ORIGINAL ARTICLE

Coronary Angiographyic Findings in Patients of Acute Coronary Syndrome with Atrial Fibrillation

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ABSTRACT

Background: Acute coronary syndrome (ACS) is a fatal entity and can be even more deadly if they develops concomitant complications in the form of arrhythmias like atrial fibrillation. Coronary artery disease is thought to be more severe in cases with ACS and atrial fibrillation.

Objective: To determine the angiographic findings in patients presenting with acute coronary syndrome and atrial fibrillation and To find the involvement of more common circulation (right or left coronary circulation) leading to atrial fibrillation in acute coronary syndrome.

Materials and Methods: This 6 month case series study conducted at department of Cardiology, Sheikh Zayed Hospital, Rahim Yar Khan from 14-01-20 to 14-09-20. A total of 198 cases aged 30-60 years of both gender were included in the study through non-probability consecutive sampling. Patients suffering with ACS and has atrial fibrillation on presentation or develops within 24 hours of admission were included. They underwent coronary angiography to look for number of vessels involved, severity of coronary artery disease and culprit vessel involved.

Results: In this study there were total 198 cases. Mean age of the participants was 50.09±5.88 years and mean duration of atrial fibrillation was 14.91± 4.51 hours. There were 70 (35.35%) cases with DM, 78 (39.39%) with HTN and 61 (30.81%) smokers. STEMI was found in 35 (17.68%) and NSTEMI in 152 (76.77%) of cases as in figure 05. One vessel disease was observed in 26 (13.13%), two vessel disease in 147 (74.24%) and three vessel disease in 25 (12.63%) of cases. Mild disease on angiography was seen in 45 (22.73%), moderate in 132 (66.67%) and severe in 21 (10.61%) of the cases.it was found that out of 198 patients , 146 (74 %) had right coronary artery culprit lesion and 51 (26 %) has left sided coronary circulation culprit lesion and from left coronary circulation, left circumflex was most commonly involved : 41 (21 %) of patients as compared to only 10 (5 %) patients had culprit in left anterior descending artery.

Conclusion: AF in patients with ACS is most commonly associated with right coronary artery lesionsand right type of coronary circulation. In terms of number and severity of disease the most common pattern observed was two vessel disease comprising almost 3/4th of all cases and moderate disease was in most of the vesselsrespectively.

Key words: ACS, Atrial fibrillation

INTRODUCTION

Arrhythmiasis the most common complication seen in patients present to emergency with ACS (including both Non-STEMI and STEMI).Atrial fibrillation (AF) is one the common arrhythmias seen during acute ACS setting. In acute myocardial infarction (AMI) is has an incidence of about 6 and 21%.There are many predictors which make few patients more prone to AF in the setting of ACS which includes advanced age, female sex, long history of hypertension, obesity, COPD and already reduced left ventricular systolic function . [1, 2]

ACS complicating AF during hospitalization has many serious short term implications like acute heat failure, ischemic stroke, tachycardia leading to worsening of heart failure and ischemia, anticoagulation/ antiplatelet dose adjustment issues related to PCI and also long term complication like worsening or new onset of heart failure and ischemic stroke as these patients are more prone to recurrent AF.[3]

There may be many other causes of this AF complicating ACS other than this acute ischemic injury to myocardium and reduced ejection fraction which are the two most common .The other common causes are electrolyte abnormalities, acute ethanol intoxication, drugs,post pulmonary embolism and hyperthyroidism precipitated by acute ACS insult. While atrial fibrillation secondary to acute coronary syndrome, sepsis, acute pericarditis, postoperative in cardiac and non-cardiac surgery, pulmonary embolism, or acute pulmonary disease like pneumonia and exacerbation of COPDis considered separately as it is usually seen that the chances of AF to recur is very less once the precipitating condition like chest disease is treated and electrolyte imbalance is corrected.[4] The stronger predictor which determines the occurrence of subsequent AF is the reduced ejection fraction.

Coronary angiography is performed now a days in every patient of ACS to find out the extent of coronary artery disease, type of lesion, number of vessels involved and in primary PCIespecially to treat the culprit lesion and culprit artery. According to study done by Androulakis A et al, obstructive CAD was present in angiography in 27 (32.5%) of the 83 patients. 19 of these patients had one vessel disease (10.84%), 5 patients had two vessel disease (6.02%), and 3 (3.61%) patients had three vessel disease.[79]Coronary angiography data analysis of study showed that patients with AF more often had right coronary circulation involvement (87.5 % vs. 80.4 %, p=0.043) as well as lesions of the right coronary artery (92.1 % vs. 85.8 %, p=0.037), and less often lesions of left coronary circulation (16.3 % vs. 24.8 %, p=0.027). [6]

The aim of my study is to find out the coronary angiographic findings in terms of number vessels involvement and number of vessels which has severe disease inAF patients presenting with ACS and also to find out which is the most common coronary artery involved in AF with ACS which will be helpful in performing primary PCI.

