Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/jptcp.v31i3.5179

IMPACT OF DOOR TO BALLOON TIME ON CLINICAL OUTCOME IN PATIENTS UNDERGOING PPCI

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Abstract:
Background: The interval of time between an individual's visit to the hospital until PCI is beginning to unblock the obstructed artery and start blood flow again is known as the door-to-balloon time.it is very important method for MI care.

Objective: The current study was carried out to determine the Impact of Door to Balloon time on clinical outcome in patients undergoing PPCI.

Material and method; this prospective observational study was conducted at the department of cardiology Lady reading hospital Peshawar from January 2022 to December 2023 after taking approval from the ethical committee of the institute. The study's sample size consisted of 94 primary PCI individuals that were treated at institute of cardiology during the duration of the research. Patients diagnosed with acute ST-segment elevation myocardial infarction (STEMI) who received primary PCI at department of cardiology during study period were included while Individuals lacking complete or missing medical records were excluded. Majority of the patients were male (70%). Information of each individual was carefully gathered from a variety of sources, including patient files, angiogram results, and internal medicine records. SPSS version 21.0 software was utilized to do the statistical analysis. Descriptive statistics were used to summarize the patient demographics, clinical outcomes, and presentation time.

Results: A total of 94 primary PPCI cases were included. Most of the patients Were in the 50–60 age group. Hypertension was the most predominant risk factor 40(42.5%) followed by diabetes 25(26.5%), smoking 14(14.8), family history 12(12.7) and hyperlipidemia 3(3.1%)**.** Anterior ST segment elevation myocardial infarction (STEMI) was most prevalent in the study population**(**63%).The majority of the participants (80%) only underwent PCI While 20% of the patients were given the recommendation to have a bypass after PCI of the infarct-related artery**.** Concerning the role of the culprit vessel, the most obstructed arterial was the left anterior descending artery, with 60 cases. 3.1 ± 0.6 mm was the mean stent diameter and 17.0 ± 8.0 mm the mean stent length. 1.38 was the average number of stents utilized per methodology and 18 minutes were the total

average duration of the procedure. However, the total death rate was 4 (4.25%), which only comprised one person from the no delay group**.** Because of myocardial issues such cardiogenic shock, pulmonary edema, heart failure, and other mechanical issues, the remaining % is attributed to the delayed time group. In the delayed door-to-balloon time group, the mortality rate is around 30 percent. It was 1.5% for the group that arrived on time.

Conclusion: Treatment for an acute myocardial infarction depends on the door-to-balloon time, which is significant in developing countries like Pakistan. Enhancing patient outcomes may be achieved via sponsoring emergency services, public health instruction, and healthcare infrastructure.

Keywords: myocardial infarction; door-to-balloon; PPCI

Introduction

The interval of time between an individual's visit to the hospital until PCI is beginning to unblock the obstructed artery and start blood flow again is known as the door-to-balloon time. This is a vital part of myocardial infarction (MI) care. Depending on the references provided, there are different optimum door-to-balloon times for STEMI (ST-segment elevation myocardial infarction). Several studies suggest working for a door-to-balloon duration of no more than ninety minutes.(1,2) Acute coronary syndrome is the term used to describe a collection of conditions characterized by myocardial ischemia that have a similar etiology.(3) Both STEMI and NSTEMI (non-ST-segment elevation myocardial infarction) are possible manifestations of ACS, as they both involve an interruption of blood flow to the heart muscle.(4) Since research suggests that shorter door-to-balloon durations are linked to better outcomes and lower mortality rates, the goal is to reduce this period as much as possible.(5,6) Ischemia-induced irreversible damage and limited regeneration capability in adult mammalian hearts can result in abnormal LV remodeling and progressive cardiac failure if treatment is delayed.(7) coronary artery disease (CAD) is a serious public health issue. Poverty may be linked to a higher prevalence of CAD risk factors such as including inadequate nutrition, inactivity, and limited access to preventive treatment.(8) This study was carried out to determine the Impact of Door to Balloon time on clinical outcome in patients undergoing Primary percutaneous coronary intervention .

