



EVALUATION OF ETIOLOGY OF MYOCARDIAL INFARCTION IN YOUNG AND IN OLD MALES

Physiology

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ABSTRACT

Background: Coronary artery disease (CAD) mostly occurs in persons older than 45 years of age. In India, CAD manifests almost a decade earlier than in Western countries. This study was done to study the risk factors and angiographic profile in young patients presenting with acute myocardial infarction (AMI).

Patients and Methods: One hundred and eighty six consecutive patients presenting with AMI at less than 40 years of age were studied for risk factors from September 2017 to February 2018. Coronary angiography was done in all.

Results: Out of 186 patients, 185 were male. Mean age was $36.94 \pm$ yrs. One hundred and seventy six had ST elevation myocardial infarction (MI) (95%) and ten had non ST elevation MI (5%). Anterior wall MI was present in 130 patients (70%), inferior wall MI in 46 patients (25%) and lateral wall MI in ten patients (5%). One hundred two patients (55%) were smoker, 81 were hypertensive (44%), 15 were diabetic (8%). Family history of CAD was present in 31 (17%) patients. Low High-density lipoprotein (HDL) was seen in 80 patients (43%), and high triglycerides in 91 patients (49%). Significant CAD was found in 130 (70%) patients, 18 (10%) had normal coronaries. Single vessel disease was seen in 86 patients, two-vessel disease in 22 patients and three-vessel disease in 12 patients. Total 187 lesions were seen and left anterior descending (LAD) was the commonest vessel involved, with 117 lesions (62.4%).

Conclusion: AMI in young almost exclusively occurs in male, and ST elevation MI is the main presentation. Anterior wall MI is most common, with LAD being involved in around 2/3 patients. Smoking, hypertension, low HDL and high triglycerides are the major risk factors.

KEYWORDS

Coronary artery disease, myocardial infarction, risk factors

INTRODUCTION:-

There is a relative paucity of information concerning the clinical features, natural history, and prognosis in young patients with acute myocardial infarction¹. Despite the relatively low frequency of myocardial infarction in the young population,² the potential for death and long-term disability make this entity an important clinical problem³. A number of studies have examined the epidemiologic features and the coronary arterial anatomy in young adults with evidence of coronary heart disease,⁴⁻⁶ and angiographic studies have demonstrated less extensive coronary artery disease than in older patients.⁷⁻⁹ We reasoned, therefore, that young patients with myocardial infarction should have not only different presenting features, but also a more favorable early and late prognosis than their older counterparts. Accordingly, in the present study, we divided a large group of patients with acute myocardial infarction into subsets defined by age to examine in detail differences in risk factors, clinical features, morbidity, and mortality.

MATERIAL AND METHODS:-

One hundred and eighty six consecutive patients of less than 40 years and above 18 yrs presenting with AMI were studied for the conventional risk factors from September 2017 to February 2018.

AMI was defined as typical rise and fall of cardiac markers of myocardial necrosis with at least one of the following:

- Ischaemic symptoms
- Electrocardiogram (ECG) changes indicative of ischaemia (ST elevation or depression)
- Development of Pathological Q waves in ECG
- Echocardiographic evidence of new regional wall motion abnormality.

Diabetes was defined as having a history of diabetes diagnosed and/or treated with medication and/or diet or fasting blood glucose ≥ 126 mg/dl or greater. Hypertension was defined as having a history of hypertension diagnosed and/or treated with medication, diet, and/or exercise, blood pressure greater than 140 mmHg systolic or 90 mmHg diastolic on at least two occasions. Hyperlipidaemia was defined as history of Dyslipidaemia diagnosed and/or treated by a physician or total cholesterol greater than 200 mg/dl, low-density lipoprotein greater than or equal to 130 mg/dl, or high-density lipoprotein < 40 mg/dl. High homocystine (HC) was defined HC more than 15 mg/dl and high Lipoprotein a (Lpa) as Lpa more than 30 mg/dl. Current smoker was defined as a person smoking cigarettes within 1 month of index admission. A positive family history for Coronary artery disease

(CAD) was defined as evidence of CAD in a parent, sibling, or children before 55 years of age. Overweight was defined as body mass index (BMI) greater than 25 kg/m^2 . Obesity was defined as BMI greater than 30 kg/m^2 . Waist circumference more than 102 cm was considered as high.

All patients were subjected to coronary angiography during the index admission or on follow up. Significant stenosis was defined as more than 50% stenosis in any of the coronary arteries, insignificant disease as less than 50% stenosis or plaques in any of the coronary arteries.

RESULT:-

Out of total 186 patients studied, 176 had ST elevation MI. Youngest patient was 21 years of age. Most of the patients had anterior wall MI. Three patients presented in cardiogenic shock. There were two deaths, one due to cardiogenic shock and the other had sudden cardiac death.

