



MYOCARDIAL INFARCTION; PROCEDURAL SUCCESS OF PRIMARY PERCUTANEOUS INTERVENTION IN PATIENTS WITH ACUTE ST SEGMENT ELEVATION

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ABSTRACT... Coronary artery disease is one of the major cause of mortality in the modern world and will become the leading cause of death by 2020, percutaneous coronary intervention has proven to be most efficient in STEMI to decrease the mortality. **Objectives:** This study was designed to determine the procedural success of Primary PCI in patients with Acute ST segment elevation Myocardial infarction. **Study Design:** It was an observational study. **Place and Duration:** Cardiology unit of P.I.M.S, Islamabad, conducted from 2nd November 2011 to 2nd May 2012. **Patients and Methods:** This study included 43 patients with Acute STEMI. All of them had primary PCI. The main outcome variable was frequency of procedural success described as TIMI flow II or III, which was described as frequency distribution table. **Results:** Procedural success was achieved among all (100%) patients. **Conclusions:** The procedural success of primary PCI is high (almost successful in every case) and should be offered to the patients with Acute STEMI whenever the facility is available.

Key words: ST-segment elevation myocardial infarction; primary percutaneous coronary intervention.

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INTRODUCTION

In western countries Coronary artery disease is an important cause of mortality.^{1,2} Each year in United States 650,000 new patients are diagnosed with Acute Myocardial Infarction (AMI) and another 450,000 get a recurrent AMI.³ Till 2020 Chronic heart disease is assumed to become the leading cause of mortality.⁴ AMI is currently responsible for 10.6% of hospital mortality.⁵

Acute rupture of the atherosclerotic plaque leads to completer blockage of coronary arteries, is one of the serious menifestations of the coronary artery disease resulting in ST segment elevation MI.⁶

STEMI management has always been a challenge as it needs prompt diagnosis and appropriate treatment.⁷ Electrocardiogram is very safe, simple and accurate initial test, ST elevations of more than 0.1mv are very accurate sign of myocardial injury.^{2,8} Early percutaneous intervention is the first choice treatment in these patients.⁹

Fibrinolytic or Antithrombotic medicines as proven by many trials are very effective if given within early hours of start of ischemic symptoms.^{10,11} Percutaneous coronary intervention(PCI) is advised therapy for early restoration of blood flow to ischemic tissues and should be performed timely.^{12,13}

As an alternative to bypass surgery Andreas Gruntzig in 1977 introduced PCI.³ It includes ballooning or placing stents either bare metal or drug eluting, these stents have reduced the restenosis rate. Now stenting is advised cases where coronary artery bypass is contraindicated.¹⁴

In dedicated PCI laboratory primary PCI is superior to fibrinolytic therapy when performed within 90 minutes of first medical contact.^{13,15,16} Most PCI procedures are around 90-97% successful.⁷ In totally occluded vessel cases (100% obstruction of the lumen), success rate decreases to only about 50 to 73%.¹⁷

Meta analysis have confirmed the advantage of PCI over fibrinolysis and that found a lower mortality rate (4.4% versus 6.5%; odds ratio, 0.66) and lower rates of nonfatal reinfarction (2.9% versus 5.3%; odds ratio, 0.53) and intracerebral hemorrhage with primary PTCA compared with fibrinolysis. All age group show better results with PCI when procedure is performed within 1 to 2 hours of presentation to a health care facility.¹⁷

PCI is the treatment of choice in centers who can give rapid access (within 3 hours) to this procedure and have 24 hours active catheter laboratory.¹⁸ There is only one study done in Pakistan on this mode of treatment in private setup, at Aga Khan University Hospital Karachi.¹⁹ This study is one of a kind in government setup and will help us in evaluating the success of Primary PCI and making this ideal mode of treatment wide spread in our country to decrease the mortality from AMI.

MATERIAL AND METHODS

This was Observational study conducted at cardiology unit of P.I.M.S, Islamabad, from 2nd November 2011 to 2nd May 2012 after approval from hospital ethical committee. Patients of Both Gender ages 30 to 75 years, patients with onset of ischemic symptoms in last 12 hours with ST segment elevation on ECG were included in the study. Exclusion criterion included: Preceding thrombolysis, age < 30 years, previous CABG, Prinzmetal Angina, cocaine poisoning. Confidence level 95%, anticipated population proportion of 90%, absolute precision required is 9%. Sample size = 43 according to WHO calculator. Non-probability consecutive sampling was used as sampling technique.

