ORIGINAL ARTICLE

PROCEDURAL OUTCOMES OF PRIMARY PERCUTANEOUS CORONARY INTERVENTION IN ELDERLY PATIENTS WITH STEMI

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Background: Cardiovascular disease (CVD) is the leading cause of death worldwide, and coronary artery disease (CAD) is the most prevalent manifestation associated with high mortality and morbidity. Older age is independent predictor of cardiovascular mortality and death. Elderly may experience high rates of complications following acute STEMI. Optimal reperfusion strategy in elderly following STEMI remains under debate due to their exclusion from trials evaluating various treatment modalities. Primary PCI has emerged as treatment of choice in patients presenting with acute STEMI in a certain window period. The rationale of this study is to help us determine the outcome of primary PCI in the local elderly population. **Methods:** The study was designed as descriptive cross-sectional study and was carried out at AFIC, NIHD hospital Rawalpindi over a six months period. A total of 105 adults with STEMI were included in study. Data was analysed using SPSS-19.0. **Results:** Total 105 patients were included in the study according to the inclusion criteria of the study. There were 102 (97.1%) patients who successfully achieved TIMI II flow post Primary PCI. **Conclusion:** We concluded that outcome of primary PCI in local elderly population is favourable which leads to a consensus that primary PCI should be offered to every elderly patient presenting to tertiary care hospital with well-equipped Cath lab and experienced staff.

Keywords: Primary PCI; Elderly; Myocardial infarction

INTRODUCTION

Coronary artery disease is the most common cause of death worldwide and is the most common manifestation of cardiovascular disease.[1] Older age is independent predictor of arteriosclerosis and cardiovascular events.[2]

Elderly patients are more likely to have CAD than young individuals. Elderly population tends to have more advanced disease on presentation. Elderly constitute an increasing proportion of patients presenting with acute coronary syndrome (ACS), and advanced age is a strong predictor of adverse outcomes. The leading cause of death in elderly is cardiovascular disease.[3]

Elderly may experience high mortality from STEMI due to various comorbidities, advanced nature of disease and high rates of electrical as well as mechanical complications.[4,5] Patients with STEMI who are elderly more often have multiple pre-morbid such as hypertension, diabetes mellitus, COPD, chronic renal failure and end stage heart and liver disease, which makes their management difficult and portends a bad prognosis in terms of treatment outcomes.

Elderly patients presenting with STEMI, usually present late due to atypical presentations and various other factors. Further when they present with STEMI, their modality of revascularization is difficult to decide due to various co morbidities such as hypertension, Diabetes Mellitus, COPD, Chronic renal failure and bone and joint disorders.[6–9]

Frequently elderly patients have comorbid like diabetes mellitus which usually masks their pain and elderly patients frequently tend to present late or out of 12–24 hours window period for treatment of STEMI. This late presentation frequently leads to more complicated in hospital course and longer recovery times. Elderly population due to multiple factors is at risk of more mechanical and electrical complications. STEMI has higher mortality in elderly population due to these factors. Optimum treatment strategy for STEMI in elderly population is very important as it changes prognosis altogether.

It is still unclear, what reperfusion strategy should be employed in elderly because elderly population is usually under represented and excluded in different landmark clinical trials addressing optimum reperfusion strategy in STEMI.[10] Most of the major landmark trials addressing treatment of STEMI haven't addressed elderly population separately or have excluded them from sample, thereby complicating the optimum treatment modality in elderly.

Primary PCI as a reperfusion strategy in STEMI is widely used and constitutes a vital treatment strategy for STEMI.[11–13] If performed

within 90 minutes of initial medical contact, primary PCI is the preferred reperfusion strategy.

In the elderly, coronary disease is diffuse and the vessels are more often severely calcified. Therefore, the procedure is often technically difficult.[14] Primary PCI is quite effective in restoring post procedural TIMI flow in elderly. A study shows restoration of post procedural TIMI flow 2 and 3 in 14.3% and 73.5% of elderly patients.[15]

Elderly patients tend to have more advanced disease owing to multiple comorbid. Most elderly patients are frail with low BMI and have increased bleeding risks. This factor makes thrombolysis a more-risky modality in elderly. Primary PCI is a more convenient option, if available in elderly population with low bleeding risks.

