

Original Article:

In-Hospital Outcomes of Acute Inferior Myocardial Infarction Associated with Complete Heart Block: A Coronary Care Unit Experience

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Abstract

Background: Complete heart block (CHB) is a common complication in patients of acute inferior myocardial infarction (MI). Their in-hospital outcomes depend on the time of onset of the sequelae, pattern of newer area of infarction and concomitant complications.

Objective: To see in-hospital outcomes of the patients with acute inferior myocardial infarction complicated by complete heart block. **Methods:** This prospective observational study was conducted in the Coronary Care Unit (CCU) under Department of Cardiology, Sher-E-Bangla Medical College Hospital, Barisal, Bangladesh, between November 2014 and May 2015. A total of 100 patients (77 males and 23 females) were selected based on specific inclusion and exclusion criteria by using convenient sampling technique. All study participants were evaluated by detailed history, clinical examination and relevant investigations. Response to different treatment modalities and their complications were recorded. Recovery of CHB was also monitored. **Results:** Mean age of the patients was 57.16±10.24 years. Early presentation (within 24 hours) of CHB had only 4.17% mortality. However, mortality increased in patients as CHB developed after 24 hours (26%). Overall, 10% mortality was evident despite advanced cardiac support. Complications reported in optimum medical treatment included hypotension (17 patients), bleeding (1 patient) and arrhythmia (1 patient). 11% of the patients received temporary pacemaker by femoral vein approach. However, only 1 patient had hematoma, 1 had A-V fistula and 1 developed vesovagal shock during puncture of the femoral vein. Duration of hospital stay was more for the patients who were refractory to conservative medical treatment and received temporary pacemaker; however, the difference was not statistically significant (5.06±0.71 vs. 8.07±1.01; P>0.05). **Conclusion:** Complete heart block associated with acute inferior MI is very much responsive to optimum medical treatment and an early presentation of complete heart block allows an early intervention, better prognosis and recovery.

Keywords: Myocardial infarction, complete heart block, temporary pacemaker, in-hospital outcomes.

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Introduction:

Complete heart block (CHB) is a common complication in patients hospitalized with acute inferior myocardial infarction (MI)¹ and tends to develop in 3-13% of such patients². Even with optimum medical management, sometimes adverse prognosis is observed in those patients in terms of higher in-hospital stay or mortality, and

complications like hypotension, left ventricular failure (LVF), cardiogenic shock, recurrent angina and cardiac arrest^{2,3}. The pathophysiology behind is either ischemia/infarction involving the conduction system of the heart or autonomic imbalance, which gives rise to those series of consequences⁴. Hence, complete heart block complicating acute inferior myocardial infarction

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is a focus of research worldwide due to higher incidence of related complications and mortality. Evidence suggests that South Asian population including Bangladesh has one of the highest rates of coronary artery disease (CAD) in the world⁵. Besides, with recent advancement in cardiac care, most of the patients of acute inferior MI with complete heart block are generally viewed as having a more favorable prognosis than anterior wall infarctions⁶, if they are intervened early and treated conservatively with atropine and isoprenaline/isoproterenol and only few need temporary pacemaker^{2,3,4,6}. However, to our knowledge, no such studies have been carried out in recent years despite advancement of cardiac treatment facilities in our country in this regard. The outcomes of CHB in acute inferior MI with conservative medical treatment and temporary pacemaker in hospitalized patient demands a comparison to produce evidence. Therefore, the present study was designed to observe the management procedures and their outcomes in patients of acute inferior myocardial infarction complicated by complete heart block in a coronary care unit (CCU) of a tertiary level health facility in Bangladesh. This study results will act as evidence in coronary care and management in a developing country setting.

Methods:

This prospective observational study was conducted in the Coronary Care Unit under Department of Cardiology, Sher-E-Bangla Medical College Hospital, Barisal, Bangladesh, between November 2014 and May 2015. The study population was all the patients of acute inferior myocardial infarction admitted into the hospital during that study period, who had associated complete heart block or developed complete heart block after admission. However, convenient sampling technique was adopted. Finally, a total of 100 patients (77 males and 23 females) were selected based on inclusion and exclusion criteria.