After approval of study from the hospital ethical committee, a written informed consent was taken from all of the patients admitted with Acute STEMI in Cardiology unit. All those who fulfilled the inclusion criterion were included in study and those patients who fulfilled the exclusion criteria were excluded. After selection of patient they were shifted to Angiography department, arterial sheath was passed in femoral or radial artery to assess the coronary arteries. Angiography

was done and area of occlusion identified was ballooned/ stented by the interventional cardiologist. After this again dye was injected in the coronary vessels to see the grade of TIMI flow (success) achieved. There are four grades of TIMI flow, grade 0,1,2 and 3. 0 means no perfusion of contrast beyond obstruction, grade 1 means penetration of contrast without perfusion, grade 2 means partial perfusion while grade 3 means complete perfusion. The trainee researcher who entered the data in the proforma assisted all these procedures.

Data was analyzed in SPSS version 11. Mean and standard deviation was used for quantitative variables i.e. age, while frequency and percentage was used for qualitative variables i.e. gender, procedural success and mortality.

RESULTS

The total number of patients included in the study was 43 (including both males and females).

Distribution of patients by Age

The mean age of the patients was 55.91 ± 9.51 years [range 37 - 73 years]. There were 4 (9.3%) patients of age range of 31-40 years, 08 (18.6 %) patients of age range of 41 - 50 years, 18 (41.8%) patients of age range of 51-60 years, 11 (25.6%) patients of age range of 61 – 70 year and 2 (4.7%) patients of age range of 71 – 80 years of age. (Table-I)

Age (Years)	No.	Percentage
31-40	04	9.3
41-50	08	18.6
51-60	18	41.8
61-70	11	25.6
71-75	02	4.7
Mean \pm SD	55.91 \pm 9.51	
Range	37 – 73	

Table-I. Distribution of patients by age (n= 43)

Key: SD = Standard deviation

Distribution of patients by Sex

Patients were also distributed according to sex. There were 28 (65.1%) male patients in the study, while 15 (34.3%) patients were female. Male to female ration was 1.86:1. (Figure-1)

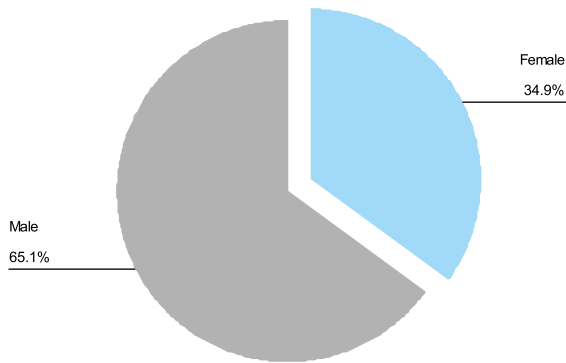


Figure-1. Distribution of patients by sex (n=43)

Distribution of patients by TIMI scores

The mean TIMI score of the patients was 2.56 + 0.50 (range 2 – 3). None of the patients in the study had TIMI score 0 or 1 after the procedure. There were 6 (14%) patients who had TIMI score 2 and 37 (86%) patients had TIMI score 3. (Table-II)

TIMI score	No.	Percentage
0	0	0
1	0	0
2	6	14
3	37	86
Mean±SD	2.56 ± 0.50	
Range	2-3	

Table-II. Distribution of patients by TIMI score (n=43)
Key: SD = Standard deviation

Distribution of patients by Procedural Success

Out of the 43 patients in the study, procedural success was achieved among all (100%) patients. (Figure-2)

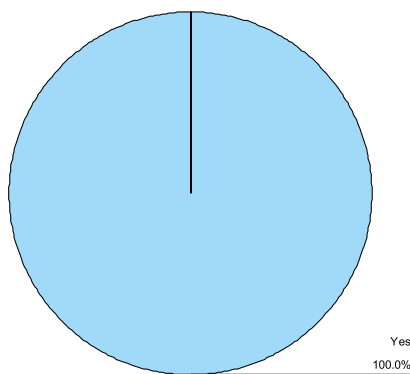


Figure-2. Distribution of patients by Procedural success (n=43)

DISCUSSION

Patients with ST elevation acute myocardial infarction comprise a heterogeneous population with respect to the risk for adverse events. Primary percutaneous coronary intervention has shown promising results in some studies. The studies in this regard were scanty in our country. This study was conducted to see the outcome of primary PCI in a government setup. This prospective study was carried out among 43 patients with STEMI. The results of this study were in favor of primary PCI as the success rate was 100%.

There are few other studies, which have determined the outcome of primary PCI among patients with STEMI. The results of these studies are variable among different authors.

