

FREQUENCY OF RESOLUTION OF ST-SEGMENT ELEVATION AFTER PRIMARY PERCUTANEOUS CORONARY INTERVENTION IN PATIENTS WITH STEMI

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ABSTRACT

Objectives: To determine frequency of resolution of ST-segment elevation after primary percutaneous coronary intervention (PPCI) in patients with STEMI.

Materials and Methods: After approval by the CPSP and the institutional ethics committee, all eligible patients presenting to the Cardiology Department of PGMI/Lady Reading Hospital, Peshawar, were enrolled. Informed consent was obtained, and baseline data (age, gender, BMI, infarct territory) were recorded. Primary PCI was performed by experienced cardiologists following a standard protocol. A repeat ECG was done 30 minutes post-PCI to assess ST-segment resolution. Data were collected using a structured proforma and analyzed with SPSS version 26.

Results: The mean age was 59.77 ± 11.74 years and mean BMI was 26.61 ± 3.15 kg/m². Of the participants, 45.6% were male and 54.4% female. Most were aged 51–60 years, and antero-septal infarcts were the most common (30.1%). ST-segment resolution occurred in 87.5% of patients. No significant associations were found between resolution and gender, age, infarct territory, or BMI ($p > 0.05$).

Conclusion: It was concluded that most STEMI patients showed successful ST-segment resolution after primary PCI, with no significant link to age, gender, BMI, or infarct territory. ST-segment resolution remains a key marker of effective reperfusion and should be routinely evaluated. Further large-scale studies are needed to identify additional influencing factors and improve post-PCI care.

Key words: ST-segment elevation, primary percutaneous coronary intervention, STEMI.

INTRODUCTION

ST-elevation myocardial infarction (STEMI) is one of the most serious cardiovascular emergencies and is associated with high morbidity and mortality.(1-3) Primary percutaneous coronary intervention (PCI) is currently considered the most effective reperfusion strategy for restoring coronary blood flow and limiting myocardial damage.(4) An important indicator of reperfusion success is the resolution of ST-segment elevation in the post-intervention electrocardiogram (ECG).(5) This disease affects people all around the world, and each year in the United States as well as globally, it claims the lives of large set of population.(6) Non-ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation myocardial infarction (STEMI) are the two types of acute myocardial infarction (MI).(7, 8)

Significant ST-segment resolution indicates effective epicardial and microvascular reperfusion and is closely associated with improved myocardial function and reduced mortality. The extent of ST-segment resolution can therefore serve as a simple, non-invasive, and early tool for assessing treatment success.

The frequency of ST-segment resolution after primary PCI varies depending on various factors such as infarct size, infarct location, time to reperfusion, and individual patient characteristics. Investigating this frequency in a specific population allows for a better understanding of treatment quality and prognosis in STEMI patients.

The aim of this study is to determine the frequency of ST-segment resolution after primary PCI in patients with STEMI.

Objective: To determine frequency of resolution of ST-segment elevation after primary percutaneous coronary intervention (PPCI) in patents with STEMI.

MATERIALS AND METHODS

Study Design: Cross sectional study.

Study setting: Cardiology Department, PGMI/Lady Reading Hospital, Peshawar.

Duration of the study: Duration of the study was 3 months (from 2, May 2025 to 2, August 2025).

Sampling Technique: Non probability consecutive Sampling technique was used for the recruitment of patients.

Sample size: It was calculated by using WHO sample size calculator by assuming:

Confidence level = 95%

Absolute precision = 8%

Anticipated frequency of resolution of ST-segment elevation after primary PCI = 64.8% (9)

Calculated sample size is 136.

Inclusion Criteria:

- Patients with STEMI,
- Both genders (male and female).
- Patients of age 30-80 years old.

Exclusion Criteria:

- Patients with NSTEMI.
- Patients having previous history of PCI, assessed by reviewing previous medical records.
- Patients with history of pharmacological thrombolytic therapy, assessed by reviewing previous medical records.

