Original Research Article

Study of arrythmias within 48 hours of Acute Coronary Syndrome

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Abstract

Introduction: Acute coronary syndrome remains the leading cause of mortality in the industrialized world. Development of arrhythmia during the early period of ACS leads to majority of deaths. Study was aimed seeing retrospectively the occurrence of arrhythmias within 48 hours of ACS. **Method:** We did an observational study on 200 patients from April 2019 to June 2020 in our department via fulfilling the criteria. **Results:** Maximum number of patients were in the age group 60-69 years. Arrhythmias were more common among male. Most common arrhythmia was ventricular premature complex (23.5%) followed by 1st degree AV block (11%). Majority of arrhythmia (51.5%) occurred within 6 hours of hospitalization. **Conclusion:** Most of the arrhythmias develops during initial 24hours of ACS with almost half of these occurred within 6 hours of onset of symptoms. Mortality is more common in patients with arrhythmias specifically QRBBB, VT and CHB.

Keywords: Acute coronary syndrome, arrhythmias, ventricular premature complex, mortality.

Introduction

Acute coronary syndrome is caused by an abrupt reduction in a coronary blood flow, resulting in acute myocardial ischemia or infarction.[1] Its components are ST elevation myocardial infarction (STEMI), non ST elevation myocardial infarction (NSTEMI) and unstable angina (UA). Some arrhythmia may be benign while others can be life threatening. Strong connection has been found between the site of infarction and type of arrhythmia. Bradyarrhythmia like sinus bradycardia, escape rhythms and heart blocks are mostly consistent with inferior wall myocardial infarction. Tachyarrhythmia like atrial premature beats, ventricular premature beats and ventricular tachycardia are more consistent with anterior wall myocardial infarction.[2] Major mechanisms of arrhythmia in the acute phase of coronary occlusion are reentry caused by in homogeneity of the electrical characteristics of ischemic myocardium and cellular electrophysiological mechanism for reperfusion arrhythmia which include washout of multiple ions like lactate, potassium, and toxic metabolic substances that have accumulated in the ischemic zone.[3] Identification of the type of arrhythmia is of prime therapeutic and prognostic importance as they will indicate either reperfusion, which is a good prognostic sign, or pathological arrhythmia, which can precipitate further ischemia, failure or shock.

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Material and Methods

It was an observational study carried out from April 2019 to June 2020 in the Department of medicine, Shyam shah medical college and Sanjay Gandhi Hospital, Rewa, MP. We studied 200 cases fulfilling the inclusion & exclusion criteria.

Inclusion criteria

1. Patient age of 18 years or above admitted in the ICCU with acute coronary syndrome.
2. Acute Coronary syndrome presented within 48 hours was included in the study.

Exclusion Criteria

1. Patients less than 18 years of age
2. Old cases of coronary artery disease
3. New cases of acute coronary syndrome presenting after 48hrs.
4. Vasculitis
5. Valvular heart disease

6. Sinus arrhythmia

Data Collection and Methods

Patients admitted in the Medicine ICCU, fulfilling the inclusion criteria, during the study period were taken into the study. A complete clinical, ECG, 2D Echo and laboratory evaluation (CBC, LFT, RFT, RBS),cardiac biomarkers, electrolytes, lipid profile) was done. On the basis of Symptoms, cardiac biomarkers and ECG, the occurrence of arrhythmias in ACS patients were detected.Obtained details were analyzed by appropriate statistical methods.

Statistical analysis

SPSS software version 19 was used to analyze the data. Pages and Number from HP laptop were used for data recording and analysis. Categorical variables were analyzed using Chi square test. A P value <0.05 was taken as significant.

