Original Article

FREQUENCY OF CORONARY ARTERY ECTASIA IN PATIENTS WITH MYOCARDIAL INFARCTION

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Author's Contribution

FI:Conducted the study and wrote the article. MS: Helped in review the article. SS: Re-arranged data and corrected article. IH: Tables and figures. KS and SN made corrections and did the proof reading.

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ABSTRACT:
BACKGROUND: Although coronary artery ectasia (CAE) is a rare entity but its correlation with myocardial infarction (MI) leads to significant considerations in management of patients with MI .Coronary artery ectasia (CAE) may be isolated i.e. occurs without obstructive coronary artery disease (CAD) or can coexist with CAD. In majority of the patients, ectasia coexists with CAD. CAE may be a precipitating factor of acute coronary syndrome (ACS) including acute MI even without associated stenotic lesions. About 30% patients with CAE present with ACS. This study was conducted to calculate the frequency of coronary artery ectasia in patients with myocardial infarction (MI).
MATERIALS & METHODS: One ninety one patients presenting with myocardial infarction of age 18-60 years of either gender undergoing coronary angiography were included. Patients with valvular heart disease, cardiomyopthies, heart failure and renal failure were excluded. Full demographic information including name, age, gender and risk factors like hypertension (HTN), diabetes mellitus (DM) and smoking were noted. The coronary angiographic films were reviewed by the consultant cardiologist and presence of coronary artery ectasia was noticed.
RESULTS:Mean age was 49.28 ± 9.64 years. Out of the 191 patients, males were 85.86% while females were 14.14% with ratio of 6:1. The percentage of vessel involvement in descending order was right coronary artery in 56.02%, left anterior descending artery in 25.13%, left circumflex artery in 13.10% and left main stem in 5.76% patients. Coronary artery ectasia was found in 62.83% patients, while it was not present in 37.17% patients.
CONCLUSION: Coronary artery ectasia was found in 62.83% patients with myocardial infarction.
KEYWORDS: Ischemic heart disease, coronary artery ectasia, angiography, myocardial infarction

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INTRODUCTION

Acute coronary syndrome is a major cause of mortality and it includes ST-elevation myocardial infarction (STEMI), non-ST elevation myocardial infarction (NSTEMI) and unstable angina.[1] In STEMI there is total coronary artery occlusion due to thrombus formation which leads to myocardial necrosis.[2] NSTEMI is due to partial narrowing of coronary artery which leads to increase in serum cardiac biomarkers and has high mortality.[3]

In 2004, WHO (World Health Organization) reported that ischemic heart disease is the cause of mortality in approximately 12.2% and commonly involves middle to high income areas.[4] Approximately 3 million people present with STEMI and nearly 4 million patients present with NSTEMI annually.[5] STEMI is present in males two folds more as compared to females.[6] Disability Adjusted Life Years (DALYs) is a common parameter to predict the course of chronic disease like myocardial infarction and it is predicted that ischemic heart disease will be the second important cause of morbidity by 2030.[4]

The dilatation of Coronary artery at least 1.5 times the normal diameter is labeled as coronary artery ectasia (CAE).[7] 3-8% patients present with CAE which may be a form of atherosclerotic process.[8,9] CAE may be congenital in 20-30% and may be associated with connected tissue disorders. It may be localized or diffuse and may be present with or without obstructive CAD.[10]

CAE may be benign or it may present with acute coronary syndrome (ACS).[11] CAE may lead to sluggish flow in coronary arteries thereby leading to development of anginal symptoms. It may present with MI due to formation of micro-emboli or total thrombotic occlusion of vessel.[12-15] CAE is responsible for higher prevalence of poor outcomes as compared to patients with normal coronary arteries. A previous study has shown approximately 15% mortality in patients with CAE.[16-17]

CAE may be present in young patients who are hypertensive, obese and smokers.[18] while diabetes mellitus has shown inverse link with CAE.[19] CAE may be isolated involving a single segment of coronary artery or it may involve all the three coronary arteries.[10] It may be present in obstructive CAD and commonly involves right coronary artery. The involvement of left main stem is less common as compared with other arteries.[11]

