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Original Research Article

An Angiographic Profile and in Hospital Outcomes of Primary Percutaneous Coronary Intervention in Patients Presenting with ST Elevation Myocardial Infarction (STEMI)

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Conflict of interest: Nil

Abstract

Aim: The aim of the present study was to assess the angiographic profile and in hospital outcomes of primary percutaneous coronary intervention among patients presenting with acute ST Elevation Myocardial Infarction and underwent primary PCI.

Methods: 100 patients less than 45 years of age who presented to Ford hospital and research centre Pvt. Ltd, Patna, Bihar, India with acute ST elevation myocardial infarction (STEMI) as defined according to fourth universal definitions and underwent primary Percutaneous Coronary Intervention (PPCI) were included in this study.

Results: Majority were male 80 (80%) and 20 (20%) were female. The mean age for male was 42.04 years and for female was 36.94 years. 6 patients (5.8%) were below 30 years old, youngest being 25 years old. Among the young patients who underwent primary PCI smoking was the most common coronary risk factor present in 58 (58%) patients. This was followed by hypertension in 34 (34%), dyslipidemia 23 (23%) and diabetes 17 (17%). Family history of premature CAD was present in 3 (3%) patients. On analyzing data from Coronary angiogram reports, Single Vessel Disease (SVD) was the most common finding 60 (60%). Multi Vessel Disease (DVD +TVD) was less common comprising of 40 (40%).

Conclusion: Though the frequency of young acute STEMI is small, but these patients have different clinical and laboratory characteristics and early clinical outcomes vs. older patients. It is more likely associated with single vessel disease. The LAD and hence anterior wall is the most commonly involved. Smoking is most common modifiable risk factor. Furthermore emphasis should also be given to the contributing factors like homocysteine, fibrinogen, hsCRP, apo B, apo A1, Lp(a), SCAD etc. in all young patients with established CAD without conventional risk factors.

Keywords: Young, myocardial infarction, Angiographic profile, Primary percutaneous coronary intervention, ST-elevation myocardial infarction, In-hospital outcome

Introduction

ST-segment myocardial infarction (STEMI), a serious consequence of coronary artery disease (CAD), tends to affect people between the sixth and seventh decade of life. [1] Patients younger than 45 years of age represent approximately 5-10% of all acute myocardial infarction (AMI) cases. [2,3] In developing countries, however, AMI frequently occurs at a younger age, approximately one decade earlier than that reported in developed countries. [4] The Middle East has one of the highest percentages (11%) of adults who develop STEMI for the first time before the age of 40 years. [5] In comparison, the rate in North America is 4%, Western Europe is 2.7%, and Africa is 9.7%. [6]

In young patients, STEMI has lower mortality rates and a lower incidence of related major adverse cardiovascular events (MACE), such as cardiogenic shock or stroke. Moreover, a higher rate of successful primary percutaneous coronary intervention accompanied by higher thrombolysis in myocardial infarction grade flow and fewer bleeding complications have been reported in young patients. [7] Moreover, a family history of premature coronary artery disease is frequently encountered as an important risk factor in youth. [8] This could be attributed to genetic disorders related to lipid metabolism. [9] Most previous reports have shown favorable outcomes in young adults with AMI. [10] However, identifying the variations of such risk factors for STEMI in the younger age group might have an important value for preventive measures and treatment plans.

Fournier et al [11] have reported young MI with an incidence of approximately 4% in those aged <40 years. In India, 12%–16% of CAD patients are young and about 25% of acute MI in India occurs under the age of 40 years. [12] Young patients frequently have characteristics that are different from those of older patients. Up to two-thirds of young MI patients present with non-ST-elevation MI (STEMI) and one-third with STEMI. [13] While conventional cardiovascular risk factors clearly play a major role in the predisposition to CAD [14] novel risk factors such as hyperhomocysteinaemia and lipoprotein (a) may have significance in younger people. [15,16]

The aim of the present study was to assess the angiographic profile and in hospital outcomes of primary percutaneous coronary intervention among young patients presenting with acute ST Elevation Myocardial Infarction and underwent primary PCI.