Results

During this study the following results were obtained;

Most of the patients with arrhythmia in acute coronary syndrome were in the group 60-69 years (31.5%) followed by 50-59 years (30.5%) (**Table no.1**).Male patients were in predominance 134(67%) whereas females were 66 (33%). Majority of arrhythmia (51.5%) occurred within 6 hours of hospitalization. Progressively arrhythmia occurrence decreased with time (**Table no 2**).VPC was most frequent arrhythmia in ACS (23.5%) followed by 1st degree AV block (11%)(**Table no 3**).Tachyarrhythmia were mostly associated with anterior wall ACS while bradyarrhythmia were more consistent with inferior wall ACS (**Table no 4**).Chi square value- 56.4 p-value- 0.0001(significant)QRBBB was one of the most commonly associated with mortality (80%). VT, trifascicular block and CHB was associated with 33.33%, 33.33% and 30.76% mortality risk respectively. Benign arrhythmia like VPC, APC, 1stdegree AV block was not associated with mortality which were frequent arrhythmia (**Table no 5**). There was 9.5% mortality associated with arrhythmia within 48hours of ACS (**Table no 6**).

Table 1:Age wise distribution

Age group	No. of patients	Percentage (%)
18-39yr	5	2.5
40-49yr	16	8
50-59yr	61	30.5
60-69yr	63	31.5
70-79yr	35	17.5
>80y	20	10
Total	200	100

Table 2: Time of appearance of arrhythmia after admission

Time	No. of patients	Percentage (%)
<6hr	103	51.5
7-12hr	52	26
13-18hr	18	9
19-24hr	12	6
25-36hr	9	4.5
37-48hr	6	3
TOTAL	200	100

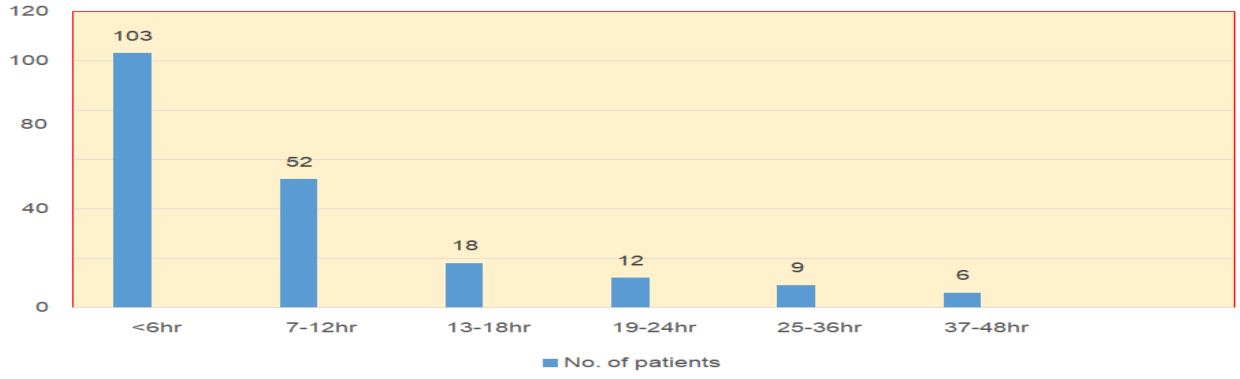

Fig 1:Time of arrhythmia after admission

Table 3: Type of arrhythmia

Arrhythmia	No. of patients	Percentage (%)
VPC	47	23.5
APC	6	3
1st degree AV block	22	11
2nd degree AV block	9	4.5
CHB	13	6.5
Atrial fibrillation	21	10.5
VT	9	4.5
LAHB	15	7.5
LBBB	10	5
RBBB	7	3.5
QRBB	5	2.5
Junctional rhythm	4	2
SA block	2	1
AIVR	12	6
Bifascicular block	12	6
Trifascicular block	6	3
Total	200	100.0

Table 4: Incidence of various type of arrhythmia in relation to site of infarction

Arrhythmia	Anterior	Inferior
VPC	25	22
APC	0	6
AF	12	9
VT	7	2
1st degree AV block	6	16
2nddegree AV block	1	8
CHB	4	9
LAHB	13	2
LBBB	10	0
RBBB	5	2
QRBB	5	0
Junctional rhythm	0	4
SA block	00	2
AIVR	8	4
Bifascicular block	5	7
Trifascicular block	6	0

