

Frequency of Cardiogenic Shock after Primary Percutaneous coronary intervention In Patients with ST elevation myocardial infarction And Their Hospital Outcome.

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ABSTRACT

Objective: To find out the frequency of cardiogenic shock in patients with STEMI (ST Elevation Myocardial Infarction) and there in hospital outcome after primary PCI (Percutaneous Coronary Intervention).

Methodology: This design of the study is observational cross sectional, performed at department of adult cardiology, National Institute of Cardiovascular Diseases (NICVD) from 1st November 2016 to 30th April 2017. We took 292 patients who landed at Emergency room within 12 hours of onset of symptoms with ST segment elevation or new LBBB, treated with primary or rescue PCI or patient presenting with cardiogenic shock.

Results: The age of the patients was 50.10±6.45 years on average. Cardiogenic shock in patients with STEMI after primary PCI was 19.8%. From total 70.7% mortality, 24.1% coma and 5.2% remains alive and well after primary PCI in STEMI patients with cardiogenic shock. (p=0.0005).

Conclusion: As per study conclusion cardiogenic shock prevalence among cases having STEMI after primary PCI and rate of mortality was high, so a preventable cause of cardiogenic shock with STEMI after primary PCI should be established.

Key Words: STEMI, Cardiogenic shock, Myocardial infarction

INTRODUCTION

Coronary artery diseases are responsible for 16.7 million deaths/y worldwide so remains the leading cause of death.¹ Around 1.2 million Americans suffered from Myocardial infarction, a major form of coronary artery disease. Many have ST-segment elevation MI and the recommended treatment according to current guidelines is revascularization.^{1,2} The ideal approach for revascularization is primary PCI or popularly known as angioplasty if performed within appropriated time frame for acute ST-segment elevation myocardial infarction patients.² Many studies has also ascertained the rapidity of performing the Primary PCI or angioplasty as accessed to reduced mortality.³ It is proved by observational studies that reported decreased mortality rate in cases of ST segment elevation MI who have received Primary PCI facility with respect to door to balloon time.

Cardiogenic shock was known to effect around 7-10% of total patients of acute myocardial infarction from which 5-9% have ST segment elevation myocardial infarction while only 2-3% have Non ST segment elevation myocardial infarction.^{3,4} Cardiogenic shock is responsible for 70-80% mortality⁵ from which around 42-48% mortality recorded among during the reperfusion era despite percutaneous coronary intervention (PCI).⁶ It is calculated the mortality rate after PCI according to TIMI flow grade among study subjects having cardiogenic shock due to acute STEMI and states 46.1% overall mortality.^{7,8} Shock complicating myocardial infarction is fatal complication despite timely treatment using several new treatments strategies over last decade, the mortality remains more than 50%. However this study has been conducted to assess the prevalence of

established and preventable cause of cardiogenic shock with STEMI after primary PCI, which could be helpful to develop the future treatment modalities for the management of cardiogenic shock & its outcomes (coma & deaths). The purpose of this study is also to better understand what treatment methods result in the better outcomes for patients who have cardiogenic shock after PCI.

MATERIAL AND METHODS

This was a cross sectional study conducted on inpatients at National Institute of Cardiovascular Diseases from 1st November 2016 to 30th April 2017. The Sample size was calculated through the following formula:

Frequency of Cardiogenic shock in patients with STEMI= 5%⁵

Confidence level=95%

Bond on error= 2.5%

Sample size (n) = 292 no: of patients of with STEMI

Formula $n = z^2 p (1-P) / d^2$.

