

CLINICAL OUTCOMES OF EARLY VERSUS DELAYED DISCHARGE AFTER PRIMARY PERCUTANEOUS CORONARY INTERVENTION

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ABSTRACT:

INTRODUCTION:

Heart disease is the most significant cause of death worldwide and ST-elevation myocardial infarction (STEMI) is a prime cause of death in developing nations. PCI has progressed to the point where overnight monitoring is unnecessary for some patients because of its increased safety and effectiveness. Improved patient satisfaction, shorter hospital stays, and more efficient use of healthcare resources are the key advantages of same-day release following PCI. PCI has always been viewed as an inpatient or short-stay surgery, requiring up to 24 hours of observation time. The purpose of this research was to make comparison of the outcomes of early and delayed discharge strategy after primary PCI in patients with STEMI and to establish the frequency of early discharge following primary PCI in patients having STEMI.

AIMS & OBJECTIVE:

MATERIAL & METHODS:

The study was conducted in Cardiology department of Punjab Institute of Cardiology, Lahore from August 10, 2020 to February 10, 2021. Total 200 patients presenting with STEMI were enrolled in the study. Patients underwent primary PCI by a single team with assistance of researcher. If patients were discharged within 36 hours, then earlier discharge was labeled. Patients were asked to present after 1 month in OPD. Patients were advised to present in case they feel similar symptoms of myocardial infarction, stroke, heart failure or mortality. The collected data were analysed statistically by using SPSS v25.0. Both groups were compared using chi-square test for clinical outcome. Data were stratified for age, gender, history of diabetes, hypertension, smoking and duration of symptoms. Post-stratification, both groups were compared by using chi-square test for clinical outcome in each strata. A p-value ≤ 0.05 was taken as significant.

RESULTS:

Total 200 patients presenting with STEMI and underwent primary PCI were enrolled in this study. There were 146(73.0%) were males and 54(27.0%) were females. The mean age of patients was 50.6 ± 19.2 years. Out of 200 patients with STEMI, 86(43.0%) were early discharged and 114(57.0%) had delayed discharged.

CONCLUSION:

This study showed that early discharge is also safe and feasible among patients with STEMI who underwent PCI as compared to delayed discharge. Early discharge may help in lowering down healthcare costs for Primary PCI service providers.

KEY WORDS:

ST Elevation Myocardial Infarction, Primary Percutaneous Coronary Intervention, Early Discharge, Delayed Discharge.

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INTRODUCTION:

Guideline recommendations for primary PCI in patients with STEMI have been recently updated by the ACC, the AHA, and SCAI.¹⁻² PCI has progressed to the point where overnight monitoring is unnecessary for some patients because of its increased safety and effectiveness.³

Improved patient satisfaction, shorter hospital stays, and more efficient use of healthcare resources are the key advantages of same-day release following PCI.⁴ PCI has always been viewed as an inpatient or short-stay surgery, requiring up to 24 hours of observation time. This approach has its clinical origins in the early days of percutaneous coronary intervention (PCI), when problems related to vascular access were widespread and often fatal, leading to acute ischemic episodes.⁵

The length of a patient's stay in the hospital is a measure of clinical efficacy. Patients with low-risk acute coronary syndromes should be eligible for early hospital discharge (72 hours), however the causes for a longer hospital stay are rarely recorded.⁶ It is a usual practice to release patients early following a simple initial PCI, however there is a paucity of data to support this.⁷

One study found that after primary PCI, 40.5% patients discharged early. The 30-days events (recurrent myocardial infarction, mortality and heart failure) were 3.13% in early and 1.42% in delayed group, heart failure of 0% in early group while 0.71% in delayed group while mortality was not reported in any case after primary PCI.⁸

One more study found that after primary PCI, 50% patients discharged early. Recurrent myocardial infarction and stroke were 0% in early and delayed groups, heart failure was 2.5% in early group while 1.2% in delayed group and mortality was 2.5% in early group while 1.2% in delayed group after primary PCI.⁹

Rationale of this study was to compare the outcome of early versus delayed discharge after primary PCI in patients of STEMI. Literature showed that there is not much difference in the outcome of primary PCI whether patient is discharged earlier or late. But not much work has been done in this regard. And also there is lack of local literature. So this study was done locally in order to get ideas about what could help us in determining

the magnitude of problem in our population and hence, we could put in practice these results in a local setting and alter the treatment protocol of the patients who stay in hospital for prolonged time. This will help us to plan strategy to alter some treatment protocol to regarding hospital stay after primary PCI.