Materials and Methods

100 patients less than 45 years of age who presented to Ford hospital and research centre Pvt. Ltd, Patna, Bihar, India with acute ST elevation myocardial infarction (STEMI) as defined according to fourth universal definitions and underwent primary Percutaneous Coronary Intervention (PPCI) were included in this study. None of these patients had any previous history of diagnosed CAD. Patients with concomitant severe valvular heart disease or cardiomyopathy were not included. Severe renal impairment and hepatic impairment were also excluded.

All these patients were taken up for primary PCI. Selective coronary angiography in multiple (≥ 2) views was performed by standard technique to define both the extent and severity of disease. Significant CAD was defined as at least 70% reduction in the diameter of major epicardial coronary arteries i.e. left anterior descending (LAD), left circumflex (LCx) or right coronary artery (RCA) and their branches; or at least 50% luminal narrowing of the left main coronary artery (LMCA). Patients were classified as having single-vessel disease (SVD), double-vessel disease (DVD) or triple vessel disease (TVD) accordingly. Presence of significant CAD in LMCA was classified as DVD.

They were also studied for the presence of conventional risk factors such as presence of diabetes, hypertension, obesity, smoking, dyslipidemia and family history of premature CAD. All cases were followed until discharge or death and major clinical outcomes like NYHA 3-4 heart failure, cardiogenic shock, high degree AV block were noted.

Data were entered into spread sheet (Microsoft Excel) and analysed using Statistical Package for the Social Science (SPSS) software.

Results

Table 1: Prevalence of risk factors in patients <45 years with STEMI undergoing PPCI

Gender	**N**	**%**
Male	80	80
Female	20	20
Mean age in years	42.04	36.94
	Yes	**No**
Smoking	58	42
Hypertension	34	66
Diabetes mellitus	17	83
Dyslipidemia	23	77
Family history ofpremature CAD	3	97
Coronary angiography findings		
SVD	60	60
DVD	28	28
TVD	12	12

Majority were male 80 (80%) and 20 (20%) were female. The mean age for male was 42.04 years and for female was 36.94 years. 6 patients (5.8%) were below 30 years old, youngest being 25 years old. Among the young patients who underwent primary PCI smoking was the most common coronary risk factor present in 58 (58%) patients. This was followed by hypertension in 34 (34%), dyslipidemia 23 (23%) and diabetes 17 (17%). Family history of premature CAD was present in 3 (3%) patients. On analyzing data from Coronary angiogram reports, Single Vessel Disease (SVD) was the most common finding 60 (60%). Multi Vessel Disease (DVD +TVD) was less common comprising of 40 (40%).

Table 2: Involvement of coronary artery and in-hospital outcome

Involvement of coronary artery	N	%
LAD	75	75
RCA	58	58
LCX	15	15
LMA	3	3
In-hospital outcome		
Shock	5	5
Heart failure	4	4
Death	2	2

Among the coronary artery, Left Anterior Descending (LAD) was the most common artery to be obstructed seen in in 75 (75%). It was involved in all patterns of CAD, whether SVD, DVD or TVD. Second most common artery to be affected was RCA which was involved in 58 (58%) patients. LCX was involved in 15 (15%) patients. Left main artery was the least involved;3 (3%) patients. Out of 100 patients who underwent PPCI, 5 (5%) had suffered cardiogenic shock, 4 (4%) had developed NYHA 3-4 heart failure. None of the patient developed Complete heart block. Most of the patients 98 (98%) improved and were discharged without significant morbidity. However 2 patients (2%) died in hospital and all of these 3 had TVD along with significant obstruction in left main coronary artery.