Inclusion criteria:

1. Patients diagnosed as complete heart block in association with acute inferior myocardial infarction (according to the Third Universal Definition of Myocardial Infarction)⁷;
2. Patients of acute inferior myocardial infarction who developed complete heart block after hospital admission.

Exclusion criteria:

1. Patients with first and second degree heart block not progressing to complete heart block;

2. Patients with previous conduction blocks;
3. Patients with cardiomyopathy;
4. Patients with congenital or rheumatic heart disease;
5. Patients with history of medication which may cause conduction blocks e.g. clonidine, methyldopa, verapamil, digoxin, etc.

Data collection was done after taking written informed consent. Initial evaluation of all patients done by history taking and clinical examination was recorded in the preformed data collection sheet. Demographic profile, pulse, blood pressure, body weight, height and ECG report at emergency room were recorded. Baseline investigations like ECG and echocardiography, hematological (e.g. complete blood count), and biochemical (e.g. blood glucose, lipid profile, CK(MB), serum troponin-I, serum creatinine, serum electrolytes) tests were also done. ECG was done on daily basis and continuously observed. Initially, patients were intended to be managed by the optimum medical treatment. However, based on clinical evaluation and ECG findings, some patients were intervened by placing temporary pacemaker. The management protocol, response to different treatment modalities and recovery of CHB, either transient or persistent as well as the complications observed – all were recorded in a pre-designed proforma during hospital stay.

Data were recorded and entered in an excel sheet and analyzed using SPSS (Statistical Package for Social Science) version 16.0. The results were presented in tables. Qualitative or categorical variables were described as frequencies and proportions. Proportions were compared using Chi-square (χ^2) test. P value was determined at a 2-sided probability with a significance threshold of <0.05.

Results:

In the present study, most of the patients were between 50-70 years; mean age was 57.16 ± 10.24 years (Table 1). Among 100 patients, 79 patients were managed with optimum medical treatment including atropine and isoprenaline, while 11 patients received temporary pacemaker by femoral vein approach (Table 2). Early presentation (within 24 hours) of CHB had only 4.17% mortality. However, mortality increased in patients as CHB developed after 24 hours (26%). Overall, 10% mortality was observed even with advanced cardiac facility (Table 2). Complications reported in optimum medical treatment category included hypotension (17 patients), bleeding

(1 patient) and arrhythmia (1 patient) (Table 3). In contrast, among the patients who received temporary pacemaker, only 1% had hematoma and 1% developed vesovagal shock during puncture of the femoral vein (Table4). The duration of hospital stay was more for the patients who were refractory to conservative medical treatment and received temporary pacemaker; however, the difference was not statistically significant (5.06±0.71 vs. 8.07±1.01; P>0.05) (Table 5).

Table 1:Distribution of the patient by age group with sex (n=100)

Age group (in years)	Male Frequency (%)	Female Frequency (%)
31-40	5 (6.49%)	0
41-50	14 (18.18%)	4 (17.39%)
51-60	27 (35.07%)	10 (43.48%)
61-70	21 (27.27%)	8 (34.78%)
71-80	8 (10.39%)	1 (4.35%)
>80	2 (2.60%)	0
Total	77	23
Mean±SD	57.16±10.24 years	
Range	38-84 years	

Table 2: Outcome with time of onset of complete heart block (n=100)

Outcome	Patients who had CHB within 24 hours of onset of symptoms n=72		Patients who had CHB after 24 hours n=28
	Diagnosed on admission n=31	Presented after admission n=41	
Recovery with medical management	28 (90%)	36 (87.8%)	15 (53%)
Recovery with temporary pacemaker	2 (6.5%)	3 (7.3%)	6 (21%)
Death	1 (3.5%)	2 (4.87%)	7 (26%)

Table 3:Pattern of complications in patients who received optimum medical treatment (n=79)

Complication	Frequency (%)
Hypotension	17 (21.5%)
Bleeding	1 (1.26%)
Hypersensitivity reaction	0
Arrhythmia	1 (1.26%)

Table 4:Pattern of complications in patients who received temporary pacemaker (n=11)

Complication	Frequency (%)
Hematoma	1 (9.09%)
A-V fistula	1 (9.09%)
Fatal arrhythmia	0
Vasovagal shock	1 (9.09%)
Infection	0

Table 5:Mean duration of hospital stay (n=100)

Mean Duration of Hospital Stay (in days)		
Patients received optimum medical treatment (n=79)	Patients received temporary pacemaker (n=11)	P value
5.06±0.71	8.07±1.01	P>0.05 ^{NS}

NS = not significant; P value reached by Chi-square test.