Objective: To determine the angiographic findings in patients presenting with acute coronary syndrome with atrial fibrillation.

Operational definitions:

Angiographic findings: On angiography lesions were classified into three types.

Mild: when stenosis was 30% to <50%

Moderate: when stenosis was 50 to <70%

Severe: when stenosis was >70%

Presence of ≥50% stenosis of any vessel on angiography was taken as positive which was assessed by visual assessment by 2 consultant cardiologists and as well with the help of software QCA (Quantitative Coronary Analysis). Involvement of single vessel was labeled as 1 VD, for 2 as 2VD and for 3 as 3VD.

METHODOLOGY

Study Design: Case series study.

Setting: Department of Cardiology, Sheikh Zayed Hospital, Rahim Yar Khan.

Duration: 14-01-19 to 14-09-19

Sample Size: The sample size was calculated as 198 by keeping the confidence level equal to 95% and the margin of error equal to 2.6% while anticipated prevalence of 3 vessel disease as 3.61% in previous studies with ACS and atrial fibrillation.[8]

Sampling Technique: Non-probability consecutive sampling.

Inclusion Criteria:
1   Age 30 to 60 years
2   Both Gender
3   Cases of ACS with atrial fibrillation as per operational definition within 24 hours.

Exclusion Criteria:
1.   All cases with previous history of CABG (assessed by history and medical record)
2.   Electrolyte imbalance (potassium more than 06 mEq/L).
3.   Known case of valvular heart disease, heart failure with reduced ejection fraction, Ischemic heart disease, congenital heart disease
4.   Any surgical intervention during first 24 hours of admission for ACS.
5.   Case of having any pre-existing chronic liver or kidney failure (assessed by history and medical record).

Data collection Procedure: After the approval of synopsis from CPSP, and from ethical committee of Sheikh Zayed Hospital (SZH), Rahim Yar Khan (RYK) an informed consent was taken from each patient for inclusion in this study. Sociodemographic data like age, gender and other data like DM (fasting blood sugar more than 126mg/dl on any single occasion), HTN (systolic BP more than 140 and diastolic BP more than 100 mmHg on two occasions 24 hr apart), smoking (10 cigarettes per day more than 1 year), type of ACS like STEMI (AWMI or IWMI), NSTEMI, Unstable Angina and duration of atrial fibrillation was taken and recorded on a predesigned proforma attached as Annexure. These cases then underwent angiography within 48 hours of admission in the angiography unit of the same institute by a consultant cardiologist with at least 1-year post fellowship experience and were assessed for stenosis more than and equal to 50% on angiography in any vessel and the number of vessel involved were noted as per operational definition. The results were noted on the same proforma.

Data Analysis: Data was analyzed with the help of SPSS version 21. Quantitative variables like age, and duration of atrial fibrillation were presented in terms of mean ± SD (Standard Deviation). Frequency & percentages were calculated for gender, DM, HTN, Smoking, type of ACS and outcome variable i.e. vessels involved on angiography. Effect modifier like age, gender, duration, DM, HTN, smoking and type of ACS were controlled through stratification. Post stratification Chi-Square test were applied, taking P-value < 0.05 as significant.

RESULTS

In this study, there were total 198 cases (figure 3). Mean age of the participants was 50.09±5.88 years and mean duration of atrial fibrillation was 14.91±4.51 hours. There were 70 (35.35%) cases with DM, 78N (39.39%) with HTN and 61 (30.81%) smokers as in figures 04-06. STEMI was found in 35 (17.68%) and NSTEMI in 152 (76.77%) of cases.

One vessel disease(I) was observed in 26 (13.13%), two (II) vessel disease in 147 (74.24%) and three(III) vessel disease in 25 (12.63%) of cases as in figure01. Three vessel disease was more seen in males affecting 19 (14.40%) vs 6 (9.09%) females and II vessel disease was more in females affecting 92 (69.69%) male vs 55 (83.33%) females with p= 0.11 .