METHODS

After approval of the study proposal by the CPSP and the institutional ethical committee, all patients meeting the selection criteria who presented to the Cardiology Department of PGMI/Lady Reading Hospital, Peshawar, were included in the study. Informed consent was obtained from each patient prior to inclusion. Baseline characteristics such as age, gender, BMI, and infarct territory were recorded. All patients subsequently underwent primary PCI according to a standardized protocol, performed by consultant cardiologists with a minimum of five years of experience. Thirty minutes after PCI, a repeat ECG was conducted to evaluate ST-segment resolution. All data were collected using a predesigned proforma. For analysis SPSS version 26 was used.

RESULTS

The mean age of the study population was 59.77 ± 11.74 years, and the mean BMI was 26.61 ± 3.15 kg/m². Among the participants, 62(45.6%) were male and 74(54.4%) were female. Regarding age distribution, 25(18.4%) were between 30–50 years, 49(36.0%) were between 51–60 years, 34(25.0%) were between 61–70 years, and 28 (20.6%) were older than 70 years. In terms of infarct territory, 41 (30.1%) had anteroapical infarcts, 20 (14.7%) anteroapical, 19(14.0%) anterolateral, 9 (6.6%) lateral, 27(19.9%) inferior, and 20(14.7%) posterior infarcts. Resolution of ST-segment elevation was observed in 119 patients (87.5%), while 17 patients (12.5%) showed no resolution (Table 1).

In the analysis of factors associated with resolution of ST-segment elevation, 53 (44.5%) males and 66(55.5%) females showed resolution, compared to 9(52.9%) males and 8(47.1%) females without resolution, indicating no significant association with gender ($p=0.51$). Regarding age distribution, among those with resolution, 21(17.6%) were aged 30–50 years, 41(34.5%) were 51–60 years, 31(26.1%) were 61–70 years, and 26 (21.8%) were over 70 years, whereas in the non-resolution group, the corresponding numbers were 4(23.5%), 8(47.1%), 3(17.6%), and 2(11.8%), respectively, with no statistically significant difference ($p = 0.55$). Considering infarct territory, in patients with resolution, 35(29.4%) had anteroapical infarcts, 16(13.4%) anteroapical, 16(13.4%) anterolateral, 8(6.7%) lateral, 26(21.8%) inferior, and 18(15.1%) posterior infarcts. In those without resolution, 6(35.3%) had anteroapical, 4(23.5%) anteroapical, 3(17.6%) anterolateral, 1(5.9%) lateral, 1 (5.9%) inferior, and 2 (11.8%) posterior infarcts, with no significant association ($p = 0.63$). In terms of BMI, 28(24.3%) of those with resolution had normal BMI, 65(56.5%) were overweight, and 22(19.1%) were obese, compared to 5(29.4%), 11(64.7%), and 1(5.9%) in the non-resolution group, with no significant relationship observed ($p = 0.40$) (Table 2).

Table 1: Baseline Demographic and Clinical Characteristics of the Study Population (n=136)

Variables	
Age (Years)	59.77±11.74

BMI (kg/m²)	26.61±3.15
Gender	
Male	62(45.6%)
Female	74(54.4%)
Age Groups	
30-50 years	25(18.4%)
51-60 years	49(36.0%)
61-70 years	34(25.0%)
>70 years	28(20.6%)
Infarct territory	
Anteroseptal	41(30.1%)
Anteroapical	20(14.7%)
Anterolateral	19(14.0%)
Lateral	9(6.6%)
Inferior	27(19.9%)
Posterior	20(14.7%)
Resolution of ST-segment elevation	
Yes	119(87.5%)
No	17(12.5%)

Table 3: Stratification of Resolution of ST-segment elevation on the basis of different characteristics (n = 136)

	Resolution of ST-segment elevation		
	Yes	No	p-value
Gender			
Male	53(44.5%)	9(52.9%)	0.51
Female	66(55.5%)	8(47.1%)	
Age Groups			
30-50 years	21(17.6%)	4(23.5%)	0.55
51-60 years	41(34.5%)	8(47.1%)	
61-70 years	31(26.1%)	3(17.6%)	
>70 years	26(21.8%)	2(11.8%)	
Infarct territory			
Anteroseptal	35(29.4%)	6(35.3%)	0.63
Anteroapical	16(13.4%)	4(23.5%)	
Anterolateral	16(13.4%)	3(17.6%)	
Lateral	8(6.7%)	1(5.9%)	
Inferior	26(21.8%)	1(5.9%)	
Posterior	18(15.1%)	2(11.8%)	
BMI			
Normal	28(24.3%)	5(29.4%)	0.40
Over weight	65(56.5%)	11(64.7%)	
Obese	22(19.1%)	1(5.9%)	

