



ISSN Print: 2394-7500  
ISSN Online: 2394-5869  
Impact Factor: 5.2  
IJAR 2020; 6(5): 166-169  
[www.allresearchjournal.com](http://www.allresearchjournal.com)  
Received: 20-03-2020  
Accepted: 22-04-2020

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## Clinical profile and outcome of RBBB with anterior wall myocardial infarction

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### Abstract

**Background:** The prevalence of right bundle branch block (RBBB) in the setting of acute myocardial infarction (AMI) ranges from 3–29%<sup>1-9</sup> and many studies have shown that the occurrence of RBBB with MI is associated with higher mortality<sup>10-15</sup>.

**Materials and methods:** We did a prospective observational study over 1 year duration in our centre. We included patients above 18 years of age presenting with acute Anterior wall myocardial infarction and RBBB. Those who presented within the window period of <12 hrs of onset of chest pain and with nil contraindications for thrombolysis were thrombolysed with streptokinase or tenecteplase. Those who presented >12 hrs of chest pain were treated with heparin and antiplatelets. Eligible and willing candidates were subjected to CAG.

**Results:** A Total of 53 patients included in our study. The mean age was 60.02 ±12.07 years (Range was 28 to 82 years). Majority were males (n=44, 83.02%). 50.94% (n=27) were diabetics, 33.9% (n=18) were hypertensives, 62.2% (n=33) were smokers and 30.18% (n=16) were alcoholics. 64.2% (n=34) presented within 12 hrs of onset of chest pain and 35.8% (n=19) presented beyond 12 hrs. Out of the 34 pts, 67.65% (n=23) were lysed with tenecteplase and 32.35% (n=11) were lysed with streptokinase. As per Killips classification, 90.6% (n=48) were class ≥ 2 at presentation, out of which 31.25% (n=15) had cardiogenic shock (killips class 4). TIMI risk score at presentation was >6/14 in 79.24% (n=42) of patients. Ejection fraction was <30% in 37.73% (n=20) patients. Ventricular arrhythmias occurred in 30.2% (n=16) patients. CAG was done in 62.2% (n=33) patients, TVD was seen in 15.15% (n=5) DVD was seen in 6.06% (n=2) LMCA lesion seen in 9.1% (n=3) patients. LAD lesion found in 81.8% (n=27) patients out of which 74.1% (n=20) had lesion in proximal LAD astriding S1, 18.5% (n=5) had ostio-proximal LAD lesion and 7.4% (n=2) had proximal LAD cut off. TIMI flow grade was 0/1 in the infarct related artery in 90.9% (n=30) of patients. PCI was done in 63.6% (n=21). Mortality was seen in 41.5% (n=22) of patients during the hospital stay and majority of deaths (59.09%, n=13) occurred within 48 hrs of admission. Mortality rate was less (26.4%, n=9) among those thrombolysed compared to those not thrombolysed (68.42%, n=13). Important predictors of mortality were age ≥60 yrs, late presentation, low ejection fraction <30% and occurrence of ventricular arrhythmias.

**Conclusion:** Hence identification of AMI with RBBB in ECG at presentation may help to identify the subset of patients with higher cardiac failure, arrhythmias and mortality and hence may provide prognostic information and hence guide early risk stratification.

**Keywords:** AMI, qRBBB, High mortality, High risk stratification

### 1. Introduction

Right bundle-branch block (RBBB) occurs in 3–29% of patients with acute myocardial infarction (AMI)<sup>[1-9]</sup> and its occurrence is associated with severe disease<sup>[10, 11]</sup> and a higher mortality<sup>[10-15]</sup>. Hence we studied the clinical profile and outcome of right bundle branch block with anterior wall myocardial infarction in our centre.

### 2. Materials and methods

The study was conducted prospectively over a period of 1 year from June 2018 to June 2019. We included patients above 18 years of age presenting with acute anterior wall myocardial infarction and with RBBB at presentation. Acute Anterior wall myocardial infarction was diagnosed as per the diagnostic criteria proposed by ACC/AHA/ESC. The diagnostic criteria of the right bundle-branch block was in line with the standards of bundle-branch block recommended in AHA/ACCF/HRS guideline for electrocardiogram

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2009 which is given by RBBB: i) QRS duration is  $\geq 120$  msec in adults; ii) rsr', rsR', or rSR' in leads V1 or V2. The R' or r' deflection is usually wider than the initial R wave. In a minority of patients, a wide and often notched R wave pattern may be seen in lead V1 and/or V2; iii) the duration of S wave is greater than R wave or greater than 40 msec in leads I and V6; iv) normal R peak time in leads V5 and V6 but  $>50$  msec in lead V1. Of the above criteria, the first three should be present to make the diagnosis. When a pure dominant R wave with or without a notch is presented in V1, criterion 4 should be satisfied.

