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CONDUCTION DISTURBANCES IN PATIENTS WITH ACUTE ANTERIOR WALL MYOCARDIAL INFARCTION AND IN-HOSPITAL OUTCOMES

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ABSTRACT

Objective: To determine the frequency of conduction abnormalities and in hospital mortality in patients with acute anterior wall myocardial infarction (MI).

Methodology: This study was conducted from 1 January to 30th June 2011 in the Cardiology Department of Lady Reading Hospital, Peshawar. Patients who presented with acute anterior wall MI were included. Those patients who were having renal failure, Hypo or Hyperkalemia, history of valve replacement, coronary artery bypass graft and those who were using Beta blocker, Lanoxin and Calcium channel blocker (Verapamil, Diltiazem) were excluded. Patients were followed daily for development of AV blocks until discharged or died. Data was analyzed using statistical package for social sciences (SPSS) version 15.

Results: A total of 309 patients were included, out of which 228 (73.8 %) were males and 81 (26.2 %) were females, having mean age of 58.88 years. Conduction abnormalities developed in 33(10.67%) patients during hospital stay. Among these, A-V blocks were present in 3.5% and Intraventricular blocks in 7.11% patients. During hospital stay, 56 (18.1%) patients died. LBBB developed in 6 patients in which, 3(50%) patients died whereas, RBBB developed in10 patients in which 6(60%) patients died, Bifascicular block developed in 6 patients in which 3 died and complete heart block (CHB) developed in 9 patients with 77.7% mortality.

Conclusion: CHB in anterior wall MI is an uncommon finding in this thrombolytic era but associated with high incidence of in-hospital death even if these patients are timely thrombolysed and paced.

Key Words: Acute Mycordial Infarction, Bifascicular Block, LBBB, RBBB, AV Block, In Hospital Mortality

INTRODUCTION

Acute myocardial infarction(MI) is associated with a number of complications including conduction disturbances. The most commonly observed conduction defects after acute MI include atrioventricular (AV) blocks (1st degree heart block, 2nd degree heart block and 3rd degree heart block also called complete Atrioventricular block (CAVB). Intraventricular (IV) conduction defects include right bundle branch block (RBBB) or left bundle branch block(LBBB).[1,2] In some cases fascicular blocks (anterior and posterior hemiblocks) alone or in combination with RBBB (bifascicular blocks) are also observed. In these settings, delayed conduction may occur as consequence of physiological phenomena or pathological process.[3]

Incidence rates of heart blocks vary in different populations and according to type of MI. 1st or 2nd degree AV block is seen very frequently with in 24 hour of the beginning of acute coronary syndrome and are usually transient. Type I 2nd degree AV block is considered a more benign entity than type II 2nd degree AV block.[4] In acute Inferior myocardial infarction (IMI),1st degree AV block is present in 2-12%, 2nd degree AV block in 3-10% and CAVB in 3-7%. In acute anterior wall myocardial infarction (AWMI), 1st degree AV block is present in 0.2%,2nd degree AV block in 0.2% and CAVB in 2.6%. CAVB is more common in acute Inferior wall myocardial infarction (3.7-15%) than acute Anterior wall myocardial infarction (1-8%).[5,6]

Bundle branch blocks (BBB) are common findings in patients with acute myocardial infarction (MI). It is more common in Anterior wall myocardial infarction (AWMI) than acute Inferior wall myocardial infarction (IMI). BBB are usually found in 9.2%patients with acute AWMI (LBBB 2.3%, RBBB 3.7%, fascicular block1.4%. BBB in association with CAVB usually is present in 1.7% patients among whom, 1.1% have RBBB, 0.2% LBBB and 0.2% have fascicular block.[3]