There was no significant difference in terms of age group and type of vessel involved with p= 0.52 (table 05). There were 42 (71.19%) cases with II vessel disease in atrial fibrillation of 1-12 hours as compared to 105 (75.40%) cases with duration more than this with p= 0.29 as in table 06.
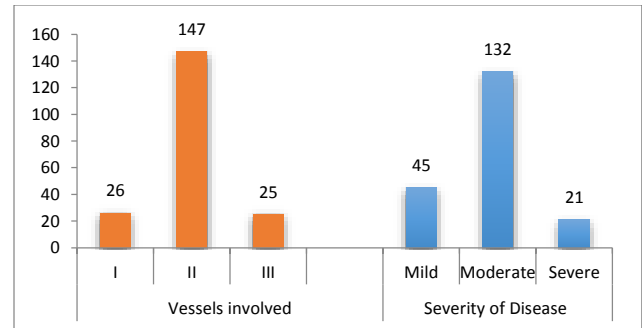

Figure 1: Vessels Involved On Angiography Severity Of Disease In Study Subjects N= 198
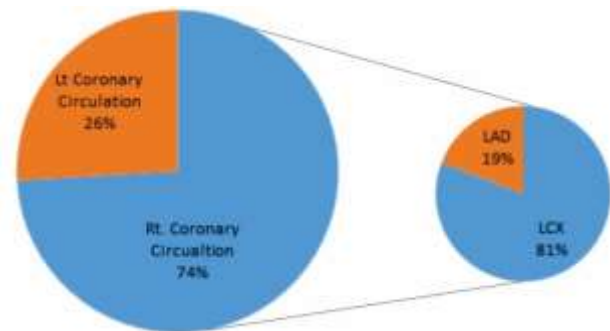

Figure 2: Severity Of Disease In Study Subjects

there was no difference observed in both groups regarding type of vessel involved with respect to DM, HTN and smoking with p= 0.14, 0.99 and 0.99 respectively. In cases with all STEMI, NSTEMI and Angina II vessels disease was most commonly involved affecting 26 (74.28%) vs 114 (75%) vs 7 (63.64%) cases in their respective groups with p value of 0.28 as. Mild disease on angiography was seen in 45 (22.73%), moderate in 132 (66.67%) and severe in 21 (10.61%) of the cases as in figure 02.

DISCUSSION

Chest pain and palpitations are the two most common presentations of the patients coming to the chest pain with cardiovascular events. ACS is further classified into unstable angina and myocardial infarction (MI) which has further two subtypes; Non segment elevation MI (STEMI) and ST segment elevation MI (STEMI). These are differentiated on the basis of ECG findings and Troponin-Iand/or Troponin-T levels. [7,8]72-73One of the most common complication of ACS seen in ER is the arrhythmias. Most common arrhythmias are premature ventricular contractions, bigeminy, ventricular tachycardia, ventricular fibrillation and atrial fibrillation.

ACS when complicated with atrial fibrillation may leads to worsening of chest pain, heart failure, cardiogenic shock and even to stroke. After medical management of the AF the patients are usually taken to Cath lab for angiography to fix the coronary artery lesion with percutaneous coronary intervention (PCI).

There was no association of gender and age groups with the type of vessel involved and similar was seen in previous results as well where any particular vessel pattern was not involved with any group of the patients. In a study done by Kralev S et al,[9]in subjects of having Atrial Fibrillation in cases of ACS, the overall detection on angiography was found positive in 34% of the cases.

Crijns et al. found an incidence of 24% and another study focusing on middle-aged (50±9 years) asymptomatic subjects with AF, reported an incidence of 22%.[10]The average age of the subjects that were included in the present study were almost similar to their age group and mean age of the participants was 50.09±5.88 years in present study and the most commonly

involved vessel in this study was two vessel disease seen in 70 (70.71%) cases with age 30-44 years vs 77 (77.78%) cases with age 45-60 years; though no such cut off values were used in their study.

In the present study in cases presented with ACS and atrial fibrillation, upon angiography one vessel disease was observed in 26 (13.13%), II vessel disease in 147 (74.24%) and III vessel disease in 25 (12.63%) of cases. These results were comparable with the findings of the studies done in the past where two vessel disease was the most common finding found in cases admitted with IHD.

Some of these studies analyzedretrogradely the data from previous hospital registries and few had difference inclusion criteria's and they included all those cases that were admitted with in and out of hospital cardiac arrest and angiography was done as a part of the surveillance work up. And that's why there was immense variation in the results of the angiography.

According to a study done by Androulakis A et al, on retrospective analysis, obstructive CAD was present in angiography in 27 (32.5%) of the 83 patients. 19 of these patients had one vessel disease (10.84%), 5 patients had two vessel disease (6.02%), and 3 (3.61%) patients had three vessel disease.[11]

Watson et al. also reported nearly similar results and they found that CAD was seen in 40% in the patient group with >50% time in AF.[12]On the other hand, Van Gelder et al. detected an incidence of CAD of 18% and the lower results were reported because they included only those cases that had chronic A fib as compared to the cases admitted with new onset A fib along with ACS as was the inclusion criteria of the present study.[13]

In this study, we observed that the patients presented with ACS and atrial fibrillation, after angiography findings were analyzed it was found that out of 198 patients, 147(74 %) had right coronary artery culprit lesion and 51 (26 %) has left sided coronary circulation culprit lesion and from left coronary circulation, left circumflex was most commonly involved:41 (21 %) of patients as compared to only 10 (5 %) patients had culprit in left anterior descending artery.