Table 5: Arrhythmia associated with mortality

Arrhythmia	Total	No. of deaths	Percentage (%)
CHB	13	4	30.76
VT	9	3	33.33
QRBBB	5	4	80
LBBB	10	1	10
AF	21	4	19.04
Trifascicular Block	6	2	33.33
Bifascicular Block	12	1	8.33

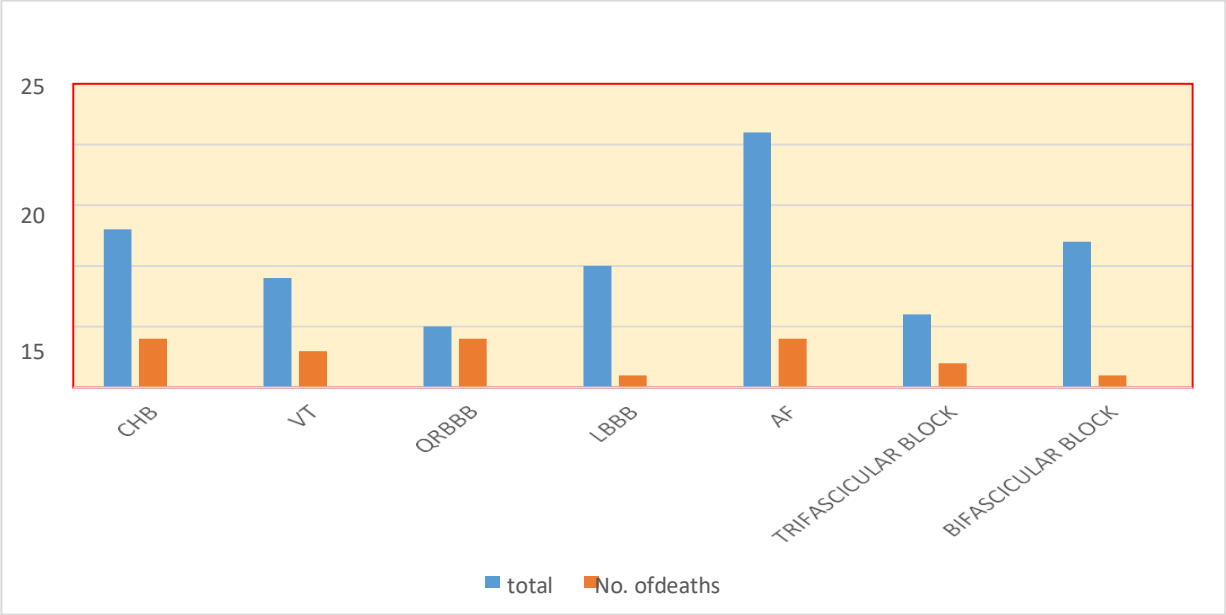

Fig 2:Arrythm associated with mortality

Table 6: Outcome amongst patients with ACS who had arrhythmia

Outcome	No. of patients	Percentage
STABLE	181	90.5%
DEATH	19	9.5%

Discussion

Observation from the present study shows a maximum number of patients fall in the age group of 60-69 years (31.5%). Percentage of patients between the age group of 50-59 were 30.5%. The findings were similar to the results of studies done by various Indian researchers like Singh PS et al[4], study showed that 29.54% patients were in the age group 61-70 years and study conducted by Mahajan D et al[5] showed 35.55% patients were between 61-70 years also 21.11% were between 51- 60 years.There was a predominance of male patients i.e. 134 (67%), with only 66(33%) females. This was also similar to the study published by Nagendra Prasad T et al[6] which showed male predominance (63.6%) and study by Mahajan D et al[5] showed 54.54% patients were males.The majority of arrhythmia 185(92.5%) in our study occurred within the first 24 hours of symptoms with maximum patients presenting within initial 6 hours 103(51.5%). Similar findings were also observed by Patil P.R. et al[7], where majority of arrhythmia (90%) occurred within 24 hours of hospitalization. Aufderheide TP et al[8] noted that 90% patients were having abnormality of cardiac rhythm and cardiac conduction disturbance within 24 hours of ACS.VPC was the most frequent arrhythmia found in our study 47(23.5%) which was mostly associated with anterior wall ACS 22 (53.19%). This was similar with the study by Patil B.M[9] in which VPC was the most consistent arrhythmia in 35% out of which 68.57% were associated with anterior wall MI.In the current study tachyarrhythmia (AF, AIVR, VPCs and ventricular tachycardia) were more common in anterior wall (anterior, antero-septal & extensive anterior) myocardial infarction. i.e. out of 89 cases of tachyarrhythmia 52 cases were found involving AWMI (58.42%), whereas bradyarrhythmia (AV block, SA block, junctional rhythm and bifascicular block) were more common in inferior wall myocardial infarction i.e. out of 62 patients of bradyarrhythmia 46 patients were associated with IWMI (74.19%). This association between anatomical site of myocardial infarction and types of cardiac arrhythmia was