Studies have shown that these conduction disturbances are associated with increased in-hospital mortality rate.[7] Cardiac arrhythmias and conduction abnormalities complicating acute MI are always associated with adverse prognosis. Patients with acute IMI more often experience conduction abnormalities but they are usually transient. In case of acute AWMI, the conduction abnormalities are less common but are always serious and associated with high short and long-term mortality. Patients with AWMI are more likely to die before hospital discharge than inferior or posterior MI (11.3 vs. 7.7%).[8] Overall mortality is 27.9 % in patients with block and 9.3 % in those without, it is significantly higher in both anterior (47.0% vs. 11.8 %) and inferior (20.4% vs. 6.7%) infarction groups.[9,3] CAVB development has been associated with significantly increased likelihood of ventricular tachyarrhythmia's and reduction of left ventricular ejection fraction (LVEF) during the hospitalization period.[10,11] CAVB during hospital stay, after an acute AWMI has been associated with an increased rate of both short and long-term mortality.[12,13]

Use of thrombolytic agent is associated with a tendency toward a lower occurrence of BBB and CAVB. But the evidence is conflicting in multiple studies. The GUSTO study reported a lower rate of incidence of AV block of the 2nd and 3rd degrees in the t-PA group relative to streptokinase (7.3% vs 9.1%, $P<0.001$).[14] On the other hand, the GISSI-2 did not find a significant difference between CAVB in the t-PA group (5.1%) versus the streptokinase group (5.5%).[15] The GISSI-1 study reported similar incidences of CAVB in the streptokinase group (5%) and non-thrombolytic-treated controls (5.7%).[16-18] Reperfusion therapy was associated with a significant reduction in in-hospital mortality compared with conservative treatment in patients with CAVB (12.8% vs. 45.2%).[19-21] Thirty-day mortality among acute IMI patients with CAVB was significantly higher compared to uncomplicated acute IMI, irrespective of whether they received thrombolytic therapy or not. For thrombolytic (IMI with CAVB vs. IMI without CAVB: 22% vs. 5%$p< 0.001$) for non-thrombolytic, IMI with CAVB vs. IMI without CAVB: 35% vs. 8% $p < 0.001$).[22]

Previous studies have been conducted on the western population. We are genetically different from western population. In addition, our health system has not been fully established. We, therefore, don't know, weather we have the same frequency and mortality of these blocks in our population. This study was, therefore, conducted to know the exact frequency of blocks and their mortality in our set up.

METHODOLOGY

This descriptive cross-sectional study was conducted at department of cardiology,Lady Reading Hospital Peshawar from 1st January to 30th June 2011. A total of 309 patient's data collected through probability consecutive sampling technique. Written informed consent was taken from all the patients. Patients of either gender and age with acute AWMI were included in the study (acute AWMI was diagnosed by having chest pain of more than 30 minutes, that did not relieved by two doses of Glyceryl Trinitrate and Electrocardiography (ECG) showing ST segment elevation of $\geq$2mm in two consecutive chest leads). Following type of patients were excluded: Patients with renal failure (creatinine >2mg/dl), history of previous myocardial infarction, coronary artery bypass graft (CABG) and history of valve replacement or septal repair. Patients with hypokalemia and hyperkalemia, and conduction disturbances due to drug usage were also excluded (drugs that were considered included: beta blockers,varapamil, diltiazem, amiodarone and digoxin). All these conditions independently, can cause conduction disturbances and therefore, were excluded from the study. Study patients were managed according to hospital treatment protocols. Detailed history, clinical examination and all routine investigations were done. History of previous CABG, drug usage or renal disease was determined. Serial ECG was performed daily, to detect the development of any new conduction abnormality. Serum electrolytes measured daily to detect hypokalemia or hyperkalemia. Use of thrombolytic or otherwise, was recorded. Patients were followed daily in the ward until, discharged or died.

Conductance disturbance included A-V blocks and bundle branch block:

A-V Blocks include: 1st degree heart block, 2nd degree heart block and complete A-V block(CAVB).Bundle branch block include LBBB and RBBB and bifascicular block.

Following operational definitions were used:

First degree block: PR interval more than 0.2 seconds. Second degree heart block: Every P wave is not followed by QRS complex on ECG.

CHB: Complete dissociation of P waves and QRS complexes on ECG. (no correlation between P wave and QRS complex on ECG).

LBBB: QRS duration of >0.12 s; QS pattern complex in lead V1 or a notched R-wave in lead I, AVL, V5, or V6 and absent Q-wave in the same lead.

