

ACUTE INFERIOR WALL MYOCARDIAL INFARCTION; FREQUENCY OF AV BLOCKS

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ABSTRACT ... drkamin2002@yahoo.com **Objective:** The study was designed to see the frequency of atrio-ventricular block in acute inferior wall myocardial infarction. **Material & Methods:** This study was carried in patients admitted in Coronary Care Unit of Allied Hospital, Faisalabad and Divisional Head Quarters Hospital. Total no of patients were 100. All patients presented with severe chest pain of more than 30 minutes duration. **Results:** Total of 100 patients inferior wall MI were selected. 48 (48%) were male and 52(52%) were female. Age of patients ranged from 40-90 years with mean age of 57.85 ± 9.29 years. Out of 100 patients, 70(70%) had no AV block and 30(30%) had AV block. Among 30 cases 4(4%) had first degree AV block. Among 30 cases 4(4%) had first degree AV block and 5(5%) had 2nd degree AV block and 21(21%) had third degree AV block. **Discussion:** HB is more common with inferior than anterior wall MI because R. coronary A. supplies AV node in addition to infero-basal part of left ventricle and because vagal reflex is more likely from this area. **Conclusion:** AV block was a frequent complication after acute inferior wall MI.

INTRODUCTION

All degree of artio-ventricular blocks may occur in the course of acute myocardial infarction. The block at the level of the atrio-ventricular node is more common than infra-nodal block and occur in approximately 20% of inferior wall myocardial

infarction.^{81,72}

Complete atrio-ventricular block is relatively frequent complication of inferior wall myocardial infarction and is associated with large infarct, high frequency of complications and mortality, early appearance, shorter duration and fewer in hospital mortalities

seem to characterize those complete artio-ventricular block occurring in patients treated with thrombolytics.

Complete AV block and syncope sometimes are the presenting signs of acute myocardial infarction. Among patients of acute inferior myocardial infarction, frequency of artio-ventricular block is high particularly complete heart block that complicates in hospital course. That is why I designed this study to determine the frequency and in hospital complications due to atrio-ventricular block in acute inferior wall myocardial infarction in this thrombolytic era.

PURPOSE & OBJECTIVES

Frequency of atrio-ventricular block in acute inferior wall myocardial infarction is high. Although inferior wall myocardial infarction is considered less extensive than anterior wall infarction, but development of advance artio-ventricular block may complicate the clinical picture when develops severe bardycardia and it further makes it worse when concomitant right ventricular infarction is also present.

This study was designed to get the data about the frequency of atrio-ventricular block in acute inferior wall myocardial infarction concomitant right ventricular infarction will also be determined in order to determine the frequency of atrio-ventricular block in these patients and will be compared with isolated inferior wall myocardial infarction.

MATERIAL & METHODS

Setup:

This study was carried in patients admitted in coronary care units of Allied Hospital, Faisalabad and Divisional Head Quarters Hospital, Faisalabad. Both coronary units are 14 bedded each, equipped with bedside and central cardiac monitoring. Allied Hospital is teaching hospital affiliated with Punjab Medical College and 1100 bedded.

Number of Patients:

This study was designed for 100 consecutive patients of acute inferior wall myocardial infarction.

Inclusion criteria:

Adult patients of either sex presenting with severe chest pain of more than 30 minutes duration and fulfill the following criteria:

1. ST segment elevation equal to or more than 1mm(0.1mv) in two of these leads II, III and aVf.
2. Rise in serum creatinine kinase level (CPK Level) more than twice the normal Value along with CK-MB fraction more than 6% of CPK value.
3. Inferior wall myocardial infarction with concomitant right ventricular infarction i.e ST segment elevation equal or more than 1 mm in one or more right precordial lead V₄R to V₆R.

METHODS OF STUDY

Standard 12 leads electrocardiogram was recorded immediately after admission. Diagnosis of acute inferior wall myocardial infarction was made in the presence of ST segment elevation equal to or more than 0.1 mv (1mm) in two or more of leads. II, III and aVf. Presence or absence of any rhythm disturbance at the time of admission was recorded and afterwards during the whole stay in coronary care unit(CCU).