The rationale of this study was to help us determine the outcome of primary PCI in the local elderly population and to build up a consensus that Primary PCI should be offered to every elderly patient presenting to a tertiary care cardiac centre with a well-equipped lab and experienced staff so that maximum benefit of reperfusion should be dispensed and to reduce mortality with acute myocardial infarctions.

MATERIAL AND METHODS

The objective of the study was to determine procedural outcomes of primary percutaneous coronary intervention in elderly.

Our study was a descriptive cross-sectional study carried out in Armed forces institute of cardiology, National institute of heart diseases (AFIC, NIHD) over a period of six months. Sample selection was done by non-probability purposive sampling. Sample size was calculated by WHO sample size calculator. Inclusion criteria utilized patients belonging to both genders with age between 65–90 years, new ST elevation MI on ECG and presentation within 12 hours of symptom onset. Exclusion criteria was patients who were less than 65 years of age, presented greater than 12 hours after symptom onset or were in cardiogenic shock.

A written informed consent was taken from all the patients enrolled in the study. ECG of all elderly patients with acute MI presenting to emergency department, was done immediately and promptly managed by post graduate resident/cardiologist. Patients were shifted to Cath Lab where they were counselled about the complications of the procedure and afterwards primary pci was done. Procedure was performed by the consultant cardiologist/post graduate resident. The success of procedure was established by Thrombolysis in Myocardial infarction (TIMI) flow grade and 50% Resolution of ST –T changes in ECG.

Data was analysed on SPSS version 19. Mean and standard deviation were used for quantitative variables, i.e., age and duration of resolution of ST-T changes, while frequency and percentage were used for qualitative variables like gender and success. Effect modifiers like age and gender were controlled by stratification. Post stratification chi-square test was applied. p-value ≤ 0.05, was considered as significant.

RESULTS

Data was entered and analysed in SPSS version 19.0. Total 105 patients were included in the study according to the inclusion criteria of the study.

Descriptive statistics of age (years) of patient was calculated in terms of mean and standard deviation. Mean age (years) was 70.02 ± 6.24 with ranges from 65–90 years, as shown in table-1

Distribution of gender was calculated in terms of frequency and percentage of male and female patients. There were 85 (81.0) male and 20 (19.0) female patients in the study, as shown in table-2. Descriptive statistics of duration of resolution of ST-T changes (mins) of patient was calculated in terms of mean and standard deviation. Mean duration of resolution of ST-T changes (mins) was 89.55 ± 1.06, as shown in table-3

The outcome of the study is the frequency of success of procedural outcome of primary percutaneous coronary intervention (PCI) in elderly patients with STEMI. There were 102 (97.1) patients who have successfully achieved Thrombolysis In Myocardial Infarction (TIMI) score ≥ 2 after the primary percutaneous coronary intervention (PPCI), as shown in table-4

Effect modifier like age stratification compared with success of primary percutaneous coronary intervention. There were 94 (92.2) and 8 (7.8) patients having age between 65–80 and 81–90 years respectively who have successfully achieved TIMI score ≥ 2 after the primary percutaneous coronary intervention (PPCI). Chi-square test was used to compare effect modifier like age stratification with success of primary percutaneous coronary intervention which was statistically not significant (p-value 0.614).

Effect modifier like gender stratification compared with success of primary percutaneous coronary intervention. There were 82 (80.4) male and 20 (19.6) female patients who have successfully achieved TIMI score ≥ 2 after the primary percutaneous coronary intervention (PPCI). Chi-square test was used to compare gender stratification with success of primary percutaneous coronary intervention which was statistically not significant (p-value 0.394).

Effect modifier like duration of resolution stratification compared with success of primary percutaneous coronary intervention. There were 41 (40.2) patients having duration of resolution between 88–89 mins who have successfully achieve TIMI score >2 after the primary percutaneous coronary intervention (PPCI). Similarly, there were 61 (59.8) patients having duration of resolution 90–91 mins who have successfully achieve TIMI flow >2 after the primary percutaneous coronary intervention (PPCI). Chi-square test was used to compare duration of resolution with successful achievement of TIMI score >2 after primary percutaneous coronary intervention which was statistically not significant (*p*-value 0.358).