Using non probability consecutive sampling, patients of either gender between 30 to 60 years of age reaching within time frame of twelve hours of symptoms with ST segment elevation myocardial infarction or having vascular occlusion on angiography or patient presenting with cardiogenic shock were included after written and informed consent. All the patients in cardiac arrest, assessed by history, clinical examination & ECG changes, other causes of shock (hypovolemia, hemorrhage, sepsis, pulmonary embolism or anaphylaxis), and shock secondary to mechanical complication such as rupture of papillary muscle or of ventricular free wall or interventricular septum,

severe aorta valve regurgitation/stenosis, renal disease and pregnant women were excluded. Patients were enrolled prospectively into the database. Patients were assessed for cardiogenic shock and end-organ hypo perfusion. Primary PCI outcome(mortality) was checked in patients with STEMI and cardiogenic shock (>48 hours). All the data was recoded via study proforma. Data analysis was done of SPSS version 17. Frequencies and percentages were computed for categorical variables like gender, outcome of cardiogenic shock. Mean ± standard deviation for continuous variables like age, duration of sign & symptoms of STEMI, duration of cardiogenic shock & outcomes of shock. Effect modifier like age, gender, duration of sign & symptoms of STEMI was controlled through stratification. Chi-square test was used. P ≤0.05 was considered level of significance.

RESULTS

A total of 292 patients were selected from which 168(57.5%) male and 124(42.47%) female and most of the patients were above 40 years of age. There were

28(9.59%) patients with age between 31-40 years, 127(43.49%) patients lies in 41-50 years and 137 (46.92%) patients lies in 51-60 years age group. The average age of the patients was 50.10±6.45 years, the minimum age was 34 years while maximum was 60 years.

The mean ± standard deviation of duration of signs and symptoms of STEMI was 5.85±2.48, 6 hours median, the minimum duration was 1 hour and maximum was 12 hours.

The statistics of artery occlusion shows 109 (37.33%) patients with single vessel disease, 56(18.84%) with proximal LAD, 35(11.99%) with LAD and Lcx, 42(14.38%) with LAD and RCA and 51(27.49%) with left main and 3 vessel involvement on angiography.

Cardiogenic shock incidence in cases of STEMI after primary PCI was 58/292 (19.86%) as presented in table 1. The mean ± standard deviation of duration of cardiogenic shock was 1.69±0.45 hours, 2 hours median, the minimum duration was 1 hour and maximum was 6 hours.

Table 1: Cardiogenic Shock Outcome Among Cases of Stemi After Primary PCI n=292

| Outcome | CARDIOGENIC SHOCK | | Overall | P-Value |
|-----------|-------------------|-------------|-------------|---------|
| | Yes | No | | |
| Mortality | 41(70.7%) | 19(8.1%) | 60(20.5%) | 0.0001* |
| Coma | 14(24.1%) | 3(1.3%) | 17(5.8%) | |
| Alive | 03(5.2%) | 212(90.6%) | 215(73.6%) | |
| Total | 58(100.0%) | 234(100.0%) | 292(100.0%) | |

*Chi-square =176.329

Table 2. Cardiogenic Shock in Patients with Stemi After Primary PCI by Age Groups n=292

| | | CARDIOGENIC SHOCK | | Total | P-Value |
|----------------------|-----------|-------------------|------------|-------|---------|
| | | Yes | No | | |
| AGE | 31 to 40 | 8(13.8%) | 20(8.5%) | 28 | 0.0005* |
| | 41 to 50 | 11(19%) | 116(49.6%) | 127 | |
| | 51 to 60 | 39(67.2%) | 98(41.9%) | 137 | |
| GENDER | MALE | 34(58.6%) | 134(57.3%) | 168 | 0.852* |
| | FEMALE | 24(41.4%) | 100(42.7%) | 124 | |
| DURATION OF YMP TOMS | < 6 hours | 39(67.2%) | 143(61.1%) | 182 | 0.388* |
| | >6 hours | 19(32.8%) | 91(38.9%) | 110 | |

*Chi-square =17.71, 0.035,0.744

Table 4. Cardiogenic shock outcome among cases of STEMI after primary PCI According to age, gender and duration of onset of sign and symptoms n=292

| Variables | Cardiogenic shock | Outcome | | | P-Value | |
|---|-------------------|---------|------|-----------|---------|--------|
| | | Alive | Coma | Mortality | | |
| Age groups (years) | 31 to 40 | Yes | 01 | 07 | 00 | 0.0001 |
| | | No | 20 | 00 | 00 | |
| | 41 to 50 | Yes | 02 | 01 | 08 | 0.0001 |
| | | No | 113 | 01 | 33 | |
| | 51 to 60 | Yes | 00 | 06 | 17 | 0.0001 |
| | | No | 79 | 02 | 79 | |
| Gender | Male | Yes | 01 | 08 | 25 | 0.0001 |
| | | No | 121 | 02 | 11 | |
| | Female | Yes | 02 | 06 | 16 | 0.0001 |
| | | No | 91 | 01 | 08 | |
| Duration of onset of sign & symptoms of STEMI | <6 hours | Yes | 01 | 09 | 29 | 0.0001 |
| | | No | 126 | 03 | 14 | |
| | >6 hours | Yes | 02 | 05 | 12 | 0.001 |
| | | No | 86 | 00 | 05 | |