Farman MT, et al.²⁰ conducted a prospective study among 113 patients with STEMI and agreed to go for primary PCI admitted in a tertiary care teaching Hospital (National Institute of Cardiovascular Diseases Karachi, Pakistan) during January 1st, 2008 to December 31st, 2008 were included. All Patients received Aspirin, Clopidogrel and Platelet Glycoprotein IIB IIIA Inhibitor. After Primary PCI patients were planned to follow at one month, 3 months and 6 months. Primary end point was to document death, MI, CABG and re-hospitalization. Out of 113 cases, 102 (90.3%) were male and 11 (9.7%) were female, Mean age was 51.2±11.7 years. These observation are also similar to ours i.e. majority of patients in our study were male (male to female ration was 1;86:1). The mean age in our study (i.e. 55.91 ± 9.51 years) was a little higher to their study. The main outcome parameters were in hospital mortality which was 5.3%. The other outcome parameter was need for CABG at 6 months, which was needed among 4.9% patients. At the completion of follow up, 7.9% patients died. The immediate success rate of the study was 98.2%, which as compared to ours was 100%. However, in their study, post procedural TIMI score was used to determine the success of the procedure. The following were the details of the TIMI score: TIMI score 0, I, II and III was calculated in 0%, 0.8%, 2.6% and 95.6% patients respectively. These observations reflect

that a higher proportion of patients achieved TIMI score 3. Similarly, a higher proportion i.e. 86% patients in our study achieved TIMI score 3. However, the success rate was comparable in both studies i.e. 97% and 100% which was based on TIMI score in both.

Another study was conducted by Shaikh AH, et al.²¹ in which procedural success was assessed among 104 patients with STEMI. The main outcome parameters were 30 days mortality, myocardial infarction, recurrent angina and congestive cardiac failure which were observed among 5.8%, 1% and 1% respectively. They also documented the procedural success which was based on postprocedural TIMI score, the same as in ours. The procedural success was assigned on gaining TIMI score 2 or 3. They observed that procedural success was achieved among 97% patients.

Jaffary FH, et al.¹⁹ I conducted a retrospective cohort study at a tertiary care university hospital in Karachi, Pakistan. A total of 277 consecutive patients undergoing primary PCI between January 2001 and December 2005 were reviewed. Cox proportional hazards models were constructed. The primary outcome was mortality. Procedural success was 97.1%. In hospital mortality was 8.3%. This study also validates the outcome of our study.

In a report from National Cardiovascular Data Registry, clinical characteristics and in-hospital outcomes were assessed in consecutive PCI cases from January 1, 2004, to March 30, 2006. The analysis cohort consisted of 308,161 patients from 465 PCI-capable facilities. The procedural success in this report was documented for primary PCI was 92% which was based on TIMI score > 2.²²

In a study by Ting HH, a total of 1,007 elective PCI and primary PCI procedures performed from March 1999 to August 2005 at the Immanuel St. Joseph's Hospital-Mayo Health System (ISJ) in Mankato, Minnesota, were matched one-to-one with those performed at St. Mary's Hospital (SMH)

in Rochester, Minnesota. Procedural success was 93% at ISJ (95% CI 90% to 96%) and 96% at SMH ($p = 0.085$).²³

The success rates of primary PCI for STEMI are high. A majority of patients (86%) patients in our study achieved a TIMI score of 3. Although Thrombolytic therapy (Streptokinase) is widely available in urban Pakistan, the efficacy of this treatment in achieving TIMI 3 flow is around 50% at best.²⁴

The above discussion yields that the procedural success with primary PCI range from 92% to 100%, which is quite high. However, this can only be preceded in the specialized units fully equipped and expert interventionists available.

CONCLUSION

The success rate of primary PCI among patients with STEMI is very high (almost successful in every case). So, it is recommended that patients with STEMI should be treated with primary PCI whenever the facilities are available. This also highlights the need that primary PCI should be considered as first line treatment wherever this facility is available. There is also need for future trials to compare the outcome of primary PCI with routine thrombolysis.

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REFERENCES

1. Le May MR, Derek YS, Dionne R. **A citywide protocol for primary PCI in ST-segment myocardial infarction.** *N Engl J Med* 2008; 358:231-240.
2. Antman EM, Anab DT, Armstrong PW. **ACC/AH guidelines for the management of patients with ST segment elevation myocardial infarction.** *J Am Coll Cardiol* 2004; 44:671-719.
3. Elliot M, Antman, Andrew P, Braunwald E, Loscalzo J, Selwy. **Ischemic Heart Disease.** In: **Fauci AS, Braunwald E, Kasper DL, Stephen LH, Longo DL, Jameson JL et al.** *Harrison's Principles of Internal Medicine* 17th ed. McGraw Hill Medical 2008;1514-1548.
4. Bloomfield P, Bradbury A, Grubb NR, Newby DE. **Cardiovascular Disease.** In: **Boon NA, Walker BR, Hunter JAA.** *Davidson's Principles and Practice of Medicine.* 20th ed. Edinburgh: Churchill Livingstone