Baseline and clinical characteristics of these patients were documented. Killip classification and TIMI risk score were applied in all patients at presentation. Those who presented within the window period of  $<12$  hrs of onset of chest pain and with nil contraindications for thrombolysis were thrombolysed with streptokinase or tenecteplase. Electrocardiograms were performed before and 60 min after the start of fibrinolytic therapy. Those who presented  $>12$  hrs of chest pain were treated with heparin and antiplatelets. ECHO was performed in all patients. Eligible and willing candidates were subjected to CAG. Based on CAG findings, CABG was advised for those with TVD or  $>50\%$  lesion in LMCA and in others stenting was done if  $>70\%$  lesion was detected and the outcome of these patients was also analysed.

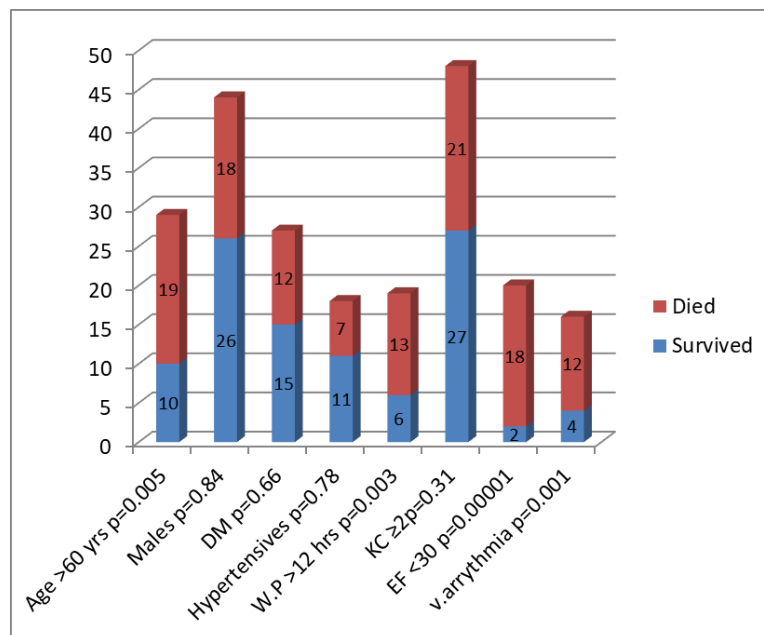
**3. Results**

A total of 53 patients were included in our study. The mean age was  $60.02 \pm 12.07$  years (Range was 28 to 82 years). Majority were males (n=44, 83.02%). 50.94% (n=27) were

diabetics, 33.9% (n=18) were hypertensives, 62.2% (n=33) were smokers and 30.18% (n=16) were alcoholics. 64.2% (n=34) presented within 12 hrs. of onset of chest pain and 35.8% (n=19) presented beyond 12 hrs. Out of the 34 patients, 67.65% (n=23) were lysed with tenecteplase and 32.35% (n=11) were lysed with streptokinase. 11.3% (n=6) of patients had reversal of RBBB in repeat ECG done at 60 min of thrombolysis. As per Killip classification, 90.6% (n=48) were class  $\geq 2$  at presentation, out of which 31.25% (n=15) had cardiogenic shock (killips class 4). 56.6% (n=30) required ventilator support. TIMI risk score at presentation was  $>6/14$  in 79.24% (n=42) of patients. Ejection fraction was  $<30\%$  in 37.73% (n=20) patients. Ventricular arrhythmias occurred in 30.2% (n=16) patients. Complete heart block occurred in 5 patients in whom TPI was done. one patient developed ventricular septal rupture during the hospital stay. The average duration of hospital stay was 7.8 days. CAG was done in 62.2% (n=33) patients, TVD was seen in 15.15% (n=5), DVD was seen in 6.06% (n=2), LMCA lesion seen in 9.1% (n=3) patients. LAD lesion found in 81.8% (n=27) patients out of which 74.1% (n=20) had lesion in proximal LAD astriding S1, 18.5% (n=5) had osteoproximal LAD lesion and 7.4% (n=2) had proximal LAD cut off. TIMI flow grade was 0/1 in the infarct related artery in 90.9% (n=30) of patients. PCI was done in 63.6% (n=21). Mortality was seen in 41.5% (n=22) of patients during the hospital stay and majority of deaths (59.09%, n=13) occurred within 48 hrs. of admission. Mortality rate was less (26.4%, n=9) among those thrombolysed compared to those not thrombolysed (68.42%, n= 13)

