Original Article

In-Hospital Outcomes and Angiographic Pattern in Primary Percutaneous Coronary Intervention (PCI) Among Patients of Acute Myocardial Infarction

Badar ul Ahad Gill[1], Nisar Ahmed[1], Muhammad Tahir Mohy-ud-Din[1], Muhammad Zohaib Zahoor[1], Muhammad Ikram Farid[1] and Abubakr Ali Saad[2]

ABSTRACT

Objective: To find out the in-hospital outcomes and angiographic pattern of coronary artery disease in patients subjected to primary percutaneous coronary intervention (PCI) undergoing primary PCI for AMI.

Study Design: A descriptive cross-sectional study.

Place and Duration of Study: This study was conducted at the Department of cardiology, Chaudhry Pervaiz Elahi Institute of Cardiology, Multan January 2018 to September 2018.

Materials and Methods: Among these 135 study cases, 115 (85.1%) were having male gender, and 20 (14.88%) were having female gender. In our study cases, the mean age was 47.17 ± 6.89 years (The minimum age of included cases was 30 years, on the other hand the maximum age of study cases was 60 years). Among these 135 study cases, 30 (22.2%) were having diabetes mellitus and 45 (33.3%) were having a history of hypertension. History of cigarette smoking was present in 55 (40.7%) of our study case. Family history of coronary artery disease (CAD) was present in 15 (11.1%). A successful outcome was noted in 129 (95.6%) of our study cases. Single vessel involvement was present in 90 (66.6%) of study population, involvement of two vessels by coronary artery disease was found in 25 (18.5%) of patients and multi-vessel involvement in 20 (14.8%) of our study cases.

Results: A total of 135 patients fulfilling inclusion criteria of the study were recruited for study from Department of cardiology, Chaudhry Pervaiz Elahi Institute of Cardiology, Multan. Patients undergoing PCI were enrolled in the study to document in-hospital outcomes (success rate) and angiographic pattern. IBM SPSS version 18 was used to analyze the data.

Conclusion: The primary percutaneous intervention is seen to be a most effective, dependable and highly effective method of coronary revascularization in the setting of acute myocardial infarction. So our study results support employing primary PCI for high success rate and desired clinical outcomes among the patients who present with acute myocardial infarction, however, there are limitations to the applicability of this modality due to lack of resources.

Key Words: Primary Percutaneous Intervention, Outcome, Acute Myocardial Infarction

Citation of article: Gill BA, Ahmed N, Din MTM, Zahoor MZ, Farid MI, Saad MA. In-Hospital Outcomes and Angiographic Pattern in Primary Percutaneous Coronary Intervention (PCI) Among Patients of Acute Myocardial Infarction. Med Forum 2020;31(9):173-177.

INTRODUCTION

Coronary artery disease (CAD) is one of the most prevalent reasons of hospital admission and death all around the world in all socioeconomic strarta[2,3].

One of the presentations of coronary artery disease is acute myocardial infarction (MI). Acute MI is not only known to be a disease of the developed industrial world but its incidence is also quite high in the developing world and males are known to be affected more as compared to the females[4]. Over the last three to four decades, the research and advancements in the field of interventional cardiology showed Percutaneous coronary intervention (PCI) as considerable evidence-based invasive treatment of patients with IHD. Extensive research and advancements in drugs and hardware related to coronary interventions during the last decade resulted in an extensive use of primary PCI (PPCI) for management of patients who present to emergency departments with acute ST-segment elevation myocardial infarction (STEMI)[5].

Primary PCI not only reduced the death rate associated with acute myocardial infarction but also decreases the

1. Department of Cardiology, CPE Institute of Cardiology, Multan.
2. Department of D.G. Khan Medical College & Teaching Hospital, D.G. Khan

Correspondence: Dr. Badar ul Ahad Gill, Assistant Prof Cardiology, CPE Institute of Cardiology, Multan.
Contact No: 0300-8630727
Email: badargill1@hotmail.com

Received: May, 2020
Accepted: July, 2020
Printed: September, 2020

chances of re-infarction and neurological deficits due to intracranial bleeds associated with fibrinolysis and resulting stroke leaving some patients with permanent disability [6]. It is the most beneficial therapy for acute STEMI, as rapid and more consistent reperfusion is achieved with a low complication rate when compared to fibrinolysis.[7-8] Despite the beneficial effects of primary PCI, this modality of management for acute myocardial infarction has not been widely used in developing third-world countries, especially in the tertiary public health institutions and even university-level teaching hospitals where most of the patients expect a free treatment. The sole reason is the financial situation of these countries which led to low health budget hindering the availability of such procedures. This is the reason why a small amount of data is available from the countries of Subcontinent regarding the outcome of primary PCI [6]. Up till now nothing surpasses Primary percutaneous intervention with regards to speed and accuracy in reperfusion of the affected myocardium. The side effects of treatment are minimal when the comparison is made using fibrinolytic therapy in acute myocardial infarction[7-8].