Temporary pacemaker was also considered if any type of bardycardia(sinus or atrio-ventricular block) causing symptoms and signs of low perfusion. Thrombolytic therapy was not employed among those patients with contraindications for its use. In these patients of acute inferior wall myocardial infarction, the in-hospital complications were divided into major and minor.

Among the major asystole, angina, reinfarction,

altered consciousness, ventricular tachycardia, death congestive cardiac failure (CCF) and sinus bradycardia. Among the patients having atrio-ventricular blocks, the degree of block, duration and in case of complete heart block the stability of escape rhythm in view of ORS width, heart rate and associated other conduction defect (inraventricular) were also recorded.

After studying 100 patients, the data was analyzed according to the appropriate statistical methods. Two groups were made out of 100 patients.

GROUP I (AVB +) = these patients had acute inferior wall infarction with electrocardiographic evidence of atrio-ventricular block.

GROUP II (AVB -) = these patients had acute inferior wall infarction without any evidence of block. Patients in two groups were further characterized with age, sex, vital signs and use of thrombolytic therapy. Coronary risk factors and concomitant right ventricular infarction was also determined in each group and was analysed.

RESULTS

In this study, a total of 100 patients of acute inferior wall myocardial infarction were selected on the basis of diagnostic criteria laid down. Out of these 100 patients 48 (48%) were male and 52 (52%) were female. Male to female ratio was 0.9. Age of the patients ranged from 40 to 90 years with mean age of 57.85 ± 9.29 years as shown in Table-V.

Duration of Symptoms:

The duration of symptoms in these 100 patients range from half an hours to twenty-one hours, with mean of 5.09 4.628 hour.

Distribution of Patients:

Out of these 100 patients of acute inferior wall myocardial infarction 70 (70%) had no atrio-ventricular block (AVB-) and 30 (30%) had atrio-ventricular block (AVB+). In 30 cases of atrio-ventricular block, First Degree AV block were 4

(4%). Among second degree AV block, type I were 5 (5%), type II second degree block was nil and third degree AV block were 21 (21%) (Table-I).

Considering the frequency and sex and analyzed with Chi square test of significance probability value is $p = 0.6910$ (Non-significant).

Among these 100 patients of acute inferior wall myocardial infarction, 54 (54%) had no right ventricular infarction and 46 (46%) had right ventricular involvement (Table-II). In 46% patients of acute inferior wall myocardial infarction with right ventricular infarction, overall frequency of atrio-ventricular block were 19 (41.30%). Among these 19 cases of atrio-ventricular involvement, first degree AV block were 3(6.52%), second degree AV block type I was 1(2.17%) and third degree AV block were 15 (46%) Table-III.

Table-I. Overall Frequency and Distribution of Atrio-ventricular Block in 100 Patients Of Acute Inferior Wall Myocardial Infarction

1 ST Degree AV Block	Male n = 3	4	4%
	Female n = 1		
Type I 2 nd Degree AV block	Male n = 4	5	5%
	Female n = 1		
Type II	Male n = 0	0	0%
	Female n = 0		
3 rd Degree AV block	Male n=13	21	21%
	Female n = 8		

In 54 patients of acute inferior wall myocardial infarction without right ventricular infarction, overall frequency of atrio-ventricular block were 11 (20.3%). Among these 11 cases of atrio-ventricular block in 54 patients of acute inferior wall Myocardial infarction without right ventricular involvement, first degree AV block were 1 (1.85%), second degree Av block type I were 4 (7.4%) and type II second degree AV block was nil, third degree AV block were 6 (11.11%).

By employing Z test, probability value was drawn by comparing frequency of first degree AV block, in both conditions (inferior wall myocardial infarction with right ventricular infarction and inferior wall myocardial infarction without right ventricular infarction) was sound P value= 0.11750.