statistically very highly significant using chi square test (p=0.0001). Similar association between anatomical site of myocardial infarction and types of cardiac arrhythmia were observed by Rathod at al[10] in which tachy-arrhythmia were commonly associated with anterior wall MI 61.76% and bradyarrhythmia mostly associated with inferior wall MI 63.15%, and study by Marangmei et al[11] showed that byadyarrhythmia was mostly associated with inferior wall MI than anterior wall MI (28.95% vs 6.55%)In our study overall mortality was 30.76% in CHB patients which was similar to study conducted by Spencer F et al.[12]In our study mortality was more in CHB associated with anterior wall MI than inferior wall MI which was very well similar to study done by Melgarejo Moreno A et al[13] and Meine TJ et al[14].In our study mortality was high i.e 4 out of 5(80%) in QRBBB associated with AWMI which was well in comparison with study conducted by Wong CK et al.[15]In our study, over all ventricular tachycardias were seen in 9 patients (4.5%). The frequency of VT was seen more in anterolateral MI than antero-septal MI, which was

comparable with study conducted by Horvat D et al.[16] In our study mortality in patients with VT was 33.33% whereas study conducted by Al-Khatib S et al[17]was 24%.This discrepancy could be explained by larger infarcts and older age in present study.In this study reperfusion arrhythmia specially AIVR was found to be 12(6%) mostly in anterior wall MI (66.66%) than inferior wall MI (33.33%). AIVR showed a reliable indicator of coronary artery reperfusion.In our study there was no mortality in cases with reperfusion arrhythmia, which was very similar with study conducted by Ghuran AVand Cann et al.[18] They showed VPCs were usually asymptomatic and their presence in the preinfarction period, regardless of frequency and complexity (bigeminy, multi-formity etc.) bears no relation to the mortality. AIVR is usually benign and has no adverse effect on mortality.[18] The present study also highlights this aspect.

Conclusion

The study showed high prevalence of periinfarction arrhythmia. Higher mortality was seen in those patients with late hospital presentation highlighting the importance of recognizing ACS early, its associated complication & the need for early presentation to the hospital for better outcome.

Limitations

- The study was carried out in a limited population which cannot represent the entire population of world.
- As holter monitoring was not available some of the arrhythmia might be missed.