METHODOLOGY:

The study was conducted in Cardiology Department of Punjab Institute of Cardiology, Lahore from August 10, 2020 to February 10, 2021. Total 200 patients presenting with STEMI were enrolled in the study.

The sample size of 200 patients was calculated with 95% confidence level, 7% margin of error and taking anticipated percentage of early discharge i.e. 40.5% after primary PCI.⁸ The inclusion criteria were patients aged 35-65 years, either gender, presenting with STEMI (as per operational definition) and planned to undergo primary PCI. The exclusion criteria was patients with recurrent STEMI (on medical record), patients with previous stent (on medical record), patients with renal dysfunction (creatinine >1.2mg/dl), hepatic dysfunction (AST>40IU, ALT >40IU, bilirubin >5mlU), bleeding disorder (PT >20sec, aPTT >15sec, INR >2) and patients presented after 24 hours of symptoms.

Patients demographic information (name, age, gender, duration of symptoms, history of diabetes (BSR>186mg/dl), hypertension (BP≥140/90mmHg) or smoking (>5 pack year), thrombolysis) was also noted. Then patients underwent primary PCI by a single team with assistance of researcher. If patients were discharged within 36 hours, then earlier discharge was labeled. Early (<36 hours) and delayed (>36 hours) discharge were labeled as per operational definition. Patients were given standard treatment during hospital stay and after discharge as per hospital protocol.

Then patients were asked to present after 1 month in OPD. Patients were advised to present in case they feel similar symptoms of myocardial infarction, stroke, heart failure or mortality (as per operational definition). STEMI was defined as presence of chest pain > 30 minutes on rest, ST-segment elevation > 1 mm on ECG with troponin >100 mIU, CK-MB > 25 mIU at the time of

presentation and patient planned to underwent primary PCI within 12 hours of presentation. Early discharge was defined as if patient discharged \leq 36 hours after primary PCI.

Outcome was assessed in terms of following after 1 month of procedure. Recurrent MI was defined as if patient had again symptoms of STEMI. Stroke was defined as if patient had symptoms like paralysis on face or body with hypodense (ischemic) or hyperdense (hemorrhagic) area of brain detected on CT scan. Heart failure was defined as if patient had ejection fraction $<25\%$ on echocardiography. Mortality was defined as if patient died within hospital stay or 1 month after discharge.

SPSS v25.0 was used for the statistical analysis of the data. Measures of central tendency and dispersion were provided for numerical variables

such as age and illness duration. Gender, diabetes, hypertension, smoking, discharge timing (early vs. delayed), and clinical outcomes were provided as frequencies and percentages. The chi-square test was used to compare clinical outcomes of both groups. The p-value of 0.05 was significant. Results were separated by age, gender, presence or absence of diabetes, hypertension, smoking, and symptom duration.

RESULTS:

200 patients were included in the trial, all of whom presented with STEMI and had primary PCI. There were 146 males (73%) and 54 females (27%). As a whole, the patients' ages ranged from 50.6-20.2 years.

