DOI: https://doi.org/10.53350/pjmhs22163569

ORIGINAL ARTICLE

Frequency of Significant Non-Infarct Related Multi-Vessel Coronary Artery Disease in Patients after the first Presentation with St-Elevation Myocardial Infarction

MUHAMMAD QASIM KHAN[1], MUHAMMAD SHAHZAD AZEEM[2], MUHAMMAD WAQAS[3], ASMA SHAREEF[4]
[1]Medical Officer Deptt. Of Cardiology, Mayo Hospital, Lahore
[2]Senior Registrar, Deptt. Of Cardiology, Mayo Hospital, Lahore
[3]Medical Officer Deptt. Of Cardiology, Mayo Hospital, Lahore
[4]Assistant Professor, Deptt. Of Cardiology, Mayo Hospital, Lahore
Correspondence to: Shahzad Azeem, Email: shahzadazeem7@hotmail.com, Cell: 03366911718

ABSTRACT

Objective: To determine the frequency of significant non-infarct related multi-vessel coronary artery disease in patients after the first presentation with ST-elevation myocardial infarction.

Methodology: A minimum of 100 consecutive patients from the department of cardiology, Mayo Hospital Lahore, who fulfilled the inclusion/exclusion criteria were selected. Percentage stenosis in non-IRA was calculated by using quantitative coronary analysis (QCA) software.

Results: A total of 100 patients were enrolled in this study. There were 73(73.0%) males and 27(27.0%) females. The mean age of patients was 47.6±19.2 years. Out of 100 patients with STEMI, 42(42.0%) had non-IRA. Among non-IRA, 24(57.1%) had double vessel CAD and 18(42.9%) had triple vessel CAD.

Conclusion: Significant non-infarct related multivessel coronary artery disease was common among patients after the first presentation with ST-elevation myocardial infarction.

Keywords: ST Elevation Myocardial Infarction (STEMI),Coronary vessels, Coronary artery disease (CAD).

INTRODUCTION

ST-elevation myocardial infarction (STEMI) is a major cause of cardiovascular disease burden and mortality in developing countries accounting for 40-50% of presentations with ACS.[1-4]Plaque rupture and subsequent thrombotic occlusion constitutes the major pathophysiology of the disease.[5]

Approximately 50% of these patients have non-infarct related coronary artery (non-IRA) disease and about 20 to 40% of them also have a prior history of myocardial infarction.[6-8]These patients have worse short and long-term prognosis in the form of refractory angina and repeat revascularization.[9-10]

Multi-vessel coronary artery disease (MVCAD) itself is associated with increasing age, diabetes, male gender, hypertension, dyslipidemia and a previous history of CAD.[11]Though there is an increasing trend with a relatively younger population in South Asia who present with acute myocardial infarction, the prevalence of other risk factors associated with CAD are also increasing as compared to the developed countries.[12-13]

There is a paucity of data about the frequency of significant non-IRA disease after the first presentation with STEMI in our population. One study showed a frequency of non-IRA to be 50.9% with the presence of DVCAD to be 31.5% and TVCAD to be 19.4%.[14] In another study frequency of non-IRA was 45% with 25.5% of DVCAD and 19.5% of TVCAD.[7]

The rationale of this study is not only to provide our clinicians a better understanding of the population at risk and what to expect in this subset of patients but also to shed light on the disease burden and associated healthcare costs so that aggressive preventive strategies and improved treatment facilities are made available.

METHODOLOGY

A minimum of 100 consecutive patients from the department of cardiology, Mayo Hospital Lahore, who fulfilled the inclusion/exclusion criteria were selected. Percentage stenosis in non-IRA was calculated by using quantitative coronary analysis (QCA) software.

RESULTS

The mean age of patients was 47.6±19.2 years, There were 3(3.0%) in 18-30 years age group, while 32(32.0%) and 65(65.0%) were in 31-45 years and >45 years age groups respectively, 73(73.0%) males and 27(27.0%) females.Among patients, 44(44.0%) were hypertensive, while 39(39.0%) and 29(29.0%) had dyslipidemia and diabetes mellitus respectively. Among patients, 55(55.0%) were tobacco consumer, while 12(12.0%) and 25(25.0%) had obesity and family history of IHD respectively.