Similarly by comparing frequency of second degree AV block in both conditions P value is 0.1157 and finally comparing the frequency of third degree AV block in both conditions i.e , inferior wall myocardial infarction with right ventricular infarction and inferior wall myocardial infarction without right ventricular infarction probability value is P= 0.004253 which was found highly significant.

Table-II. Frequency and Distribution of Right Ventricular Infarction in 100 Patients of Acute Inferior Wall Myocardial Infarction.				
Patients of acute inferior wall Myocardial infarction with Right ventricular infarction.	Male	30	46	46%
	Female	16		
Patients of acute inferior wall Myocardial infarction without Right ventricular infarction	Male	18	54	54%
	Female	36		

Table-III. Frequency of Atrio-ventricular Block in Inferior Wall Myocardial Infarction with Right Ventricular Infarction According to Various Degrees.				
1 st Degree AV block	Male n = 2	3		(3/46) 6.52%
	Female n = 1			
2 nd Degree AV block	Type I Male n = 0	1		(1/46) 2.17%
	Female n = 1			
	Type II Male n = 0	0		
	Female n = 0			
3 rd Degree AV block	Male n = 13	15		(15/46) 32.60%
	Female n = 2			

In Hospital Complications:

In hospital complications in 100 patients of acute inferior wall myocardial infarction and comparison between two groups (AVB+) and (AVB-) is shown in Table-V. These complications were recorded during their whole stay is CCU. Overall mortality during hospital course in 100 patients of acute inferior wall myocardial infarction was 9 (9%).

It was 3 (10%) in group 6 and I (AVB+) (8.57%) in group II (AVB-) and P value for his was P = 0.4095. Post MI (Myocardial Infarction) angina in 100 patients of acute inferior wall was 27 (27%), it was 12 (40%) in group I (AVB+) and 15(21.42%) in grous II (AVB-) with P value 0.0276. Altered consciousness, syncope or presyncope in 100 patients were 8(8%).

Table-IV. Frequency of Atrio-ventricular Block in Acute Inferior Wall Myocardial Infarction Without Right Ventricular Infarction.				
1 st Degree AV block	Male n = 1	1		(1/54) 1.85%
	Female n = 0			
2 nd Degree Av block	Type I Male n = 4	4		(4/54) 7.40%
	Female n = 0			
	Type II Male n = 0	0		
	Female n = 0			
3 rd Degree AV block	Male n = 0	6		(6/54) 11.11%
	Female n = 6			

It was 5(16.66%) in groups I and 3(4.28%) in group II and P value was 0.0182.

In 100 patients of inferior infarction, total re-infarction were 10(10%), 4 in group I (AVB+) and 6(8.57%) in group II (AVB-) with P = 0.2335. Total or intermittent episodes of systole (pause more than 3 sec) were also recorded in these 100 patients of acute inferior wall myocardial infarction, 5(5%) in overall 100 patients. 3(10%) in group I and 2(2.84%) in group II (AVB-), P value for this is 0.0.666 (Table-VII).

SIGNS & SYMPTOMS

In 85(85%) of the patients, presentation was the typical chest pain of ischaemic heart disease, while 15

(15%) presented with atypical symptoms for example epigastric burning or pain, dyspnea, or syncopal attack.

Table-V. Overall In-hospital Complications and Comparison Between Group I (Avb+) and Group Ii (Avb-)

Complications	Overall in 100 Patients of inferior infarction	Group I (AVB+) n = 30	Group II (AVB-) n = 70	P value
Deaths	9(9%)	3(10%)	6(8.57%)	0.4095
Post MI Angina	27(27%)	12(40%)	15(21.42%)	0.0276
Altered consciousness, syncope or presyncope	8 (8%)	5(16.66%)	3(4.28%)	0.0182
Reinfarction	10(10%)	4(13.33%)	6(8.57%)	0.2335
Intermittent asystole (pause > sec)	5 (5%)	3 (10%)	2 (2.84%)	0.0666
Ventricular fibrillation or Ventricular tachycardia	4(4%)	0	4 (5.71%)	
Sinus Bradycardia Heart rate < 60	22 (22%)	0	22 (31.42%)	

P > 0.05 (Non Significant), p < 0.05 (Significant), P < 0.01 (Highly Significant)

In other symptoms in 100 patients of acute inferior wall myocardial infarction were like sweating 88 (88%), vomiting, 31 (31%), nausea 40 (40%), sinking of heart 35 (35%) and palpitation 38 (38%) were not of significant importance.