Material and methods

This prospective observational study was conducted at the department of cardiology Lady reading hospital Peshawar from January 2022 to December 2023 after taking approval from the ethical committee of the institute. The study's sample size consisted of 94 primary PCI individuals that were treated at institute of cardiology during the duration of the research. A precise random sample procedure was used to choose individuals from the hospital's electronic medical records. Patients diagnosed with acute ST-segment elevation myocardial infarction (STEMI) who received primary PCI at department of cardiology during the study period were included. Individuals lacking complete or missing medical records were not included. In this research, information was carefully gathered from a variety of sources, including patient files, angiogram results, and internal medicine records. A wide range of variables were collected in order to capture the subtle aspects of each individual included in the study .These variables include patient demographics especially gender and age. Additionally, significant time intervals were observed and recorded, providing insight into the critical component of presentation timing by pinpointing the exact moment of symptom start and hospital admission. The D2B time, the study's main focus, was systematically recorded, allowing for a thorough examination of its correlation with other factors. Procedure-specific information was categorized, such as the kind of stent used for the primary Percutaneous Coronary Intervention (PCI) or a thorough rundown of the intervention methods. Last but not least, the study evaluated clinical outcomes, such as the extent of myocardial infarct and the frequency of major adverse cardiac events (MACE), providing insightful information on patient prognosis and treatment effectiveness. Prior to data collection, informed permission was sought from the study participants.

Statistical analysis

SPSS version 21.0 software was utilized to do the statistical analysis. Descriptive statistics were used to summarize the patient demographics, clinical outcomes, and presentation time.

Results

This study was conducted at department of cardiology in which 94 primary PPCI cases were included. Tables 1 represents the demographic characteristics of study population. Most of the patients Were in the 50–60 age group (**fig 1**). Hypertension was the most predominant risk factor 40(42.5%) followed by diabetes 25(26.5%), smoking 14(14.8), family history 12(12.7) and hyperlipidemia 3(3.1%) as presented in **figure 2.** Anterior ST segment elevation myocardial infarction (STEMI) was most prevalent in the study population 60**(**63%) followed by inferior STEMI 28(29.1%) as shown in **figure 3.**The majority of the patients (80%) only underwent PCI While 20% of the patients were given the recommendation to have a bypass after PCI of the infarct-related artery**.** Concerning the role of the culprit vessel, the most obstructed arterial was the left anterior descending artery, with 60 cases (63.8%), and the right coronary artery, with 18 cases (19.1%). Table 2 displays the culprit vessel among different individuals concerning door-to-balloon time, the most of the participants were in delay time group 60 (63.8%) vs 34 (36.1%). 3.1 ± 0.6 mm was the mean stent diameter and 17.0 ± 8.0 mm the mean stent length. 1.38 was the average number of stents utilized per methodology and 18 minutes were the total average duration of the procedure. However, the total death rate was 4 (4.25%), which only comprised one person from the no delay group**.** Because of myocardial issues such cardiogenic shock, pulmonary edema, heart failure, and other mechanical issues, the remaining % is attributed to the delayed time group. In the delayed door-to-balloon time group, the mortality rate is around 30 percent. It was 1.5% for the group that arrived on time.