Table 1: Clinical profile and risk factors

Total Patients	186
Male	185
Female	001
ST elevation myocardial infarction	176 (95%)
non ST elevation	10(5%)
Anterior wall MI	130(70%)
Inferior wall MI	46(25%)
Lateral Wall MI	10(5%)
Smoker	102(55%)
Hypertensive	81(44%)
Diabetic	15(8%)
Family History of CAD	31(17%)
HDL	80(43%)
High Triglyceride	91(49%)
Significant CAD	130(70%)
Normal Coronation	18(10%)
Single Vessels Involvement	86(45%)
Double Vessels Involvements	22(11%)
Three vessels involvement	12(7%)
Lesion seen	187(47%)
Left vessels involvement	117(62.4%)

Table 2 : Angiographic findings

Total Patients	186
Significant coronary artery stenosis	132(70%)

Critical Stenosis	130
Mild stenosis	02
Total lesion	186(63%)
LAD	117(20%)
RCA	38(18%)
LCX	38(15%)
Insignificant stenosis	27(11%)
Normal Coronaries	18(3%)
Coronaries Thrombus	03(2%)
Coronaries dissection	01(0.8)
Coronary aneurysm	01(0.8)
Single vessels disease	86(52%)
Double vessels disease	22(28%)
Three vessels disease	12(7%)
Left Main Disease	02(1%)

Figures in Parenthesis are in percentage; LAD-Left anterior descending, RCA-Right coronary artery; LCx- Left Circumflex.

DISCUSSION:-

MI is a disease of older population and is uncommon in young, though it occurs at younger age in India compared to Western population. MI in young can be divided in to two groups, those with angiographically normal coronary arteries and those with coronary artery disease (CAD). Some young MI patients have normal coronary arteries. The MI in them can be caused by arteritis, thrombosis, embolisation or spasm. As is the case with venous thrombosis, coronary thrombosis can be seen in hypercoagulable states, such as protein C and protein S deficiency, antiphospholipid syndrome or nephrotic syndrome.^{4,5,6,7} Coronary artery spasm can cause MI in patients with cocaine abuse⁸ and also in association with alcohol binges.⁹ In the second group of young MI (those with CAD), it is mostly a result of atherosclerotic process, which starts in early childhood. Milanig *et al.*, in a necropsy study of 760 young patients, dying of various causes found that 20% of men and 8% of women in the age group between 30-34 yrs had evidence of Coronary heart disease (CHD).¹⁰

Etiology of athermanous CHD is limited to conventional risk factors, as in adults, with some differences. Zimmerman *et al.*, found prevalence of smoking in 92% of young CAD patients.¹¹ Mukherjee *et al.*, found prevalence of smoking to be higher in those less than 40 yrs of age, compared to those above 60 yrs (58.7 Vs 43%),¹¹ in patients who underwent Percutaneous transluminal coronary angioplasty (PTCA). We found smoking to be the most common risk factor, present in around 55% of young MI patients. Family history of CAD was found in 17% of our patients. This is much less than in a study done in London by Chen *et al.*, who, found family H/O CAD in 39% of patients.¹⁰ Lipid abnormalities, especially raised TG and low HDL were found in around 50% of our patients. Xie *et al.*, also found diabetes mellitus, hypertension and hyperlipidaemia as important risk factors in young women with acute MI.⁸ They found that each of these risk factors had around 50% prevalence.

Spontaneous coronary dissection is one of the rare causes of MI, especially in young women, in peripartum period. Coronary artery aneurysm may also be a cause of MI in young. These may be congenital or acquired, secondary to Kawasaki's disease in childhood.¹¹

Fibromuscular dysplasia (FMD) is another very rare cause of MI in young, especially in women. It is an idiopathic, nonatherosclerotic and noninflammatory vasculopathy affecting small-to medium-sized arteries. The renal arteries (60-80%) and cervicocranial arteries (20-30%) are most commonly involved. Regardless of the type of FMD, the disease can cause dissection, rupture, or occlusion leading to a wide range of clinical presentations and even death. Fibromuscular dysplasia of the coronary arteries has only rarely been described, since the first report of two probable cases in 1965.¹⁰ Pate *et al.*, described seven cases of coronary angiographic characteristics of seven women with acute coronary syndromes and unusual coronary anatomy who also had renal artery FMD.⁷ In each case, the proximal vessel appeared normal but in the middle or distal segment there was a well-demarcated abrupt transition to diffuse obliterative disease.

Angiographic findings are different in young MI patients compared to older MI patients. Increased prevalence of normal coronary arteries (up to 10%) and minor coronary abnormalities were found in Coronary Artery Surgery Study (CASS). Single vessel disease was found in 38%

of subjects. We found SVD in around 52% patients. Xie *et al.*, found SVD in 71.8% in a study of AMI in young Asian women.¹¹

Younger patients with MI have a better prognosis. We had in-hospital mortality of just 1.6%. Xie *et al.*, found no in-hospital mortality in young women with MI.

CONCLUSION

Although MI, fortunately, is an uncommon entity in young adults aged less than 45 years, it constitutes an important problem for both the patient and the treating physician. It has a devastating effect on the more active lifestyle of young patients. These young patients also have a different risk factor profile, clinical presentation, and prognosis in comparison with older patients, which has to be taken into consideration when treating these young adults presenting with MI. The increased prevalence of risk factors for CHD may set up an alarming trend.

Substance misuse, coronary artery anomalies, premature coronary artery disease, and hypercoagulable state have to be considered in all patients with suspected MI who are less than 45 years. Early stabilisation should be followed by risk stratification, and early revascularisation, where appropriate, should be offered as it carries a better clinical outcome. Risk factors modification should be emphasised.

We strongly emphasise the importance of secondary preventive measures in all young patients admitted with MI as the long term mortality can reach up to one third if not treated appropriately.

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