Overall 22 (22%) patients presented with shock (BP < 90 mm Hg) with all other signs of shock like cold clammy skin, perspiration, irritability, oligurea etc, of these 16 53.33% belonging to group I and 6(8.57%) belonging to group II.

Overall, bradycardia (pulse < 60 beats / min) was noted in 25 (25%) cases, among these 21 (70%) in group I (AVB+) and 4(5.71%) in group II (AVB-).

Jugular venous pressure above clavicle, while patients inclining at 45 degree was raised in 45 (45%) in overall 100 patients of acute inferior wall myocardial infarction. 18 (60%) were of group I and 27 (38%) were of group II. kussmaul's venous sign was present in 18 (18%) in all of selected patients of inferior

infarction. 14 (46.66%) in group I and 4 (5.71%) in group II.

Right-sided 4th heart sound was heard in 28 (28%). As 22 (73.33%) in group I and 6 (8.57%) in group II. Some of the patients developed pan systolic murmur of tricuspid regurgitation and prominent v wave in jugular venous pressure. Most of it was transient in nature.

Creatinine Kinase Level:

It was also noted in this study that peak creatinine kinase level in patients of both groups, exceeded than value 1500 i.u/L. In group I (AVB+), fourteen out of 30 in a percentage of 46.66% and in group II (AVB-) 27 (38.57%) had creatinine value more than 1500 i.u/L (Table-VII).

Thrombolytic Therapy:

In hundred patients of acute inferior wall myocardial infarction, 88 (88%) patients were selected for thrombolytic therapy because of no contraindication

to its use. In group I (AVB+) 22 (73.33%) and in group II (AVB-) 66 (92.28%) received thrombolytic therapy.

GROUP	(%) OF PATIENTS
Group I (AVB+) n = 14	46.66% (14/30)
Group II (AVB-) n = 27	38.57% (27.70)
<i>Group I (AVB+) with atrio-ventricular block</i>	
<i>Group II (AVB-) without atrio-ventricular block</i>	

DISCUSSION

Heart block (atrio-ventricular block) is more common with inferior than anterior infarction because right coronary artery supplies atrio-ventricular node, also in addition to infero-basal part of left ventricle and because vagal reflex is more likely from this area. It is often transient and does not necessarily imply of very large infarct size⁸.

Inferior infarction is considered less extensive than anterior and usually of short hospital stay, good prognosis and few in-hospital complications. But many of major complications when happened during acute inferior infarction like complete heart block, tricuspid or mitral value incompetence and ventricular septal defects may complicate this less extensive nature of infarction and prolong hospital stay, increase in-hospital complications and mortality to about twice higher when comparing with inferior infarction who did not have these complications at the time of their presentation or afterwards during CCU stay.

In some recent studies¹⁰ advanced atrio-ventricular block is of frequent complication ranging ten to twenty percent in patients with inferior wall infarction. Among these patients during hospital stay, it often occurs concurrently with other complications and is associated with high mortality, earlier appearance, shorter duration and fewer in-hospital mortalities seem to characterize those complete AV

blocks occurring in patients treated with thrombolytic therapy.

These above mentioned studies are very much consistent with my results. I found overall 30% atrio-ventricular block, and 21% had complete heart block (advanced atrio-ventricular block). Most cases of complete heart block 90% were transient, restored their sinus rhythm within one to five days. But angina pain was frequently observed in these patients during advance atrio-ventricular block.

