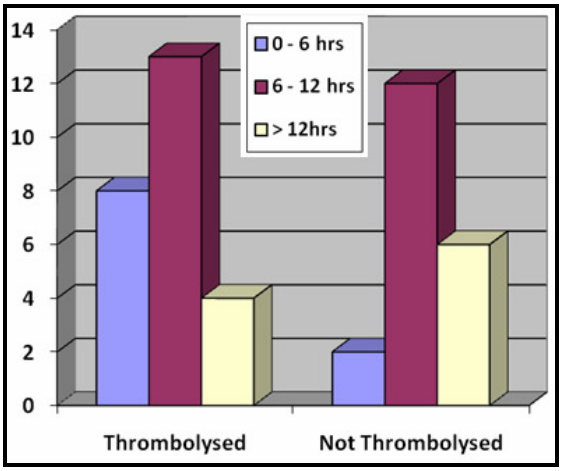
Symptoms	Thrombolysed	Not Thrombolysed	Total Present
Chest pain	15	10	25 (55.6%)
Sweating	5	2	7 (15.6%)
Breathlessness	8	9	17 (37.8%)
Palpitation	2	2	4 (8.8%)

Table-2: Association of Killip's class with LBBB and AMI				
Killip's Class	**Thrombolysed**	**Not Thrombolysed**	**Total**	**Fisher's exact test**
1: No congestive heart failure	5	4	9 (20%)	P = 0.05
2: Rales, Jugular venous distention	6	4	10 (22.2%)	
3: Pulmonary edema	13	9	22 (49%)	
4: Cardiogenic shock	1	3	4 (8.8%)	

Association of LVEF with LBBB and AMI: In this study 35 (thrombolysed 20, non thrombolysed 15) patients (77.7%) had LVEF less than or equal to 40 while 10 (thrombolysed 5, non thrombolysed 5) patients (22.2%) had LVEF above 40. [p value-0.05]

Association of Time of Presentation and LBBB with AMI: Out of 25 patients who were thrombolysed 8 patients presented to hospital < 6hrs (17.8%) while 13 patients presented at 6-12 hrs (28.9%) and 4 patients > 12 hrs (8.8%). Out of 20 patients who were not thrombolysed 2 presented to hospital < 6 hrs (4.4%) while 12 patients presented between 6-12 hrs (26.6%) and 6 patients > 12 hrs (13.3%) to hospital [Graph-1].

Graph-1: Association of Time of presentation with LBBB and AMI



Association of Reinfarctionand LBBB with AMI: 1 patient (2.2%) who was thrombolysed out of 25 developed reinfarction while 4 patients (8.8%) who were not thrombolysed out of 20 developed reinfarction [p value-0.01].

Association of CHF and LBBB with AMI: 5 patients (11.1%) who were thrombolysed developed CHF while 8 patients (17.9%) who were not thrombolysed developed CHF. [p value-0.05]

Association of Ventricular Fibrillation and LBBB with AMI: 5 patients who were not thrombolysed developed Ventricular Fibrillation while no patient who were thrombolysed developed ventricular fibrillation [p value-0.01].

Association of in Hospital Mortality: Out of 25 patients who were thrombolysed 1 (2.2%) died during the hospital stay while out of 20 patients who were not thrombolysed 5 patients (11.1%) died during hospital stay [p value-0.05].

Discussion

45 patients of Acute Myocardial Infraction with Left Bundle Branch Block were included in the study from the period of December 2011 to September 2013 at Al Ameen Medical College Hospital Bijapur.

Table-3: Association of age with LBBB and AMI with other studies			
Studies	**Year**	**No of cases**	**Age**
Sgarbossa et al [11]	1996	131	Median age 68.5 (62, 76)
Kontos et al [13]	2001	256	Mean age 66±15
Toporan Daniela [14]	2001	42	Mean age 70
Archbold RA et al [15]	2010	55	Mean age 69.3 ±10.5
Present Study	2013	45	Mean Age 60.8 ± 8.9

Table-4: Sex distribution among different studies				
Studies	**Year**	**No of cases**	**Male**	**Female**
Sgarbossaet al [11]	1996	131	84 %	16%
Kontos et al [13]	2001	256	44%	56%
Toporan Daniela [14]	2001	42	62.9%	37.1%
Archbold et al [15]	2010	55	74.5%	25.5%
Present Study	2013	45	68.9%	31.1%

In the present study, the mean age was 60.84 which shows that increased age is associated with LBBB and AMI which was comparable to other studies which was comparable to other studies. There was a male predominance in the present study that was comparable to other studies.

Association of diabetes mellitus with LBBB and AMI: In the present study 23 patients (48.9%) had diabetes mellitus associated with LBBB and AMI which suggests that diabetes mellitus is a risk factor for AMI with LBBB. Similar co relation was found in a study by Toporan Daniela [14] in which 36.4% of patients had diabetes mellitus associated with LBBB and AMI. Similar findings were substantiated in Kontos et al [13] (41%) and Archbold R.A. et al [15] (34.5%).