Discussion

Door to balloon time it is very important method for myocardial infarction care and play a major role in the treatment of cardiovascular diseases. This study was carried out to explore the Impact of Door to Balloon time on clinical outcome in patients undergoing Primary percutaneous coronary intervention. From our findings it was determined that Door-to-balloon time important because it has a rapid effect on outcomes for patients. Better clinical outcomes have been associated in several investigations with shorter door-to-balloon time corresponding better medical results, including lower rates of recurrent MI and death (9). Research has shown that the time it takes to transfer an individual from the door to the balloon is more closely associated with death than the interval between the beginning of symptoms and the balloon procedure, thus efforts should be made to shorten this period for every individual.(10) For patients with STEMI, both the American Society of Cardiology and the American College of Cardiology advise a door-to-balloon period of no more than 90 minutes.(11) This goal time must be reached since failing to start reperfusion treatment on time might cause irreversible heart damage and worsen the prognosis.(9) The fact that door-to-balloon time is reported to the Centers for Medicare & Medicaid Services and is associated with assessments of the quality of hospitals and reimbursement highlights the importance of this indicator for performance evaluation.(11) However, it might be challenging to arrive at the recommended door-to-balloon time, especially in places like Pakistan where safety concerns and poverty are pervasive. For example, a similar research was carried out in Kenya, which is considered to be significantly more developed and stable than Pakistan, with an enrollment of 45 patients. It was shown that in 43% of cases, the door-to-needle time was less than 30 minutes. In 29% of the cases, the duration from door to balloon was less than ninety minutes. Every single individual lived to get their hospital discharge.(12) A lack of resources, a restricted healthcare infrastructure, and insufficient access to specialized cardiac care facilities significantly impede timely management of MI individuals. One of Pakistan's main obstacles to fulfilling the door-to-balloon time is the lack of emergency medical staff and cardiac care facilities that are properly prepared. Personnel in emergency medicine greatly decrease door-to-balloon Prehospital ECGs are an excellent example of how to save precious time for individuals

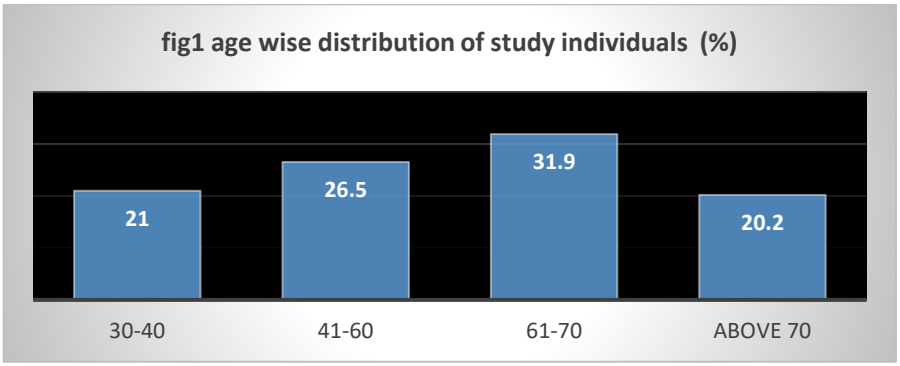
suffering from STEMI by identifying, triaging, and managing them early on.(13) Timely PCI administration for MI patients is hampered by the lack of cardiac catheterization facilities and skilled interventional cardiologists. In comparison, about 53.8 and 71.53% of South Africans, respectively, live 60 or 120 minutes distant from a PCI facility.(14) In our study the mean door to ballon time was 43.8 minutes.in contrast to our study The median duration of time from door to balloon, according to an American research, was 83 minutes.(15) The median time from door to balloon, according to another European survey, was sixty minutes.(16) The time frame from door-to-balloon (D2B) for percutaneous coronary intervention (PCI) is lower in the US and Europe for many reasons. An essential component of the efficient treatment of STEMI patients is the availability of resources and an established healthcare system in these places. Furthermore, STEMI patients can be transferred more quickly to hospitals that can perform PCI within the recommended time frame, reducing D2B times, thanks to the standardized protocol for emergencies in hospitals and the existence of nearby integrated health care and urgent care hospitals in these countries.(17) Furthermore, research has consistently demonstrated a connection between increased fatality rates and longer door-to-balloon time frames.(18) Comparable deaths were seen in our study for our median door-to-balloon time. The overall absence of understanding regarding MI symptoms, their importance, and the need for immediate medical attention further delays the initiation of therapy. A study conducted in Mogadishu revealed that 53.35% of participants did not know enough about myocardial infarction.(19) The primary limitation of this investigation on door-to-balloon time for the management of STEMI in Pakistan is the small number of participants included in the study. As a result, the sample size may not accurately represent the greater STEMI population in Pakistan, and could hinder the applicability of the study's findings.