DISCUSSION

The present study investigated the frequency of resolution of ST-segment elevation after primary percutaneous coronary intervention (PPCI) in patents with STEMI. The results showed that ST-segment resolution was achieved in the majority of patients (87.5%), while no significant resolution was observed in 12.5%. These findings are consistent with the results of previous studies that also reported a high success rate of primary PCI in terms of myocardial reperfusion. In a study, it was found that out of 196 patients who underwent PCI for STEMI, 127 (64.8%) had complete resolution of ST-segment elevation while 69 patients did not have resolution of STsegment elevation on post-PCI ECG. (9) In another study (10) it was found that frequency of resolution of ST-segment elevation in patients who presented with STEMI after having primary PCI was 73%.

An essential sign of effective cardiac reperfusion is thought to be ST-segment resolution. Despite the need for angiographic closure of the blocked coronary artery, ST-segment resolution indicates that microcirculatory flow has been successfully restored. Despite having a patent infarct artery, patients with inadequate ST-segment resolution sometimes have a worse prognosis because they may have substantial myocardial injury, continuous microcirculatory dysfunction, or a "no-reflow" phenomena. Our findings demonstrate that STR is a more accurate predictor than epicardial blood flow recovery. STR could therefore be a helpful early-stage indicator for

forecasting the prognosis of individuals with AMI. Most trials evaluated the impact of STR on clinical, angiometric, and outcome variables between 30 and 120 minutes following PCI.(11, 12) our study finding stated that ST-segment resolution is primarily a marker of the quality of myocardial reperfusion and is less dependent on demographic factors. Rather, the time to reperfusion, the intervention technique, and patient-specific pathophysiological factors such as microcirculatory status and infarct size are crucial. Like the present study, the degree of ST-segment resolution (STR) after streptokinase-assisted thrombolytic therapy was assessed in a another study (13) that included 587 patients with acute myocardial infarction (AMI). The results showed that successful STR was linked to both short-term and long-term positive clinical outcomes, underscoring its prognostic importance in determining the effectiveness of reperfusion.

Analysis of influencing factors revealed no significant association between gender and the frequency of ST-segment resolution. Patient age was also not significantly associated with ST-segment resolution. This suggests that age alone is not a decisive factor for reperfusion success, provided a rapid and technically successful intervention is performed. No significant differences were found regarding the infarct territory. Previous studies have shown that while infarction location can influence the extent of injury and left ventricular function, it does not necessarily correlate with electrocardiographic ST-segment resolution. Likewise, body mass index (BMI) showed no significant influence on the frequency of ST-segment resolution. These results underscore that ST-segment resolution is primarily a marker of the quality of myocardial reperfusion and is less dependent on demographic factors. Rather, the time to reperfusion, the intervention technique, and patient-specific pathophysiological factors such as microcirculatory status and infarct size are crucial. The study demonstrates that primary PCI leads to successful ST-segment resolution in the majority of STEMI patients. Factors such as age, gender, infarct territory, and BMI showed no significant influence on the reperfusion pattern. ST-segment resolution remains a crucial prognostic marker and should be routinely used to assess treatment success.

CONCLUSION

It was concluded that that the majority of patients with ST-elevation myocardial infarction (STEMI) achieve successful ST-segment resolution following primary percutaneous coronary intervention (PCI). No significant associations were observed between ST-segment resolution and demographic or clinical factors such as age, gender, body mass index (BMI), or infarct territory. These findings emphasize that ST-segment resolution serves as a valuable and reliable marker of effective myocardial reperfusion and should be routinely assessed to evaluate therapeutic success and predict patient outcomes after PCI. Further large-scale, prospective studies are recommended to explore additional factors that may influence ST-segment resolution and to optimize post-PCI management strategies.

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