The most important method for diagnosing CAE is by doing coronary angiography. Most commonly it involves right coronary artery, left anterior descending artery and circumflex in descending order. [12]

Ectasia has been divided into four major types. Type 1 involves diffuse ectasia in 2-3 different arteries, Type 2 involves diffuse disease in one artery and native disease in another, Type 3 has diffuse disease in one artery while Type 4 involves localized or segmental ectasia.[20]

Valente S et al [21] in his study showed a prevalence of 58.1% of CAE. Endoh S et al [22] showed a frequency of CAE 65% in MI patients.

Previous research studies have shown that there is strong correlation between MI and CAE and CAE may have possible implications when deciding medical or revascularization strategies in patients of MI. So this study was carried out to calculate the frequency of coronary artery ectasia (CAE) in patients who present with myocardial infarction (MI).

MATERIAL AND METHODS:

This cross sectional, descriptive study was performed at angiography department of Ch. Pervaiz Elahi Institute of Cardiology, Multan from 1st March 2014 to 31st August 2014. Sample size was calculated as 190 by using formula [sample size = n = (Z_(1-α/5 P(1-P))^2)/d^2] with confidence interval of 95%, margin of error 7% and taking expected frequency of coronary artery ectasia in myocardial infarction as 58.1%.21 Non-probability, consecutive sampling was done. Patients with myocardial infarction with age 18-60 years regardless of gender were enrolled. Patients having valvular /congenital heart diseases, cardiomyopathies, decompensated congestive heart failure, renal failure and contrast allergy were excluded.

DATA COLLECTION PROCEDURE:

191 patients with Myocardial Infarction i.e. detection of rise and/or fall in cardiac troponin with atleast one value above the 99th percentile of the upper reference limit, together with evidence of ischemia on ECG (ST segment elevation or depression) were included. All patients underwent coronary angiography. The data like age, gender and risk factors like hypertension (HTN), diabetes mellitus (DM) and smoking were recorded. DM was assessed on history or fasting blood sugar >110mg/dl or random blood sugar >200mg/dl, HTN was assessed on history and blood pressure >140/90 mmHg and smoking was assessed only on history. The coronary angiographic films were reviewed by the consultant cardiologist. The vessel

segment was labeled as ecstatic if it has abnormal dilatation of 1.5 times to the nearby normal coronary artery segment on coronary angiography.

DATA ANALYSIS PROCEDURE:

SPSS version 16.0 was used to enter the data. Variable like age were shown as mean and standard deviation. Qualitative variables like gender, type of vessel involved and coronary artery ectasia (yes/no) were presented as percentages and frequencies. Stratification was done on these qualitative variables age, gender, type of vessel involved and other confounding variables like DM, smoking and HTN to see the effect of these variables on outcome variable. Chi-square test was used post stratification. significant p- value was taken as ≤ 0.05.

RESULTS:

The age range was from 18 -60 years with mean of 49.28 ± 9.64 years. 103 (53.93%) patients were between 51 to 60 years of age. Males were 164 (85.86%) and females were 27 (14.14%) with ratio of 6:1 (Figure-3). The percentage of vessel involvement in descending order was right coronary artery (RCA) in 56.02%, left anterior descending artery (LAD) in 25.13%, left circumflex artery (LCX) in 13.10% and left main stem in 5.76% patients (Figure-4). Frequency of patients with status of diabetes mellitus, hypertension and smoking has been shown in Table-2.

CAE was present in 120 (62.83%) patients, whereas there was no coronary artery ectasia in 71 (37.17%) patients as shown in Figure-5. Post-stratification, it was noticed that there was significant difference of coronary artery ectasia presence among various age groups and genders as shown in Table 3 & 4 respectively while the stratification of type of vessel involvement has shown in Table 5 which showed no important difference. Stratification of confounding variables i.e. diabetes mellitus, hypertension and smoking was shown in Table 2, & 3 respectively and p-value was found <0.05 which is statistically significant.