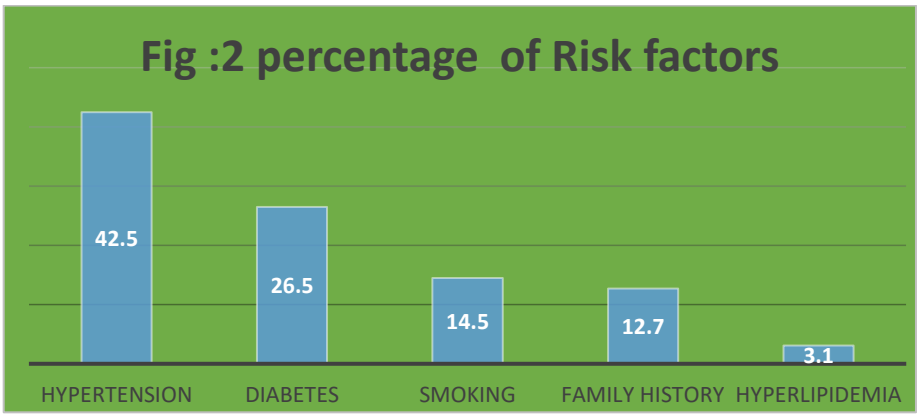
Conclusion

Treatment for an acute myocardial infarction depends on the door-to-balloon time, which is significant in developing countries like Pakistan. Enhancing patient outcomes may be achieved via sponsoring emergency services, public health instruction, and healthcare infrastructure.

Table 1: Demographic Features

Features	Value
Total cases	94
Mean age in years	60
Age range in years	30-90
Gender	
Male	66(70.2%)
Female	28(29.7%)
Presentation time	Mean ;84.7 minutes
	Range 32 to 242 minutes
Door to Balloon time	
	Mean ; 43.8 minutes
	Range 26 to 76 minutes





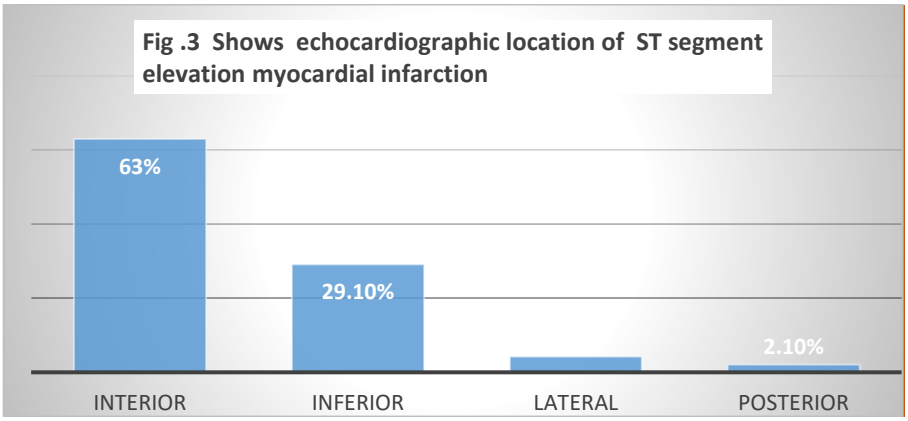


Table 2 represent Pattern of Vascular Involvement among Different individuals

Variable	N (%)
intermediate artery	2(2.1)
left anterior descending artery	60(63.8)
left circumflex artery	10(10.6)
obtuse marginal artery	4(4.2)
right coronary artery	18(19.1)
Total	94(100)

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