Discussion

Coronary artery disease is common and Acute Myocardial Infarction (AMI) accounts for a large proportion of premature death worldwide. [17] The death rates have been declining in the west but these are increasing in developing countries, more so in south asian countries. [18] The continuous rise in Prevalence of Central obesity, diabetes, hypertension and dyslipidemia in addition to physical inactivity, over indulgence in high calorie/ less fiber diet pattern, cultural preferences, and sub-optimal heath care have been incriminated. [19] Although traditional risk factors explain most of CAD, 15%–20% have no identifiable risk factors. [20] CAD is relatively less common in young age group. It is reported to be in between 5-10% in subjects below 40 years of age. [21] approximately 10-12% of all ST Elevation Myocardial Infarction (STEMI) patients are younger than 45 years old. [22]

Majority were male 80 (80%) and 20 (20%) were female. The mean age for male was 42.04 years and for female was 36.94 years. 6 patients (5.8%) were below 30 years old, youngest being 25 years old. Among the young patients who underwent primary PCI smoking was the most common coronary risk factor present in 58 (58%) patients. This was followed by hypertension in 34 (34%), dyslipidemia 23 (23%) and diabetes 17 (17%). Family history of premature CAD was present in 3 (3%) patients. On analyzing data from Coronary angiogram reports, Single Vessel Disease (SVD) was the most common finding 60 (60%). Multi Vessel Disease (DVD +TVD) was less common comprising of 40 (40%). MI in young patients have some important clinical angiographic and prognostic differences as compared to that in older patients. [23] Even though young MI form small proportion of total AMI cases; it is an important group to examine for the purpose of risk factor modification and secondary prevention. 1 year registry of STEMI from 2018 from a high volume tertiary centre in Nepal showed that 11.8% of all STEMI patients were young (<45 years old). As expected, there is male predominance. This skewed gender distribution of the study population can be attributed to the gender bias and atypical presentation which was also seen in south asian cohort of INTERHEART study. [24]

As seen in the Study by Tamrakar et al [25] We found that smoking is the most common modifiable risk factor among young AMI patients. The predominance of single vessel disease in these young patients matches with similar findings from various other studies which ranges from 39-80%. [26-30] Among the coronary artery, Left Anterior Descending (LAD) was the most common artery to be obstructed seen in in 75 (75%). It was involved in all patterns of CAD, whether SVD, DVD or TVD. Second most common artery to be affected was RCA which was involved in 58 (58%) patients. LCX was involved in 15 (15%) patients. Left main artery was the least involved;3 (3%) patients. Out of 100 patients who underwent PPCI, 5 (5%) had suffered cardiogenic shock, 4 (4%) had developed NYHA 3-4 heart failure. None of the patient developed Complete heart block. Most of the patients 98 (98%) improved and were discharged without significant morbidity. However 2 patients (2%) died in hospital and all of these 3 had TVD along with significant obstruction in left main coronary artery.

As in various other studies, which have showed in-hospital mortality rate of the approximately 0% to 3% among young MI, our study also showed the lower mortality rate of 2.9%, which ranges between 5-10% in different series. [31-33] The in- hospital mortality rate observed in overall (both young and

old combined) population who present with STEMI was found to be 6.2% in SGNHC STEMI registry which was most commonly due to cardiogenic shock and cardiac free wall ruture. Similarly a study done in 2008 from India showed 30 day mortality of 8.6% for STEMI patients. It had enrolled 12495 STEMI patients. The high rate of mortality was mainly attributed to delayed presentation to hospital. [34]

Conclusion

Though the frequency of young acute STEMI is small, but these patients have different clinical and laboratory characteristics and early clinical outcomes vs. older patients. It is more likely associated with single vessel disease. The LAD and hence anterior wall is the most commonly involved. Smoking is most common modifiable risk factor. Furthermore emphasis should also be given to the contributing factors like homocysteine, fibrinogen, hsCRP, apo B, apo A1, Lp(a), SCAD etc. in all young patients with established CAD without conventional risk factors. With early diagnosis and treatment; younger patients have favorable short term prognosis than elderly, yet the psychological and economic burden to patient, their family and whole society is substantial.

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