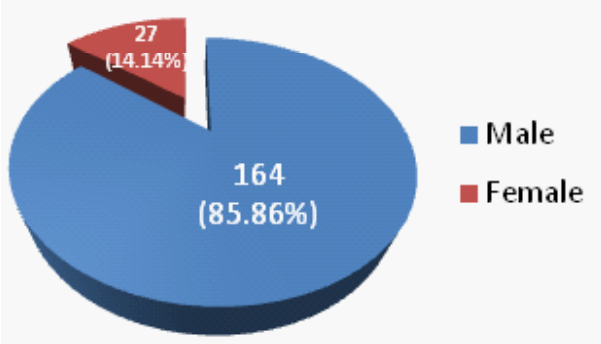

Figure-1: Percentage of patients according to gender (n=191).

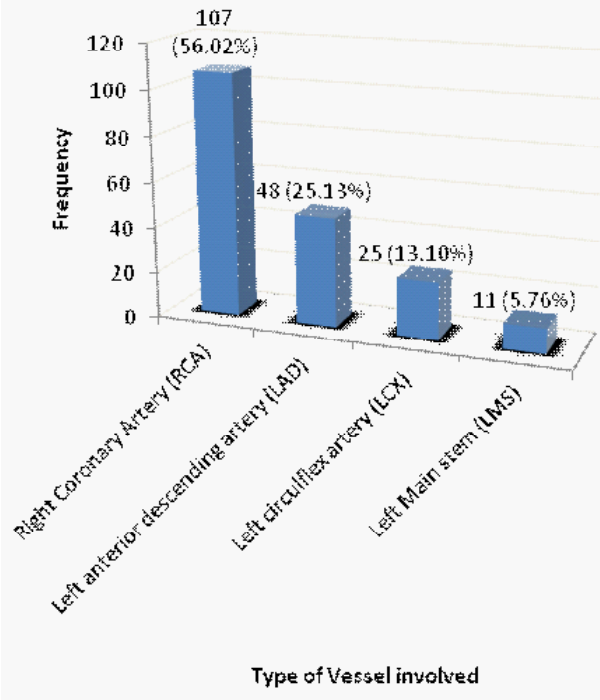

Figure-2: Percentage of patients according to type of vessel involved (n=191).

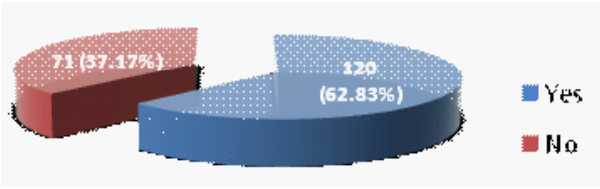

Figure-3: Percentage of patients with coronary artery ectasia (CAE) (n=191).

Table-1: Age distribution according to gender (n=191).

Age (years)	Male		Female		Total	
	No. of patients	Percentage	No. of patients	Percentage	No. of patients	Percentage
18-30	12	6.28	02	1.05	14	7.33
31-40	24	12.57	04	2.09	28	14.66
41-50	38	19.89	08	4.19	46	24.08
51-60	90	47.12	13	6.81	103	53.93
Total	164	85.86	27	14.14	191	100.0

Mean ± SD = 49.28 ± 9.64 years

Table-2: Percentage of patients with status of other confounding variables (n=191)

Confounding variables		Frequency	Percentage
Diabetes Mellitus	Yes	83	43.46
	No	108	56.54
Hypertension	Yes	127	66.49
	No	64	33.51
Smoking	Yes	113	59.16
	No	78	40.84

Table-3: Stratification of age groups with respect to coronary artery ectasia.