Most of the atrio-ventricular blocks develop during first and second day after onset and were reported to restore their sinus rhythm within a week. The transient nature of advance atrio-ventricular block is considered due to enhanced vagal discharge and accumulation of adenosine around the atrio-ventricular node⁵.

The prognosis of acute inferior wall myocardial infarction is worse, when it is complicated with right ventricular infarction. Concurrent right ventricular infarction in inferior wall infarction increases in-hospital complications like complete AV block and mortality to about twice⁷.

In my study I found 46% right ventricular infarction inferior wall myocardial infarction and frequency of overall atrio-ventricular block was markedly high i.e 41% in these sub-set of inferior infarction. Frequency of third degree AV block was 32% in inferior infarction with right ventricular involvement comparing with isolated inferior infarction where it was found 11%.

In my study, I also revealed that inferior wall myocardial infarction was commonly complicated with atrio-ventricular block but it was found transient with good hemodynamic status. The frequency of atrio-ventricular block in inferior wall myocardial infarction was increased in right ventricular involvement and intra ventricular conduction defects were not common in inferior wall myocardial infarction. Atrio-ventricular block in inferior wall infarction did not significantly affect short-term in-

hospital mortality but in-hospital complications were found high which was very much comparable with above-mentioned international studies.

CONCLUSION

1. Atrio-ventricular block was a frequent complication after acute inferior wall myocardial infarction. Overall 30% cases of acute inferior wall infarction developed various degrees of atrio-ventricular block. Considering the various degrees, it is given below:

I	First degree AV block were 4%
II	Second degree type I were 5%
III	Second degree type II were nil
IV	Third degree AV block were 21%

REFERENCES

1. Slight P. **Oxford book of medicine, myocardial infarction and complete heart block (complications), 4th**, England: oxford uni Press, 2001:78.
2. Barry M, Massic MD, Thomas M, Amidon. **Current medical diagnosis and treatment of heart conduction disturbances, 4th**. USA: Lang medical book, 2001:399-418.
3. Rathore SS, Gersh BJ, Berger PB, Soloman AJ. **Acute myocardial infarction complicated by heart block, prevalence and outcomes**. Am Heart J 2001; 141; 47-54.
4. Kostuk WJ, Beanlands DS. **Complete heart block associated with acute infarction**. Am J Cardiol 1998; 26;380.
5. Bason R, Maia IG, Bozza A. **Atrioventricular block in acute inferior wall infarction**. Am J Cardiol 1986; 8; 773.
6. Clemmenensen P, Bates ER, Califf RM. **Complete atrioventricular block complicating acute inferior wall infarction**. Am J Cardiol 1991; 119; 823.
7. Goldberg RJ, Zevalloous JC. **Prognosis of complete heart block in acute myocardial infarction**. Am J Cardiol 1999; 69; 135.
8. Bergen PM, Roucco NA, Ryon TJ. **Incidence and prognostic implications of heart block complicating inferior myocardial infarction**. Am Coll Cardiol 1992; 10: 535.
9. Giannilisis E, Haartman F, Weigand U. **Clinical and angiographic outcomes of patient with acute inferior myocardial infarction**. Z Cardiol 2000; 89: 28-35.
10. Altan A, Ozkan B, Gucogon A, Kadi H, Ozcelik F. **Early and late advance atrioventricular block in acute inferior wall infarction**. Coron Artery Dis 2000; 9: 1-4.
11. Mark E, Josephson, Peter Z, Francis E, Alfred E. **The bradyarrhythmias, disorder of sinus node function and Av conduction disturbance, 14th**. USA: Mcgraw Hill Inc, 1998: 1553-58.
12. Braunwald E. **Heart disease, A textbook of cardiovascular medicine, abnormal electrocardiogram 5th**. USA: WB Saunders, 1997: 124-5.
13. Klinch JW, Rayan TJ. **Right ventricular infarction**. N Engl J MEd 2000; 330: 1211.