- 2006; 519-646.
5. Gale CP, Manda SO, Batin PD, Weston CF, Birkhead JS, Hall AS. **Predictors of in-hospital mortality for patients admitted with ST-elevation myocardial infarction: a real-world study using the Myocardial Infarction National Audit Project (MINAP) database.** Heart 2008; 94:1407-1412.
 6. Menon V, Harrington RA, Hochman JS. **Thrombolysis and adjunctive therapy in acute myocardial infarction: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy.** Chest 2004; 126:549-575.
 7. Mehta RH, Montoye CK, Gallogly M, Baker P, Blount A, Faul J, Roychoudhury C. **Improving Quality of Care for Acute Myocardial Infarction - The Guidelines Applied in Practice (GAP) Initiative.** JAMA 2002; 287:1269-1276.
 8. Rehman ST, Sheikh S, Nazeer M. **ST segment resolution post MI – a predictor of better outcomes.** J Pak Med Assoc 2008; 58:283-285.
 9. Wang J, Asinger RW, Marriot HJL. **ST segment elevation in conditions other than acute myocardial infarction.** N Eng J Med 2003; 2128-2135.
 10. Armstrong PW, Collen D, Antman E. **Fibrinolysis for acute myocardial infarction: the future is here and now.** Circulation 2003; 107:2533-2537.
 11. Pedley DK, Bissett K, Connolly EM. **Prospective observational cohort study of time saved by prehospital thrombolysis for ST elevation myocardial infarction delivered by paramedics.** BMJ 2003; 327:22-26.
 12. Gerschlick AH, Stephens-Lloyd A, Hughes A. **Rescue angioplasty after failed thrombolytic therapy for acute myocardial infarction.** N Engl J Med 2005; 353:2758-2768.
 13. Van de Werf F, Bax J, Betriu A. **Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation: the Task Force on the Management of ST-Segment Elevation Acute Myocardial Infarction of the European Society of Cardiology.** Eur Heart J 2008; 29:2909-2945.
 14. Bashore TM, Granger CB, Hranitzky P, Patel MR. **Heart Disease.** In Mchphee SJ, Papadakis MA, Rabow MW. **Current Medical Diagnosis and Treatment 48th ed.** McGraw Hill 2009; 287.
 15. van der Werf F, Ross A, Armstrong P. **Primary versus tenecteplase-facilitated percutaneous coronary intervention in patients with ST-segment elevation acute myocardial infarction (ASSENT-4 PCI): randomized trial.** Lancet 2006; 367:569-578.
 16. Di Mario C, Dudek D, Piscione F. **Immediate angioplasty versus standard therapy with rescue angioplasty after thrombolysis in the combined abciximab reteplase stent study in acute myocardial infarction (CARESS-in-AMI): an open, prospective, randomized, multicentre trial.** Lancet 2008; 371:559-568.
 17. Anderson JL. **ST Segment Elevation acute Myocardial Infarction and Complications of Myocardial Infarction.** In Goldman L, Ausiello D. **Cecil medicine 23rd ed.** Saunders Elsevier 2007; 472-524.
 18. Abbas S, Tayyab F, Samor NA, Shabir M, Kayani AM. **Myocardial damage in successful single vessel coronary Angioplasty as assessed by Creatinine kinase and its Myocardium band isoenzyme levels.** J Coll Physicians Surg Pak 2008; 18:142-146.
 19. Jafary FH, Ahmed H, Kiani J. **Outcomes of primary percutaneous coronary intervention at a joint commission international accredited hospital in a developing country, can good results, possibly similar to the west, be achieved?** J Invasive Cardiol 2007; 19:417-423.
 20. Farman MT, Sial JA, Khan NU, Rizvi SNH, Saghir T, Zaman KS. **Outcome of primary percutaneous coronary intervention at public sector tertiary care hospital in Pakistan.** JPMA 2011; 61:575.
 21. 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.** JPMA 2009; 59:426.
 22. Kutcher MA, Klein LW, Ou FS, Wharton TP, Dehmer GJ, Singh M. **Percutaneous Coronary Interventions in Facilities without Cardiac Surgery on Site: A Report from the National Cardiovascular Data Registry (NCDR).** J Am Coll Cardiol 2009; 54:16-24.
 23. Ting HH, Raveendran G, Lennon RJ, Long KH, Sing Mandeep, Wood DL. **A Total of 1,007 Percutaneous Coronary Interventions without Onsite Cardiac Surgery.** J Am Coll Cardiol 2006; 47:1713-1721.
 24. Lincoff AM, Topol EJ. **Illusion of reperfusion. Does anyone achieve optimal reperfusion during acute Myocardial Infarction?** Circulation 1993; 88:1361-1371.

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Ishtiaq Ahmed Malik, Khalid Mahmood, M Khalid Raja. ACUTE MYOCARDIAL INFARCTION (Original) Prof Med Jour 12(4) 457-465 Oct, Nov, Dec 2005.





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