Analysis of coronary angiography data of one Russian study showed that patients with AF more often had right type of coronary circulation (87.5 % vs. 80.4 %, p=0.043) as well as the right coronary artery culprit lesions (92.1 % vs. 85.8 %, p=0.037), and less often lesions of left coronary artery (16.3 % vs. 24.8 %, p=0.027).

Limitations of study: There were few limitations of this study as this study didn't look for the chronic cases of non valvular types of atrial fibrillation which could have been association with stable IHD.

However, the main strong point of this study is that it showed very clearly in the setting of ACF with AF the common circulation involved is the right coronarycirculation and right coronaryartery, which is very helpful in the setting of primary percutaneous intervention.

CONCLUSION

AF in patients with ACS is most commonly associated with right coronary artery lesionsand right type of coronary circulation. In terms of number and severity of disease the most common pattern observed was two vessel disease comprising almost 3/4th of all cases and moderate disease was in most of the vessels respectively.

Conclusion: Coronary artery disease is the hallmark of all types of ischemic heart diseases and the most common type observed was II vessel disease comprising 3/4th of all cases and there is no significant association with type of vessel with any confounding variable of the study.

REFERENCEES

1. Roffi M, Patrono C, Collet JP, et al. 2015 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation: Task Force for the Management of Acute Coronary Syndromes in Patients Presenting without Persistent ST-Segment Elevation of the European Society of Cardiology (ESC). Eur Heart J. 2016 Jan 14. 37(3):267-315.
2. Thygesen K, Alpert JS, Jaffe AS, et al. Third universal definition of myocardial infarction. Circulation.2012 Oct 16. 126(16):2020-35.
3. Gardner LS, Nguyen-Pham S, Greenslade JH, et al. Admission glycaemia and its association with acute coronary syndrome in Emergency Department patients with chest pain. Emerg Med J. 2015 Aug. 32(8):608-12.
4. Boggs W. Blood glucose predicts outcomes of patients with chest pain. Reuters Health Information. November 11, 2014.
5. Antman EM, Tanasijevic MJ, Thompson B, et al. Cardiac-specific troponin I levels to predict the risk of mortality in patients with acute coronary syndromes. N Engl J Med. 1996 Oct 31. 335(18):1342-9.
6. Heidenreich PA, Alloggiamento T, Melsop K, et al. The prognostic value of troponin in patients with non-ST elevation acute coronary syndromes: a meta-analysis. J Am CollCardiol. 2001 Aug. 38(2):478-85.
7. Hess EP, Brison RJ, Perry JJ. Development of a clinical prediction rule for 30-day cardiac events in emergency department patients with chest pain and possible acute coronary syndrome. Ann Emerg Med. 2012;59(2):115–25.
8. Möckel M, Searle J, Muller R, Slagman A, Storchmann H, Oestereich P, et al. Chief complaints in medical emergencies: do they relate to underlying disease and outcome? The Charité Emergency Medicine Study (CHARITEM). Eur J Emerg Med. 2013;20:103–08.
9. Kralev S, Schneider K, Lang S, Süselbeck T, Borggrefe M. Incidence and severity of coronary artery disease in patients with atrial fibrillation undergoing first-time coronary angiography. PLoS One 2011;6:e24964
10. Crijns HJ, Van Gelder IC, Van Gilst WH, Hillege H, Gosselink AM, et al. (1991) Serial antiarrhythmic drug treatment to maintain sinus rhythm after electrical cardioversion for chronic atrial fibrillation or atrial flutter. Am J Cardiol 68: 335–41.
11. Androulakis A, Aznaouridis KA, Aggeli CJ, Roussakis GN, Michaelides AP, Kartalis AN, et al. Transient ST-segment depression during paroxysms of atrial fibrillation in otherwise normal individuals: relation with underlying coronary artery disease.J Am CollCardiol. 2007;50(19):1909-11.
12. Watson S, Arya A, Sulke N, Lip GY (2010) Relationship of indices of Inflammation and thrombogenesis to arrhythmia burden in paroxysmal atrial fibrillation. Chest 137(4): 869–876.
13. Van Gelder IC, Groenveld HF, Crijns HJ, Tuininga YS, Tijssen JGP, et al. Race II Investigators.Lenient versus strict rate control in patients with atrial fibrillation. N Engl J Med. 2010; 362(15): 1439–1441.