RBBB:QRS duration of >0.12 seconds and rsr', rsR', or rSR' pattern inlead V1 or V2 on ECG. Bifisicular block;RBBB and left or right axis deviation.

Data was analyzed using statistical package for social sciences (SPSS) version 15. Categorical variables like gender,1st degree block,2nd degree block, CAVB, LBBB, RBBB and bifasicular block presented as frequencies and percentages. Numerical variables like age presented as Mean ± SD. Chi square test applied to see association between categorical variables.

RESULTS

A total of 309 patients were studied. Male patients were228 (73.8%).Mean age of the study population was 58.88 ±12.5 (range 20-100) years. Baseline characteristics of the study population are given in Table 1.

Table 1: Baseline Characteristics of the Study Population

Variables	Values
Age(years)	58.88 ± 12.5
Male n (%)	228 (73.78)
Hypertension n (%)	92 (30)
Diabetes n (%)	60 (19.4)
Smokers n (%)	77 (24.9)
Mean systolic BP(mm Hg)	110.9
Mean diastolic BP(mm Hg)	66.9
Mean random blood sugar(mg/dl)	170

Conduction abnormalities developed in 33(10.67%)patients during hospital stay. Among these, A-V blocks were present in 3.5% and IVB in 7.11% patients. Frequency of various blocks is given in Table 2.

During hospital stay, 56 (18.1%) patients died. LBBB developed in 6 patients in which, 3(50%) patients died whereas, RBBB developed in10 patients in which 6(60%) patients died, Bifisicular block developed in 6 patients in which 3 died and CAVB developed in 9 patients with 77.7% mortality. Table 3 shows mortality due to different types of blocks. Significantly higher in hospital mortality was found in patients with CAVB, LBBB, RBBB, and bifiscicular block (Figure 1). Mortality in thrombolysed patients was higher but statistically insignificant as compared to non thrombolyzed patients 44(17.9%) vs.12 (19.04%)(p=0.84).

DISCUSSION

This study was conducted in tertiary care hospital. Patients with acute MI, visit this hospital, not only from Peshawar and nearby districts but also from far off areas.

Male were predominant in this study and constitutes 73.8%.Mean age of our patients was 58 ±12.5 years. These findings are similar to other local studies. Bhali et al, in a study from Abbott Abad observed mean age of 59.11 years for patients with acute MI.[3] Khan et al, had 75% male patients in their total 340 patients in a study on acute MI.[18]

Table 2: Frequency of Various Blocks in Acute AWMI

Type of block	Frequency (%)
ATRIOVENTRICULAR BLOCKS	11(3.5)
1st degree AV block	01 (0.3)
2nd degree AV block	01 (0.3)
Complete heart block(CAVB)	09 (2.9)
INTRAVENTRICULAR BLOCKS	22(7.11)
Left bundle branch block	06 (1.9)
Right bundle branch block	10(3.2)
Bifisicular block	06(1.9)
TOTAL	33(10.67)

Table 3: Comparison of Mortality with and Without Blocks

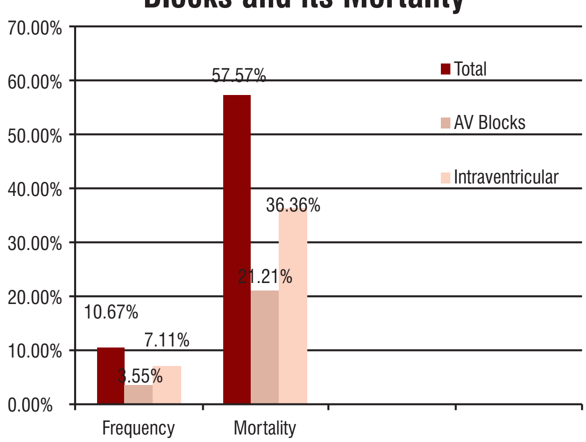
Type of block	Mortality with block	Mortality without block	P-value
LBBB (n=6)	3(50%)	53(17.5%)	0.041
RBBB (n=10)	6(60%)	50(16.7%)	0.0001
CHB (n=9)	7(77.7%)	49(15.8%)	0.0001
Bifascicular block (n=6)	3(50%)	53(17.5%)	0.041