Out of 100 patients with STEMI, 42(42.0%) had non-IRA, among non-IRA, 24(57.1%) had double vessel CAD and 18(42.9%) had triple vessel CAD.

Table 1: Demographics of the patients (n=100)

Variables		No.of patients(%)
Age	18-30	3(3%)
	31-45	32(32%)
	>45	65(65%)
Gender	Male	73(73%)
	Female	27(27%)
Hypertension	Present	44(44%)
Dyslipidemia	Present	39(39%)
Diabetes mellitus	Present	29(29%)
Tobacco consumer	Present	55(55%)
Obesity	Present	12(12%)
Family history of IHD	Present	25(25%)
Non-IRA	Present	42(42%)

DISCUSSION

This study was done to evaluate the presence of non-infarct related, multivessel coronary artery disease in patients after the first presentation with ST-elevation myocardial infarction at a single tertiary care center in Pakistan. The results demonstrated that 42% of patients presenting with STEMI had multivessel,non-infarct related coronary artery disease, evenin the absence of previous history or evidence of ischemic heart disease. Among non-IRA, 57.1% had double vessel CAD and 42.9% had triple vessel CAD. These results are in line with the previous contemporary studies by Park et al[6], Goldstein et al[14], Keeley et al[15] and Parodi et al[16]. These studies included the patients with previous history of MI or IHD and showed that 40% to 60% of patients of STEMI have Non-IRA disease; withmore DVCAD than TVCAD.[6,15-16]

A local single centerstudy at Pakistan Institute of Medical Sciences comparing angiographic severity in patients with STEMI showed a frequency of non-IRA to be 50.9%; with the presence of DVCAD to be 51.5% and TVCAD to be 39.4%.[17] In anotherstudy at Agha Khan University comparing outcomes in STEMI patients with European centers found thefrequency of non-IRA to be 45%; with 45.5% of DVCAD and 39.5% of TVCAD.[7]These studies also

included the patients with previous history of ischemic heart disease or MI and were not powered specifically to identify non-IRA disease.

The observations from this study support the concept that diffuse nature of coronary atherosclerosis and pathophysiologic inflammation, exert their effects in a widespread pattern throughout the coronary vasculature resulting in multi vessel coronary artery disease.[18] Moreover, studies have shown that, in patients with STEMI, instability of is not only a vascular accident but may be due to development of a multifocal pattern causing various complex unstable plaques in remote locations(anatomically), changing the concept of the'vulnerable plaque' towards the'vulnerable patient'.[14,19]

The limitations of the study were that this was a single institution study, with a fewer number of patients and representing trends in a local population subset. Therefore, it is suggested that larger studies and nationwide STEMI registries should be made to explore in detail the burden of the disease, its management as well as costs. Moreover, these studies should follow patient's disease and disability course and compare treatment strategies, that will help clinicians in deciding the best approach and guide policymakers to provide better prevention and treatment facilities.

CONCLUSION

Significant non-infarct related, multivessel coronary artery disease was common in patients presenting for the first time with STEMI. More patients had DVCAD than TVCAD.Non-IRA was found to be associated with hypertension, dyslipidemia and obesity. An increasing trend was noted in patients with diabetes, advancing age and family history of ischemic heart disease.