As per outcome among cases having cardiogenic shock with STEMI after primary PCI, the rate of mortality was 70.7% (41/60) and coma was 24.1% (14/17) which is significantly high with cardiogenic shock ($p=0.0005$) as shown in table 1

Stratification analysis was performed and observed that rate of cardiogenic shock was significantly high in 51 to 60 years of age patients ($p=0.0005$) while it was not significant between gender and duration of onset of sign & symptoms of STEMI as shown in table 2.

Cardiogenic shock's outcome among study subjects with STEMI after primary PCI was also observed with respect to age groups, gender, Duration of onset of sign & symptoms of STEMI and found that rate of mortality was significant in those cases who had cardiogenic shock as shown in table 3,4 and 5 respectively.

DISCUSSION

Cardiogenic shock (CS) in acute myocardial infarction (AMI) is an uncommon association. However, it is a complex syndrome that can result in decreased cardiac output and hypotension resulting in multi organ dysfunction and death. Even with the all the novel management strategies mortality and morbidity of this complication remains high^{9,10} and that after primary percutaneous coronary intervention (PCI), is approximately 40-60%. Besides patients older than 75 year is even at higher risk of mortality compares to young aged persons.¹¹ However as per genders comparison, females dominantly suffered from STEMI often have concurrent CS, reported by some studies.¹² Although according to an invasive strategy of the cardiogenic shock, there was no any significance in the survival rate of 30 days between PCI and coronary artery bypass graft (CABG) group¹³.

Long-term prognosis among cases having acute myocardial infarction, complicated by the cardiogenic shock is still controversial and analysis of predictors for adverse clinical outcomes has not been well studied. AMI complicated by CS is one of the leading causes of death in patients hospitalized with AMI. Cardiogenic shock occurred in 7-10% of patients with acute myocardial infarction with 70-80% mortality due to conservative treatment.

In present study cardiogenic shock incidence in the cases of STEMI after primary PCI was 19.86% while Goldberg RJ, et al reports 14.2% patients with cardiogenic shock.⁸ Other studies has shown that incidence of acute myocardial infarction is decreasing yet mortality remain same^{14,15}

In present study rate of mortality was 70.7% and coma was 24.1% which is significantly high with cardiogenic shock while Bernat et al reported 44% and 64% mortality in the radial group and femoral group respectively.¹⁶ One study calculated the mortality rate after PCI according to TIMI flow grade among cases having cardiogenic shock due to acute STEMI and states 46.1% overall mortality and 78.2% mortality in the cases having TIMI 0/1, 66.1% among cases having TIMI 2 and 37.4% death rate was among cases of TIMI 3 flow.^{7,8}

Post MI cardiogenic shock is the important reason for death in spite of modern treatments so there is still a need for new treatment modality to combat with this

complication.¹⁷ Urgent primary PCI is the crucial option in both culprit and non-culprit infarct related artery.¹⁸ Except pathophysiological consideration there is deficient randomized data regarding PCI of non-culprit infarct-related artery and advantage of multi vessel PCI in situations with post MI cardiogenic shock.¹⁹

Bleeding during PCI is the common and very well-known factor leading to death.²⁰ Rigorous antithrombotic therapy is the major reason for such type of bleeding. Decrease in hematocrit in patients with cardiogenic shock is due to many factors including bleeding.²¹

CONCLUSION

In this study, frequency of cardiogenic shock in ST segment elevation myocardial infarction after primary percutaneous coronary intervention and rate of mortality was high, so a preventable cause of cardiogenic shock with STEMI after primary PCI should be established.

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