There were 120(60.0%) patients in 35-50 years age group, while 80(40.0%) patients were in 51-65 years age group. Among patients, 88(44.0%)

| Table-1: Frequency distribution of gender | | |
|-------------------------------------------|------------|--------------|
| Gender | Frequency | Percentage |
| Male | 146 | 73.0 |
| Female | 54 | 27.0 |
| Total | 200 | 100.0 |

| Table-2: Frequency distribution of age groups | | |
|-----------------------------------------------|------------|--------------|
| Age groups | Frequency | Percentage |
| 35-50 years | 120 | 60.0 |
| 51-65 years | 80 | 40.0 |
| Total | 200 | 100.0 |

| Table-3: Frequency distribution of hypertension | | |
|-------------------------------------------------|------------|--------------|
| Hypertension | Frequency | Percentage |
| Yes | 88 | 44.0 |
| No | 112 | 56.0 |
| Total | 200 | 100.0 |

| Table-4: Frequency distribution of diabetes mellitus | | |
|------------------------------------------------------|------------|--------------|
| Diabetes Mellitus | Frequency | Percentage |
| Yes | 58 | 29.0 |
| No | 142 | 71.0 |
| Total | 200 | 100.0 |

| Table-5: Frequency distribution of smoking | | |
|--------------------------------------------|------------|--------------|
| Smoking | Frequency | Percentage |
| Yes | 110 | 55.0 |
| No | 90 | 45.0 |
| Total | 200 | 100.0 |

Table-6: Frequency distribution of duration of symptoms

| Duration of symptoms | Frequency | Percentage |
|----------------------|------------|--------------|
| ≤8 hours | 112 | 56.0 |
| >8 hours | 88 | 44.0 |
| Total | 200 | 100.0 |

Table-7: Frequency distribution of discharge status

| Discharge status | Frequency | Percentage |
|-------------------|------------|--------------|
| Early discharge | 86 | 43.0 |
| Delayed discharge | 114 | 57.0 |
| Total | 200 | 100.0 |

Table-8: Comparison of myocardial infarction with discharge status

| Myocardial infarction | Discharge status | | Total | p-value |
|-----------------------|------------------|---------|--------|---------|
| | Early | Delayed | | |
| Yes | 8 | 2 | 10 | 0.015 |
| | 9.3% | 1.8% | 5.0% | |
| No | 78 | 112 | 190 | |
| | 90.7% | 98.2% | 95.0% | |
| Total | 86 | 114 | 200 | |
| | 100.0% | 100.0% | 100.0% | |

Table-9: Comparison of stroke with discharge status

| Stroke | Discharge status | | Total | p-value |
|--------------|------------------|---------|--------|---------|
| | Early | Delayed | | |
| Yes | 6 | 4 | 10 | 0.265 |
| | 7.0% | 3.5% | 5.0% | |
| No | 80 | 110 | 190 | |
| | 93.0% | 96.5% | 95.0% | |
| Total | 86 | 114 | 200 | |
| | 100.0% | 100.0% | 100.0% | |

Table-10: Comparison of heart failure with discharge status

| Heart failure | Discharge status | | Total | p-value |
|---------------|------------------|---------|--------|---------|
| | Early | Delayed | | |
| Yes | 6 | 4 | 10 | 0.265 |
| | 7.0% | 3.5% | 5.0% | |
| No | 80 | 110 | 190 | |
| | 93.0% | 96.5% | 95.0% | |
| Total | 86 | 114 | 200 | |
| | 100.0% | 100.0% | 100.0% | |

Table-11: Comparison of mortality with discharge status

| Mortality | Discharge status | | Total | p-value |
|-----------|------------------|---------|--------|---------|
| | Early | Delayed | | |
| Yes | 4 | 2 | 6 | 0.234 |
| | 4.7% | 1.8% | 3.0% | |
| No | 82 | 112 | 194 | |
| | 95.3% | 98.2% | 97.0% | |
| Total | 86 | 114 | 200 | |
| | 100.0% | 100.0% | 100.0% | |

were hypertensive, while 58(29.0%) had diabetes mellitus.

Among patients, 110(55.0%) were smoker, while 112(56.0%) had duration of symptoms ≤ 8 hours and 88(44.0%) had > 8 hours. Out of 200 patients with STEMI, 86(43.0%) were early discharged and 114(57.0%) had delayed discharged.