The rationale of this study was to ascertain in-hospital outcomes and angiographic pattern of patients undergoing primary PCI in our local population because little data is available on this topic. The availability and documentation of local experience will help other hospitals to start primary angioplasty program and to help in management of patients with acute myocardial infarction with the preferable and gold standard method of coronary revascularization.

MATERIALS AND METHODS

A descriptive cross-sectional study was carried out at the Department of Cardiology, Chaudhry Pervaiz Ellahi Institute of Cardiology(CPEIC), Multan from January 2018 to September 2018. The sampling method used in the study was Non-probability consecutive sampling. The inclusion criteria were patients of either gender within the age bracket of 30 to 60 years. The included patients initially presented in the emergency department, with chest pain where prompt ECG was done and focused history was obtained. The patients who were having chest pain less than 24 hours and elevation of ST segments more than one millimeter were considered for primary PCI and shifted to cardiac catheterization laboratory. The patients undergoing fibrinolytic treatment within twenty-four hours were not included in the study. Similarly, patients having non-ST elevation myocardial infarction were not included in the study. The patients having long-standing kidney disease with uraemia were also excluded. The patients were also evaluated for having an overt or covert hepatic disease and if found to be having hepatic cirrhosis were excluded from the study based on history, physical examination and previous laboratory reports including abdominal ultra-sonogram. The subjects who did not give written consent for the interventional procedure were not taken to cardiac catheterization laboratory and managed conservatively. During the study period, 135 patients were selected for intervention applying the above inclusion and exclusion criteria.

The study variables were registered on a dedicated proforma on the same day of procedure and patients were followed for three days in the hospital. Patients undergoing PCI were enrolled to document the angiographic pattern and in-hospital outcomes during current hospitalization. The in-hospital outcome was taken in terms of success rate, assessed on 3rd day of the procedure. The Successful procedures were taken as the attainment of TIMI III flow in the index vessel and the stenosis of less than thirty per cent in the stented segment. The patients were classified based on coronary angiograms to be having single-vessel coronary artery involvement if they were having equal to or greater than fifty per cent narrowing of the major epicardial coronary vessel. Two Vessel coronary involvement was labelled when a combination of left anterior descending and dominant left circumflex artery was found to be present or left anterior descending artery and dominant right coronary vessel were involved and were having equal to or greater than fifty percent narrowing of the major epicardial coronary vessel. Patients with left main stem involvement were also excluded from study. When all three coronary vessels were involved, the patients were labelled to be having three-vessel coronary artery disease or multi-vessel involvement. All the study data after registering in the study proforma was replicated in the data file created using IBM SPSS software version 18. Numerical quantitative data as Minimum, maximum, Mean and standard deviation for the age of the patients and Body mass index(BMI) were calculated. Categorical data were presented as frequencies and percentages. A separate table was created for coronary risk factors involvement. The major conventional risk factor as male sex, diabetes mellitus, increased blood pressure, tobacco/cigarette smoking, dyslipidaemias, and family history of ischemic heart disease, associated with coronary heart disease were recorded. The frequency and percentages for each risk factor were calculated. Tables were also created to record in hospital outcomes and pattern of disease as seen in coronary angiograms.

RESULTS

In our study population of 135 patients, the total number of patients having male gender was 115(85.1%). on the other hand, the total number of female gender in study patients was only twenty, which constitutes 14.8 percent of the study patients. The mean age of all patients in our study population was 47.17 ± 6.89 years. The minimum and maximum age of our

study population were thirty and sixty years respectively. The mean age in the male gender group was 44.09 ± 5.79 years. In contrast to the male gender, the female gender group was having a mean age of 54.24 ±2.94 years, with a p-value equal to 0. 001 which is statistically significant. The results in the study population have shown that 65(48.1%) were having age greater than 45 years. The age group comprising of age 30 to 45 years was having a frequency of 70 in number, with a percentage of 51.8 in study population (Table 1). The frequency and percentage of different conventional major risk factors were as following. Out of total study population which comprise of 135 patients, 30 (22.2%) were having diabetes mellitus, and 45(33.3%) were having a history of high blood pressure. Cigarette smoking was found in 55 (40.7%) of our study patients. Positive Family history of coronary artery disease (CAD) was present in 15 (11.1%). (Table 2).