Discussion:

In the present study, most of the patients were between 50-70 years; mean age was 57.16±10.24years. Similarly, the previous studies done by Abidov et al.⁸, Newby et al.⁹ showed increasing age had increasing possibility of complete heart block. Although majority of the patients in this study were male (77%), it showed no significant difference in clinical outcome. This is also supported by the study done by Ali, Asghar & Rehman¹⁰.

In the present study, patients who developed CHB within 24 hours of onset of symptoms had early response to optimum medical treatment including atropine and isoprenaline. Our data are supported by that of McNeill et al.¹¹, as they reported recovery of CHB within first one hour of thrombolysis in 52% patients and Bates et al.¹² that showed CHB to last a mean of 2.5 hours and under 12 hours in 75% of patients after effective thrombolysis.

CHB was associated with an approximately 2-fold increase in in-hospital mortality in patients with acute inferior MI, in comparison to patients without CHB². Overall, our study showed 10% mortality despite advanced cardiac support. This is quite similar to the short-term mortality as reported in other studies—Ali, Asghar & Rehman¹⁰(9.52%), Christiansen, Haghfelt & Amtorp¹³(19%), and Nicodet al.¹(24%). However, Gregory & Grance¹⁴ (33%), Paulk & Hurst¹⁵ (41%) and Kostuk & Beanlands¹⁶ (45%) reported higher mortality, while Gould et al.¹⁷ (6%) and Bates et al.¹²(6.4%) observed a lower incidence in their studies. All those studies were done in the era of specialized Coronary Care Unit (CCU).

In our study, complications reported in optimum medical treatment category included hypotension (21.5%), bleeding (1.26%) and arrhythmia (1.26%). This has similarity with McNeill et al.¹³ as they reported hypotension; however, no hemorrhagic complications occurred in their patients. Besides, 11% of our patients received temporary pacemaker by femoral vein approach. However, only 9.09% patient had hematoma, 9.09% had

A-V fistula and 9.09% developed vesovagal shock during puncture of the femoral vein, but no lethal arrhythmia was observed. However, Melgarejo Moreno et al.¹⁸ observed that 11.8% patient developed femoral hematoma and 3.6% patients had fatal arrhythmia. Our results have similarities with McNeill et al.¹³ and Melgarejo Moreno et al.¹⁸.

In our study, the duration of hospital stay was comparatively more in those patients who received temporary pacemaker than those who received thrombolytic therapy. However, the difference was not statistically significant. Similar report was found in the study done by Harikrishnan et al.², as reported longer length of stay in the hospital in pacemaker group (5.50 ± 0.14 vs. 6.59 ± 0.04)².

Limitations of the study:

As the sample size was small and the study subjects were selected purposively, it is difficult to generalize the findings to the reference population. It was a single-center study done in the southern part of the country. Variations of outcomes might be observed in other parts of the country, as cardiac care facilities are variable. Moreover, it

was an observational non-randomized study and might be subjected to selection bias. Therefore, we recommend further studies in the same population with larger samples and longer duration, in multiple sites with randomized sampling and ensuring availability of better emergency treatment facility and high technical back-up.

Conclusion

Our study revealed that complete heart block associated with acute inferior myocardial infarction is very much responsive to optimum medical treatment and an early presentation of complete heart block allows an early intervention, better prognosis and recovery.

Conflict of interest: None declared.

Ethical approval issue: The study was approved by the Institutional Ethical Committee of Sher-E-Bangla Medical College, Barisal, Bangladesh.

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Authors' contribution: Concept and design: AIK, MAA; Data collection and compilation: AIK, MAA, MMR, MIM; Data analysis: AIK; Manuscript writing, revision and finalizing: AIK, MAA, MMR, MIM.

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