Association of Hypertension with LBBB and AMI: Our study showed 36 patients (73.3%) had hypertension associated with LBBB and AMI. Similar co relation was found in a study by Toporan Daniela [14] in which 52.5% of patients had hypertension associated with LBBB and AMI. Kontos et al [13] showed 75% of patients with associated hypertension and Archbold R A et al [15] showed 40% with LBBB and AMI [Table-5].

Table-5: Association of HTN & DM with LBBB and AMI among different studies				
Studies	**Year**	**No of cases**	**Diabetes**	**Hypertension**
Kontos et al [13]	2001	256	41%	75%
Toporan Daniela [14]	2001	42	36.4%	52.5%
Archbold et al [15]	2010	55	34.5%	40%
Present Study	2013	45	48.9%	73.3%

Association of prior CAD and LBBB with AMI: In the present study 15 patients (33.3%) had prior CAD which was significant. Similar co relation was seen in study by Toporan Daniela [14] (25.4 %) and in Kontos et al [13] (23%).

Association of Killip's class and LBBB with AMI: In the present study 9 (20%) patients presented with Killip's class 1, while Killip's class 2, 3 and 4 were seen in 10 (22.2%), 22 (49%) and 4 (8.8%) of patients respectively. In study by Toporan Daniela [14] 9.7% of patients had Killip's class 1 while Killip's class 2, 3 and 4 were seen in 29%, 41.9% and 8.9% of the patients respectively.

<u>*IN HOSPITAL EVENTS*</u>

Association of Reinfarction with LBBB and AMI: In the present study 1 patient (2.2%) who was thrombolysed developed reinfarction while 4 patients (8.8%) who were not thrombolysed developed reinfarction which was statistically significant. There was no previous study co relating re infarction with LBBB and AMI.

Association of Ventricular fibrillation with LBBB and AMI: In our study no patient who was thrombolysed developed VF while 5 patients (11.1%) who were not thrombolysed developed VF. In the study by Archbold et al [15] 8 patients (14.5%) had developed VF which is statistically significant.

In Hospital Mortality: In this study out of 25 patients who were thrombolysed, 1 (2.2%) died during the hospital stay while out of 25 patients who were not thrombolysed 5 (11.1%) patients died during hospital stay. This strongly suggests that patients presenting with LBBB and AMI if not thrombolysed can increase the chance of mortality. In the study by Archboldet al [15] there were 7 deaths (12.7%) in patients with LBBB and AMI.

We also studied the association of risk factors for LBBB and AMI like history of smoking, alcohol, hyperlipidemia and symptoms on presentation but these were not statistically significant.

Conclusion

Following conclusions are made on the completion of the study:

- Elderly patients are more prone to develop LBBB with AMI with male predominance.
- Diabetes, Hypertension and prior CAD are risk factors for LBBB with AMI.
- Patients present with a higher Killip's class in LBBB with AMI.
- LBBB with AMI patients who were not thrombolysed had increased incidence of re infarction.
- Patients with LBBB and AMI who were not thrombolysed had increased incidence of in hospital complications like Ventricular fibrillation.
- In hospital mortality was increased in patients with LBBB and AMI who were not thrombolysed.

Summary

The present study was carried out at Al Ameen Medical College Bijapur, 45 patients of Left Bundle Branch Block and Acute Myocardial Infarction were included in the study. In the present study, there were 31 males and 14 females. Out of the 45 patients, 29 patients (64.4%) were more than 60 years age and 16 patients (35.6%) were less than or of 60 years age. 22 patients (48.9%) had diabetes mellitus and 33 patients (73.3%) had hypertension associated with LBBB and AMI which suggests that diabetes mellitus and hypertension are risk factors for AMI with LBBB. In the present study 15patients (30%) had prior CAD with LBBB and AMI.

In patients with LBBB and AMI, 22 (49%) patients presented with Killip's class 3, while Killip's class 1, 2 and 4 were seen in 9 (20%), 10 (22.2%) and 4 (8.8%) of patients respectively. Out of 25 patients who were thrombolysed 1 patient (2.2%) developed re infarction while out of 20 patients who were not thrombolysed 4 patients (8.8%) developed re infarction. Out of 25 patients who were thrombolysed no patient developed VF while 5 patients (11.1%) who were not thrombolysed developed VF. In this study out of 25 patients who were thrombolysed 1 patient (2.2%) died during the hospital stay while 5 patients (11.1%) who were not thrombolysed died during hospital stay.

Our study shows that elderly patients with male predominance are more likely to have LBBB and AMI. Patients with diabetes mellitus, hypertension and prior CAD are risk factors for LBBB and AMI. Patients with LBBB and AMI are likely to present with higher Killip's class. The individuals who were not thrombolysed with LBBB and AMI were more likely to develop in hospital complications like re infarction and ventricular fibrillation and had significant in hospital mortality.

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