Table No. 1: Age-wise distribution of study cases (n= 135)

Age Groups	No. of patients	Percentage
30 – 45 Years	70	51.8
More than 45 Years	65	48.1
Total	135	100

Table No 2: Distribution of risk factors among study patients Total no.135

Risk factors	Yes(%)	No(%)
Smoking	55(40.7%)	80(59.3%)
Hypertension	45(33.3%)	90(66.7%)
Hyperlipidemia	35(25.9%)	100(74.1%)
Diabetes mellitus	30(22.2%)	105(77.8%)
Family history	15(11.1%)	120(88.9%)

Table No. 3: Distribution of successful outcome among study cases (n= 135)

Success	No. of patients	Percentage
Yes	129	95.6
No	06	4.4
Total	135	100

Table No. 4: Distribution of angiographic pattern among study cases (n= 135)

Angiographic pattern	No. of patients	Percentage
Single vessel disease	90	66.6
Double vessel disease	25	18.5
Multi-vessel disease	20	14.8
Total	135	100

A successful outcome was noted in 129 (95.6%) of our study population. Single vessel involvement was present in 90 (66.6%), two vessels were involved in 25 (18.5%) of patients. Three vessel involvement was seen in 20 (14.8%) of patients under study. (Table 3 and 4).

DISCUSSION

Interventional cardiology organizations and current extraordinary large volume trials emphasize timely intervention of acute STEMI by primary PCI. This leads to the initiatives in the developed world to provide the facility to the maximum number of people, with the least possible door to balloon time. If we consider as a model, coronary intervention capable hospitals in Canada are organized to deliver 24/7 facility of primary coronary intervention for acute myocardial infarction patients. To minimize the door to balloon time they have organized systems for the prompt delivery of patients to the hospitals for primary coronary intervention. Diagnosis of acute myocardial infarction before arriving in the hospital by the ambulance staff also facilitates the timely execution of primary percutaneous intervention in patients with acute myocardial infarction.[9]

Fulfilling our inclusion criteria as described in material and methods section, this study of primary coronary intervention in acute myocardial infarction comprised of 135 patients. The total number of patients having male gender was 115 with a percentage of 85.1. on the other hand, the total number of female gender in study patients was only twenty, which constitutes 14.8 percent of the study patients.

Numerous studies have shown the similar trends of male majority in patients presenting with acute myocardial infarction. Malik et al also recognized 79.8 % with male gender [10], Jaffery et al [11] from Jamshoro Medical College in Sindh province has shown that 77 % of their patients presenting with acute myocardial infarction were males, Shahzad et al [12] also analysed that 67 % of their study population of acute myocardial infarction patients consisted of the male gender. Furthermore, Ahmed et al [13] researchers from Quid-e-Azam Medical College Bahawalpur documented a preponderance of male gender in patients with acute myocardial infarction. They reported 67% males in their research. All these results are in congruence with findings in the present study.

The mean age of all patients in our study population was 47.17 ± 6.89 years. The minimum and maximum age of our study population were thirty and sixty years respectively. The mean age in the male gender group was 44.09 ± 5.79 years. In contrast to the male gender, the female gender group was having a mean age of 54.24 ±2.94 years, with a p-value equal to 0. 001. The results in the study population have shown that 65(48.1%) were having age greater than 45 years. The group comprising of age 30 to 45 years was 70 in number, with a percentage of 51.8 in the study population. This reflects the bias of selecting young patients for primary intervention. This also shows the

increased frequency of exclusion criteria in relatively older patients. (Table No. 1).

A study conducted by Atta et al [14] reported 49.6±8.0 years mean age of the patients and Malik et al [15] reported 54.99±11.25 years mean age of the patients with acute myocardial infarction. This depicts that our population is more prone to coronary artery disease as compared to the western population.

Among 135 patients, we reported positive success outcome in 95.6% of our patients. This is in accordance with the success rate noted in multiple international and national studies. Pedrazzini et al [16] from Switzerland also documented 89 % successful recanalization outcome with primary PCI which is approximately same as seen in our findings. Farman et al [6] reported procedural success in 98% of patients. A study was done in Karachi by Shaikh et al [17] which also registered a 97 % success among patients subjected to primary percutaneous intervention in acute myocardial infarction patients. These results are congruent to our observations.

Single vessel involvement was present in 90 (66.6%), two vessels were involved in 25 (18.5%) of patients. Three vessel involvement was seen in 20 (14.8%) of patients under study. (Table No 4). Farmen et al reported single-vessel coronary artery disease in (64.6%), two-vessel CAD in 9.7% and multi-vessel CAD in 25.7%[6]. These results comply with our study results.