Table-1: Descriptive statistics of age (years) of patient

	n	Minimum	Maximum	Mean	SD
Age (years)	105	65.00	90.00	70.02	6.24

Table-2: Distribution of Gender of patient

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	85	81.0	81.0	81.0
Female	20	19.0	19.0	100.0
Total	105	100.0	100.0	

Table-3: Descriptive statistics of duration of resolution of ST-T changes

n	Minimum	Maximum	Mean	SD
105	88.00	91.00	89.55	1.06

Table-4: Frequency and percentage of success (TIMI score > 2) of patient

	Frequency	Percent	Valid Percent	Cumulative %
Yes	102	97.1	97.1	97.1
No	3	2.9	2.9	100.0
Total	105	100.0	100.0	

DISCUSSION

Incidence of cardiovascular disease increases in elderly and it is the most common cause of death in elderly. As the life expectancy increases with advancement in medicine, elderly population tends to be on the rise. Elderly population usually consists of individuals more than 65 years of age however a more functional cut-off should be applied when considering elderly population. Ischemic heart disease accounts for one third of deaths in elderly and management of STEMI poses challenges in elderly population due to multiple comorbidities. Multiple landmark trials have excluded elderly population from their studies, so there's paucity of evidence regarding management of acute coronary syndromes in elderly.[16]

According to international guidelines and various landmark articles, primary PCI is treatment of choice in STEMI when adequate expertise and facilities are available. Life expectancy of elderly has improved with better health facilities. These better health facilities will markedly increase the proportion of elderly population by the year 2050. Elderly patients are at increased risk of complications from STEMI but they are mostly underrepresented in different landmark clinical trials addressing the issue of treatment modality of choice in STEMI. Following revascularization, elderly patients are at increased risk of developing periprocedural complications due to multiple comorbidities.[17]

In our study, mean age (years) was 70.02±6.24 with ranges from 65 to 90 years. Whereas in a study by Moonen *et al*[15], the mean age of patients was 83.5±3.4.

In our study, the frequency and percentage of male patients was 85 (81.0) and female patients was 20 (19.0). While, in one study[18], there were 107 (45) males and 131 (54) females.

A study shows restoration of post procedural TIMI flow 2 and 3 in 14.3% and 73.5% of elderly patients.[15] Similarly, in our study, there were 97.1% patients who have successfully achieve Thrombolysis in Myocardial Infarction (TIMI) score >2 after the primary percutaneous coronary intervention.

A large international registry looked into outcome of unprotected left main disease after pci in octogenarians. There was no significant difference between cabg and pci group as a revascularization modality in octogenarians.[19]

Periprocedural bleeding is a major complication in elderly patients undergoing PCI. It has been shown that periprocedural bleeding is a major determinant of bad prognosis, myocardial infarction, procedure failure, death and all-cause mortality in elderly undergoing primary pci. Elderly are more susceptible to detrimental effects of bleeding due to hypoxia, hypovolemia, drug discontinuation, reduced oxygen carrying capacity and hypotension. These all aforementioned effects are poorly tolerated in elderly who usually have poor LV systolic function and associated peripheral arterial disease leading to endothelial dysfunction.[20,21]

In elderly, it is imperative to calculate the bleeding risk bearing in mind the implication of bleeding on periprocedural and postprocedural mortality. Several risk scores have been developed and validated to assess bleeding risk, i.e., CRUSADE risk score, ACUITY-HORIZONS risk score and ACTION registry GWTG risk score. Elderly patients with STEMI undergoing primary pci should be carefully selected according to these risk scores to decrease and improve periprocedural morbidity and mortality.

Despite multiple premorbid and risk factors, primary PCI emerged as a useful tool for revascularization in settings of STEMI, if performed

in high volume centres with experienced Cath team. This study can be replicated elsewhere in Pakistan and it gives an encouraging insight into prognosis of this procedure in elderly population.

CONCLUSION

The study concludes that the outcome of primary percutaneous coronary intervention in the local elderly population is favourable, which leads to build up a consensus that primary percutaneous coronary intervention should be offered to every elderly patient presenting to a tertiary care cardiac centre with a well-equipped lab and experienced staff so that maximum benefit of reperfusion should be dispensed and to reduce mortality with acute myocardial infarctions

AUTHORS' CONTRIBUTION

MYD: Introduction, material and methods, data collection. MK: Results and analysis. SA: statistical analysis and discussion. UH: discussion
FT: Introduction

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