		Coronary artery ectasia		p-value
		Yes	No	
Age (years)	18-30	03 (21.43%)	11 (78.57%)	0.000
	31-40	12 (42.86%)	16 (57.14%)	
	41-50	25 (54.35%)	21 (45.65%)	
	51-60	80 (77.67%)	23 (22.33%)	
Gender	Male	112 (68.29%)	52 (31.71%)	0.000
	Female	08 (29.63%)	19 (70.37%)	
Diabetes Mellitus	Yes	63 (75.90%)	20 (24.10%)	0.001
	No	57 (52.78%)	51 (47.22%)	
Hypertension	Yes	109 (85.83%)	18 (14.17%)	0.000
	No	11 (17.19%)	53 (82.81%)	
Smoker	Yes	96 (84.96%)	17 (15.04%)	0.000
	No	24 (30.77%)	54 (69.23%)	

Table-4: Stratification of type of vessel involved with respect to coronary artery ectasia.

Type of Vessel	Coronary artery ectasia		p-value
	Yes	No	
Right Coronary Artery (RCA)	73 (68.22%)	34 (31.78%)	0.154
Left Anterior Descending Artery (LAD)	29 (60.42%)	19 (39.58%)	
Left Circumflex Artery (LCX)	14 (56.0%)	11 (44.0%)	
Left Main Stem (LMS)	04 (36.36%)	07 (63.64%)	

DISCUSSION:

Coronary artery ectasia (CAE) is present in 3-8% of patients undergoing coronary angiography and it is defined as dilatation of coronary artery to 1.5 times the normal segment of coronary artery. It may involve the localized area or may be of diffuse variety. In 50% of patients the underlying cause is atherosclerosis while in 30% cases it may be congenitally acquired. In 10-20% it is associated with connective tissue disorders.[23]

The ectasia is responsible for sluggish blood flow in coronary arteries due to which patient may develop angina or myocardial infarction. In 39% patients myocardial infarction is the presenting complain. It may be asymptomatic. Coronary ectasia is 4 times more prevalent in males and commonly associated with history of smoking.[24-25] The patients in this study ranged from 18-60 years with a mean of 49.28 ± 9.64 years. The major part of the patients were in the range of 51-60 years i.e 53.93%. AL-Saffar H et al[9] and Lam CSP et al [26] in their studies reported a larger mean age i.e. 65 years. In another study, Ahmad Z et al[12] has shown a lower mean age i.e. 33 years. In our study there was male pre-dominance and it was also noticed in the past studies as well.[9,11,12,26]

In our study, most commonly right coronary artery was involved with relatively lesser involvement of left coronary arteries which also has been observed by a study of Hartnell GG et al[23] and Drabba ZK et al[11].

In 75% patients there is isolated CAE with more involvement of proximal right coronary artery. In the present study 62.83% patients had CAE which was very high as compared to previous studies done by Drabba ZK et al[11] and Swaye PS et al[27].

In another study by Hartnell GG et al[23] , the frequency of CAE was much lower i.e 1.4%. In studies carried out by Valente S et al[21] and Endoh S et al, a higher prevalence of CAE was reported in patient with MI. [22]

In studies by Gunes Y et al[28] ,Yilmaz H et al[29] ,Ahmad Z et al[12] ,Lam CSP et al[26] and Ruiz-Morales JM et al[30] , a much higher frequency of CAE has been reported. In our study statistical significant difference in the prevalence of CAE among different age groups but a study conducted in India by Sharma SN et al[31] reported no significant statistical affect of age in patients with CAE and is contradictory.

Yilmaz H et al[32] has reported significant influence of risk factors for coronary artery disease in the presence of CAE which has also been shown in our study that patients with hypertension and smoking were statistically influencing the presence of CAE.

Ozbay Y et al[33] has reported no statistical significant difference of risk factors. Similarly Sen N et al[34] also showed no significant link among these risk factors (hypertension, diabetes mellitus and smoking) and coronary artery ectasia.

The limitation of this study is that it was performed in a small group of patients in a limited cohort.

CONCLUSION:

There is significant coronary artery ectasia present in patients presenting with myocardial infarction. It may be associated with old age, male gender, hypertension, diabetes mellitus and smoking. Further studies are required to find out CAE association with age, gender, hypertension, diabetes mellitus and smoking.

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