DISCUSSION

High levels of coronary atherosclerosis are strongly correlated with the rising prevalence of heart attacks. Lesions in the distal segment of the coronary arteries are more common, the severity of atherosclerosis and the restenosis events are greater, and the coronary diastolic reserve is low because of the diffuse nature of the lesions seen in these patients. There is a direct correlation between the rise of PCI procedures, patient stays, and overall hospital costs.¹⁰⁻¹¹

The amount of time spent in recovery following percutaneous coronary intervention (PCI) has been significantly cut down thanks to developments in obtaining safe and effective vascular access, scaffolding technology and antiplatelet medications. This strategy was considered appropriate in the 2018 SCAI Expert Consensus Document on Hospitalization Time after PCI Promotion; moreover, this strategy halts unnecessary hospital stay and is thus cost-effective. Multiple clinical studies have shown the safety of early discharge in patients with PCI.¹²⁻¹⁴

Outcomes of discharge after PCI were analyzed by a large observational research that was conducted recently and included 33,920 patients from the PCI registry. The length of stay (LOS) in the hospital was categorized as short term (lasting for 2 days), medium term (lasting between 3 and 4 days), and long term (lasting more than 4 days). Between the short-term and the medium-term LOS categories, there was not a significant difference in the MACE rate or mortality after two days. According to the findings of the study, diabetes that was unaccompanied by coronary heart disease was

the primarily determined Length of stay and patients who did not have diabetes were discharged from the hospital sooner.¹⁵

In recent years, the evaluation of the outcomes of early release has been the subject of a significant amount of research. Twelve randomized controlled trials with a total of 2962 people were evaluated and included in a systematic review and meta-analysis that was published in 2017. Reasons for Rehospitalizations were not analyzed, however, the rate of re-hospitalization of patients having acute coronary syndrome increased during the 30 days follow-up period in patients with stable angina. At the same time, the early release length was shorter (36 hours).¹⁶

To add, a PCI research conducted in the USA looked at information from 206,869 In patients who were readmitted to hospitals within 30 days after being released from the hospital after receiving PCI. Twelve percent, or 24,889 patients, had repeat therapy within 30 days. Nonspecific chest pain was the leading reason for readmissions, albeit the vast number of rehospitalization were due to low risk chest discomfort that did not necessitate intervention.¹⁷

Patients with diabetes who have coronary heart disease have an increased risk of complications like coronary dissection, stent thrombosis, and in-stent restenosis after coronary revascularization. It has also been demonstrated that these complications are likely to occur during the first 30 days following the revascularization procedures.¹⁸ In the current research, there were no health risks found to be related with an early release. There was no significant difference in the number of MACEs that occurred between the two groups over the 30-day follow-up period. Furthermore, neither of the two groups had an increase in the number of these adverse cardiovascular events.

A good predictor of clinical efficacy is the length of a patient’s stay in the hospital. It is advised that patients with acute coronary syndromes who have

a low risk of complications be discharged from the hospital as soon as possible (within 72 hours), although the causes for a longer length of hospital stay are rarely recorded.⁶ It is usual practice to release patients early following a simple initial PCI, yet there is a paucity of data to support this approach.⁷

One study found that after primary PCI, 40.5% patients discharged early. The 30-days events (recurrent myocardial infarction, mortality and heart failure) were 3.13% in early and 1.42% in delayed group, heart failure was 0% in early group while 0.71% in delayed group while mortality was

not reported in any case after primary PCI.⁸ One more study found that after primary PCI, 50% patients discharged early. Recurrent myocardial infarction and stroke were 0% in early and delayed groups, heart failure in 2.5% in early group while 1.2% in delayed group and mortality was 2.5% in early group while 1.2% in delayed group after primary PCI.⁹

CONCLUSION

This study showed that early discharge is also safe and feasible among patients with STEMI who underwent PCI when compared to delayed discharge. An early discharge may help to lower the healthcare costs for Primary PCI providers.

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