References

1. EzraA. Amsterdam,Nanette K. Wenger,Ralph G. Brindis,Donald E. Casey Jr, Theodore G. Ganiats, David R. Holmes Jr, et al., AHA/ACC Guideline for the Management of Patients With Non– ST-Elevation Acute Coronary Syndromes: A Report of the American College of Cardiology/ American Heart Association Task Force on Practice Guidelines. Circulation, 2014; 130(25): 1
2. Lombardi F, Sandrone G, Spinnler MT, et al. Heart rate variability in the early hours of an acute myocardial infarction. American Journal of Cardiology. 1996; 77:1037–1044.
3. Antman EM, Zipes DP, Libby P, Bonow A, Braunwald E. ST elevation myocardial infarction: Management. In: editors. Braunwald's Heart Disease. 8th ed. Philadelphia: Saunders; 2008. p. 1276-9.
4. Singh PS et al. Clinical profile and risk factors in acute coronary syndrome. Journal, Indian Academy of Clinical Medicine. 2013;14(2):130-2.
5. Mahajan D. D, Baghel R. S and Nagdeve R. N. Clinical Profile and Risk Factors Associated with Acute Myocardial Infarction. International Journal of Biomedical and Advance Research 2019; 10(7): e5234.
6. Nagendra Prasad T, KanyaKumari M. Clinical profile and risk factors associated with acute myocardial infarction. J. Evid. Based Med. Healthc. 2019; 6(45): 2881-2885.
7. Patil P.R., Khatana, P. Patil, D.R– Incidence of Cardiac Arrhythmia in Patients with Acute Myocardial Infarction during the First 48 Hours of the Onset of Chest Pain. International Journal of Advances in Medicine, 2017;4(4):144.
8. Aufderheide TP. Arrhythmia associated with acute myocardial infarction and thrombolysis. Emergency Medicine Clinics of North America, 1998; 16(3):583–600.
9. Patil,B.M.–Study on Site of Acute Myocardial Infarction Associated with Arrhythmia and Outcome.International Journal of Advances in Medicine, 2015;2(1):21.
10. Rathod,S., Parmar, P., Rathod, G.B. & Parikh, A. Study of various cardiac arrhythmia in patients of acute myocardial infarction.International Archives of Integrated Medicine, 2014;1(4):32-41
11. Marangmei L, Singh S.K, Devi K.B, Raut S.S.Profile of Cardiac Arrhythmia in Acute Myocardial Infarction Patients within 48 Hours of Admission: A Hospital Based Study at RIMS Imphal.Journal of Medical Society, 2014;28(3):175
12. Spencer FA, Jabbour S, Lessard D, Yarzebski J, Ravid S, Zaleskas V, et al. Two- decade-long trends (1975-1997) in the incidence, hospitalization, and long-term death rates associated with complete heart block complicating acute myocardial infarction: a community- wide perspective. Am Heart J. 2003 ;145 (3):500-7
13. Moreno MA, Tomás GJ, Alberola GA.Prognostic significance of advanced atrioventricular block in patients with acute myocardial infarction. Med Clin. 2000; 114(9):321-5
14. Meine TJ, Al-Khatib SM, Alexander JH, Granger CB, White HD, Kilaru R et al. Incidence, predictors, and outcomes of high-degree atrioventricular block complicating acute myocardial infarction treated with thrombolytic therapy. Am Heart J.2005;149(4):670-4
15. Wong CK, Stewart RA, Gao W, French JK, Raffel C, White HD. Prognostic differences between different types of bundle branch block during the early phase of acute myocardial infarction: insights from the Hirulog and Early Reperfusion or Occlusion (HERO)-2 trial. Eur Heart J.2006;27(1):21-8
16. Horvat D, Grman-Fanfani A, Kupres V, Grman J, Sporcić-Jelić V. Frequency of ventricular premature beats and ventricular tachycardia in STEMI treated with fibrinolytics. Coll Antropol. 2008; 32(1):99- 102
17. Al-Khatib SM, Stebbins AL, Califf RM, Lee KL, Granger CB, White HD et al. Sustained ventricular arrhythmia and mortality among patients with acute myocardial infarction: results from the GUSTO-III trial. Am Heart J. 2003;145(3):515-21
18. Ghuran AV, Cann AJ. Ischaemic heart disease presenting as arrhythmia. Br Med Bulletin. 2001;59:193-210

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