In our study, BBB was more common in anterior than inferior MI. Frequency of RBBB (3.23%) was higher than LBBB and bifiscicular blocks (1.95% each). Overall, AV nodal (10.67%) and IV blocks (7.11%) were according to other internationally published studies .Bhali et al, reported that 12.2% cases had conduction disturbances in acute AWMI.[3] Escosteguy at al, found that frequency of conduction abnormalities was 13% in patients with acute AWMI.[14] Similarly, LBBB and RBBB were present in 1.9% and 2.1% of patients respectively. Mcdonald et al, reported 9.2% blocks, 2.3% had LBBB, 3.7% had isolated RBBB and 1.4% patients had bifascicular blocks.[23] In a study by Hreybe et al, in acute AWMI, 1st degree and 2nd degree blocks were present in 0.6 % and 0.2% of patients, respectively.[8]

In our patients, mortality in patients with AWMI was 18.1% and reached to 57% when complicated by conduction abnormalities. LBBB and bifiscicular blocks were having 50% mortality each and RBBB 60% mortality. In international literature, AWMI is having worse prognosis with and without blocks as compared to inferior MI.[8]

The presence of conduction defects complicating acute MI is relatively frequent and is associated with increased short

Figure 1: Showing Frequency of Blocks and its Mortality



and long term mortality. Studies from the pre thrombolytic era have shown that IV and A-V conduction defects were associated with greater in-hospital morbidity and mortality in acute MI.[18] Mcdonald et al, also reported 47% mortality in AWMI and conduction abnormalities.[23] Escosteguy et al, found that mortality in acute MI is 40 % for LBBB,21% for RBBBand 40% for bifiscicular block.[13] AWMI and conduction abnormalities usually have high LAD obstruction and large area of myocardium is involved.[9]

Mortality in acute MI in our study is high as compared to international findings. There are many reasons for this. First, we studied only AWMI while other studies were conducted on patients with acute MI. Secondly, in our set up patients come from far off areas and there is delay in the presentation to hospital. Most of the patients are diagnosed late and several hours pass between chest pain and arrival to hospital. In USA and Europe, most of the patients with acute MI, present early to hospital, receive thrombolysis or are treated with Primary PCI well on time. Hreybe et al, found that patients with anterior or lateral acute MI were more likely to die prior to hospital discharge than patients with an inferior or posterior MI (11.3% vs. 7.7%).[8]

CAVB is associated with high in hospital mortality. In our study, acute AWMI with and without CAVB was associated with 77.77% and 16.1% mortality respectively. Escosteguy et al, found that mortality associated with CAVB in AWMI is 90%.[14] In a study in India by Gupta et al, 17 out of 19 patients with CAVB in AWMI died (89.5%). In this study of Gupta et al, 5 patients with CAVB in AWMI were paced by TPM, in whom 4 patients (80 %) died.[24] Norris found 75% mortality in CAVB in AWMI.[25] Ginks et al, and Norris found that anterior wall infarctions, and high-degree (second- or third- degree) block is associated with larger infarct size and poorer in hospital prognosis.[25,26] Hreybe et al, also found that evidence of CAVB were more likely to die prior to hospital discharge compared to patients who did not exhibit these higher risk characteristics.[7]

From our study as well as previous studies, it is clear that AWMI with its associated conduction abnormalities have high mortality and early intervention in the form of thrombolysis is needed to reduce this mortality.

STUDY LIMITATION

Intraventricular and interventricular conduction abnormalities are less frequent complication of acute Anterior myocardial infarction and our study population was small, so large number of patients are required to find the exact frequency of various blocks in acute AWMI. Morever various blocks may have long term sequel and mortality different from in hospital mortality so longer follow up should also be done of these patients as we have only studied in hospital mortality of these patients.

CONCLUSION

Conduction abnormalities with AWMI is not very common, however the outcome is fatal in majority of cases.

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