REFERENCES

1. Zeb S, Hafizullah M, Jan H, Adil M, Zeb R. ST elevation myocardial infarction: an experience at Lady Reading Hospital Peshawar. KMUJ. 2017 Apr 1;9(2):60-2.
2. Iqbal R, Jahan N, Hanif A. Epidemiology and Management Cost of Myocardial Infarction in North Punjab, Pakistan. Iran Red Crescent Med J. 2015 Jul 22;17(7).
3. Hameed S, Tawwab S, Shahbaz A, Sami W, Sherwani M, Azhar M. Cardiac mortality trends in the emergency department of a tertiary care cardiac centre. Pak J Med Sci. 2007 Oct 1; 23(6):825–31.
4. Jafary, M.H., Samad, A., Ishaq, M., Jawaid, S.A., & Vohra E. Profile of acute myocardial infarction (AMI) in Pakistan. Pak J Med Sci. 2007;23(4):485–9.
5. Falk ER. Plaque rupture with severe pre-existing stenosis precipitating coronary thrombosis. Characteristics of coronary atherosclerotic plaques underlying fatal occlusive thrombi. Heart. 1983 Aug 1;50(2):127-34.
6. Park DW, Clare RM, Schulte PJ, Pieper KS, Shaw LK, Califf RM, et al. Extent, location, and clinical significance of non–infarct-related coronary artery disease among patients with ST-elevation myocardial infarction. Jama. 2014 Nov 19;312(19):2019-27.
7. Arshad S, Dhakam S, Awan S. Outcomes in ST elevation Myocardial Infarction; a comparison of a tertiary care center in Pakistan with European centers. J Pak Med Assoc. 2011 Dec;61(12):1215–9.
8. Farman MT, Sial JA, Khan NU, Rizvi SN, Saghir T, Zaman KS. Outcome of primary percutaneous coronary intervention at public sector tertiary care hospital in Pakistan. J Pak Med Assoc. 2011 Jun 1;61(6):575.
9. Sorajja P, Gersh BJ, Cox DA, McLaughlin MG, Zimetbaum P, Costantini C, et al. Impact of multivessel disease on reperfusion success and clinical outcomes in patients undergoing primary percutaneous coronary intervention for acute myocardial infarction. European heart journal. 2007 Jun 7;28(14):1709-16.
10. Wald DS, Morris JK, Wald NJ, Chase AJ, Edwards RJ, Hughes LO, et al. Randomized trial of preventive angioplasty in myocardial infarction. New England Journal of Medicine. 2013 Sep 19;369(12):1115-23.
11. de CarvalhoCantarelli MJ, Castello Jr HJ, Gonçalves R, Gioppato S, de Freitas Guimarães JB, Ribeiro EK, Vardi JC, Maksud D, Navarro EC. Independent predictors of multivessel coronary artery disease: results from Angiocardio Registry. RevistaBrasileira de CardiologiaInvasiva (English Edition). 2015 Oct 1;23(4):266-70.
12. Noor L, Adnan Y, Khan SB, urRehman H, Ahmad F, Hafizullah M. Changing trend of presentation of acute coronary syndrome in Peshawar over the last sixteen years. Journal of Ayub Medical College Abbottabad. 2011 Jun 1;23(2):136-9.
13. Joshi P, Islam S, Pais P, Reddy S, Dorairaj P, Kazmi K, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. Jama. 2007 Jan 17;297(3):286-94.
14. Goldstein JA, Demetriou D, Grines CL, Pica M, Shoukfeh M, O'Neill WW. Multiple complex coronary plaques in patients with acute myocardial infarction. New England Journal of Medicine. 2000 Sep 28;343(13):915-22.
15. Keeley EC, Mehran R, Brener SJ, Witzenbichler B, Guagliumi G, Dudek D, et al. Impact of multiple complex plaques on short-and long-term clinical outcomes in patients presenting with ST-segment elevation myocardial infarction (from the Harmonizing Outcomes With Revascularization and Stents in Acute Myocardial Infarction [HORIZONS-AMI] Trial). The American journal of cardiology. 2014 May 15;113(10):1621-7.
16. Parodi G, Memisha G, Valenti R, Trapani M, Migliorini A, Santoro GM, Antoniucci D. Five year outcome after primary coronary intervention for acute ST elevation myocardial infarction: results from a single centre experience. Heart. 2005 Dec 1;91(12):1541-4.
17. Malik MN, Riaz A, Zahoor S. Comparison between Angiographic Severity of Lesions in Patients with Acute Myocardial Infarction with and without Thrombolytic Therapy. Ann Pak Inst Med Sci. 2017;13(1):17-22.
18. Bentzon JF, Otsuka F, Virmani R, Falk E. Mechanisms of plaque formation and rupture. Circulation research. 2014 Jun 6;114(12):1852-66.
19. Naghavi M, Libby P, Falk E, Casscells SW, Litovsky S, Rumberger J, et al. From Vulnerable Plaque to Vulnerable Patient. Circulation. 2003 Oct 7;108(14):1664–72.