**Predictors of mortality**

Factors	Survived	Death	P value
Age $\geq 60$ yrs	10	19	0.005
Males	26	18	0.84
DM	15	12	0.66
Hypertensives	11	7	0.78
$>12$ hrs	6	13	0.003
Killips class $\geq 2$	27	21	0.31
EF $<30\%$	2	18	0.00001
Ventricular Arrhythmias	4	12	0.001



#### 4. Statistical analysis

All the data were analyzed using MEDCALC. Data are presented as mean  $\pm$ S.D or proportions as appropriate. Comparisons between groups were done using  $\chi^2$  tests for categorical variables and the Mann–Whitney U test for continuous variables. P-values of  $\leq 0.05$  were considered significant. No adjustment was made for multiple comparisons.

#### 5. Discussion

Right bundle-branch block (RBBB) occurs in 3–29% of patients with acute myocardial infarction (AMI) [1-9] and is more common in the elderly [16]. The mean age was 60.02  $\pm$ 12.07 years in our study and 54.7% were more than 60 years of age.

In ECG, the proportion of anterior and/or high lateral wall myocardial infarction is high in AMI combined with new RBBB patient [17, 11]. The higher incidence of RBBB seen in patients with anterior AMI may be explained by septal ischaemia from a more proximal left anterior descending artery occlusion (before the large septal branch) and the course of the right bundle branch traversing the septum towards the apex [10].

Jingchao Li *et al.* [11] observed that compared with non-BBB patients, RBBB patients have a higher incidence of smoking, hypertension and diabetes, hyperlipidaemia. In our study, 50% were diabetics and 62% were smokers.

It has been observed that the occurrence of RBBB is often accompanied by wide infarct size and hence higher peak enzyme levels, lower level of LVEF, higher Killip class [11, 18] and a higher rate of cardiac failure and malignant arrhythmia [11, 13, 19, 20]

Similarly, a large proportion of our patients had a higher Killips class and lower Ejection Fraction at presentation, and were in cardiogenic shock at presentation. Also, ventricular arrhythmias occurred in 30.2% of our patients.

In Sathish kumar *et al.* [18] study, the involvement of LAD was 100% and in Jingchao Li *et al.* [11] study, LAD was involved in 54.29% of RBBB patients. In our study LAD was involved in 81% of patients.

The occurrence of RBBB with AAMI is associated with higher incident of complete occlusion of infarct-related artery (IRA) and closer proximal occlusion of IRA than those without RBBB [11, 18]. Similarly, most patients in our study had proximal LAD occlusion and low TIMI grade of 0/1 in IRA.

RBBB accompanying anterior AMI has been associated a higher mortality rate than patients with RBBB accompanying inferior AMI and then in those with normal conduction [10, 11]. Mortality was 41.5% in our study and most of the deaths occurred within 48 hours of admission. Sathish kumar *et al.* observed that lower EF is a significant predictor of death [18]. Important predictors of death in our study were elderly age, late presentation, lower ejection fraction and ventricular arrhythmias.

Though the mortality rate was less (26.4%, n=9) among those thrombolysed compared to those not thrombolysed (68.42%, n= 13) in our study, the occurrence of RBBB with AMI is associated with high mortality rate even in the thrombolytic era [12-15]. Also, In the Fibrinolytic Therapy Trialists meta-analysis, patients with bundle branch block (BBB) at randomization had a 35-day mortality rate of 23.6% without and 18.7% with fibrinolytic therapy [21].

Hence a mortality rate of 26% despite thrombolysis may indicate that they may be benefitted with aggressive reperfusion therapy. Though thrombolysis can effectively decrease AMI patients mortality and features advantage of massive utility, easy implementation and low cost, thrombolysis therapy has more contraindications and higher risk of bleeding; as a result, PCI treatment is more popular at present. Hence some studies indicated that, with all contraindications being excluded, AMI patients with BBB should receive emergency PCI treatment [22]

Long-term follow-up of AMI patients with RBBB found that the one-year cumulative survival in RBBB group was obviously lower than that in non-BBB group [11, 23], however the long term survival was not analysed in our study. Longer follow-up studies may provide more accurate results on long term survival of these subset of patients.

#### 6. Conclusion

Hence identification of AMI with RBBB in ECG at presentation may help to identify the subset of patients with higher cardiac failure, arrhythmias and mortality and hence may provide prognostic information and hence guide early risk stratification. The higher mortality despite thrombolysis may indicate that they may be benefitted by aggressive reperfusion

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