CONCLUSION

The primary percutaneous intervention is seen to be a most effective, dependable and highly effective method of coronary revascularization in the setting of acute myocardial infarction. So our study results support employing primary PCI to attain high success rate and desired clinical outcomes among the patients who presented with acute myocardial infarction, however, there are limitations to the applicability of this modality due to lack of resources.

Author's Contribution:

Concept & Design of Study:	Badar Ul Ahad Gill
Drafting:	Nisar Ahmed, Muhammad Tahir Mohy-ud-din
Data Analysis:	Muhammad Zohaib Zahoor, Muhammad Ikram Farid, Abubakr Ali Saad
Revisiting Critically:	Badar Ul Ahad Gill, Nisar Ahmed
Final Approval of version:	Badar Ul Ahad Gill

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Finegold JA, Asaria P, Francis DP. Mortality from ischaemic heart disease by country, region, and age: Statistics from World Health Organisation and United Nations. Int J Cardiol 2013;168(2):934–45.
2. Nowbar AN, Howard JP, Finegold JA, Asaria P, Francis DP. 2014 global geographic analysis of mortality from ischaemic heart disease by country, age and income: statistics from World Health Organisation and United Nations. Int J Cardiol 2014;174(2):293-8.
3. Moran AE, Forouzanfar MH, Roth GA, Mensah GA, Ezzati M, Murray CJ, et al. Temporal trends in ischemic heart disease mortality in 21 world regions, 1980 to 2010: the Global Burden of Disease 2010 study. Circulation 2014; 129(14):1483-92.
4. Sugunakar C, Narshima NR, Anjanayalu B. A study of serum hypomagnesium levels in acute myocardial infarction. J Evidence Based Med Healthcare 2014;1(10):1306-9.
5. Banning AP, Baumbach A, Blackman D, Curzen N, Devadathan S, Fraser D, et al. Percutaneous coronary intervention in the UK: recommendations for good practice 2015. Heart 2015;101 Suppl 3: 1-13.
6. 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;61(6):575-81.
7. Subban V, Lakshmanan A, Victor SM, Pakshirajan B, Udayakumaran K, Gnanaraj A, et al. Outcome of primary PCI - an Indian tertiary care center experience. Ind Heart J 2014;66(1):25-30.
8. Shaikh AH, Siddiqui MS, Hanif B, Malik F, Hasan K, Adhi F. Outcomes of primary percutaneous coronary intervention (PCI) in a tertiary care cardiac centre. J Pak Med Assoc 2009;59(7):426-9.
9. Ko DT, Donovan LR, Huynh T, Rinfret S, So DY, Love MP, et al. A survey of primary percutaneous coronary intervention for patients with ST segment elevation myocardial infarction in Canadian hospitals. Can J Cardiol 2008;24(11):839-43.
10. Malik MA, Khan SA, Safdar S, Taseer IH. Chest pain as a presenting complaint in patients with acute myocardial infarction(AMI). Pak J Med Sci 2013;29(2):565-8.
11. Jaffery MH, Shaikh K, Baloch GH, Shah SZA. Acute myocardial infarction; hypomagnesemia in patients. Professional Med J 2014;21(2):258-63.
12. Shahzad M, Iqbal A, Ahmad RZ. To Identify the Role of C-Reactive Protein in Predicting the Response of Thrombolytic Therapy in Acute Myocardial Infarction. Pak J Med Health Sci 2012;6(2):433-7.

13. Ahmed A, Junjua BA, Rizvi SFZ, Tanveer ZH, Ahmed I. Prevalence of hypomagnesaemia in patients with acute myocardial infarction compared with normal subjects. J Sheikh Zayed Med Coll 2010;1(4):122-4.
14. Ata MA, Khand F, Shaikh SS, Ata MA. Effect of smoking on serum xanthine oxidase and malondialdehyde levels in patients with acute myocardial infarction. J Pak Med Assoc 2015 Jan;65(1):39-42.
15. Malik MA, Khan SA, Safdar S, Taseer IH. Chest pain as a presenting complaint in patients with acute myocardial infarction(AMI). Pak J Med Sci 2013;29(2):565-8.
16. Moccetti T, Eberli F, et al. Primary percutaneous coronary intervention for unprotected left main disease in patients with acute ST-segment elevation myocardial infarction the AMIS (Acute Myocardial Infarction in Switzerland) plus registry experience. JACC Cardiovasc Interv 2011 Jun;4(6):627-33.
17. Shaikh AH[1], Siddiqui MS, Hanif B, Malik F, Hasan K, Adhi F. Outcomes of primary percutaneous coronary intervention (PCI) in a tertiary care cardiac centre. J Pak Med Assoc 2009;59(7):426-9.