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# PREDILATION BALLOONING IN HIGH THROMBUS LADEN ST ELEVATION MYOCARDIAL INFARCTION IN PATIENTS UNDERGOING PERCUTANEOUS CORONARY REVASCULARIZATION.

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## ABSTRACT

**BACKGROUND:** In some cases, thrombus fragments created during predilation ballooning may cause distal embolization leading to slow flow or no-reflow. **OBJECTIVE:** To investigate the occurrence of intraprocedural slow flow/no reflow following primary percutaneous coronary intervention in patients with significant thrombus load both with and without predilation ballooning for culprit lesion preparation. **MATERIAL AND METHODS:** This descriptive observational study was carried out at interventional cardiology unit Hayatabad Medical Complex Peshawar from January 2022 to December 20222. Total 250 patients were enrolled. Clinical practice recommendations for the management of STEMI were followed during the entirety of all main PCI operations. The thrombus grade was divided into G0 to G5 categories. High thrombus burden is classified as grade 4, which means that the complete vascular blockage has thrombus covering more than half of the artery diameter. **RESULTS:** Total 250 patients were included in the study. Age ranged between 35-75 years with a mean age of 55 years. There were 152(60%) male while 98(40%) females with a ratio of 1.6:1. Patient were divided into 2 group i.e. group A (149, 59.6%) patients & group B (101,40.4%) patients. Group A consists of patients in whom Predilation ballooning was performed while Group B patients underwent Dottering and direct stenting. **CONCLUSION**. In patients with a significant thrombus burden, predilation ballooning may be linked to an increased risk of intraprocedural slow flow / no reflow after primary per cutaneous coronary intervention.

**KEY WORDS:** Thrombus burden, predilation ballooning, primary per cutaneous coronary intervention, intraprocedure.

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## INTRODUCTION

Patients suffering from acute ST-elevation myocardial infarction (STEMI) are advised to undergo primary percutaneous coronary intervention (PPCI) within a 12-hour window. In arteries related to infarcts, the primary objective of PPCI is to restore antegrade blood flow as quickly as possible. [1]. The advantages of PPCI, however, were compromised by the occurrence of the slow-flow or no-reflow condition. Even with such an efficient management approach, not all

STEMI patients will experience optimal reperfusion and will not reach the target Thrombolysis in Myocardial Infarction (TIMI) flow grade III. The condition where there is a patent epicardial coronary artery and hypoperfusion of the heart tissue is known medically as slow-flow/no-reflow [2]. There are several different hypothesised etiologic factors for this dual state phenomenon, including distal coronary embolization, inflammatory response, vasospasm, capillary blockage, endothelial swelling, myocardial edoema, and ischemia-reperfusion injury. [3,4] Numerous predisposing factors have been found, and several explanatory processes as well as methods to deal with slow flow/no reflow in clinical practise have been recommended [5,6]. The development of slow flow or no reflow after PPCI has been observed to be substantially correlated with thrombosis burden (4 grade), among other clinical variables [7,8]. For individuals with a high thrombus burden, we hypothesise distal embolization brought on by microthrombus fragments created during predilation ballooning as a potential source of slow flow or no reflow. [9,10]

The goal of this study was to find out whether predilation ballooning affected the likelihood of intraprocedural slow flow or no reflow after primary PCI in patients with a high thrombus burden.

## MATERIALS AND METHODS

This descriptive observational study was carried out at interventional cardiology unit Hayatabad Medical Complex Peshawar from January 2022 to December 20222. Total 250 patients were enrolled. Patients who underwent manual thrombus aspiration were excluded from the study. Clinical practise recommendations for the management of STEMI were followed during the entirety of all main PCI operations. The thrombus grade was divided into G0 to G5 categories. High thrombus burden is classified as grade 4, which means that the complete vascular blockage has thrombus covering more than half of the artery diameter. DAPT and a bolus dose of glycoprotein inhibitors (IIb/IIIa) with unfractionated heparin were administered as premedication to all patients, in accordance with the recommendations of the guidelines and the institutional main PCI procedure.

All clinical characteristics was used for propensity Using SPSS version 23.0. We compared the two groups using independent sample t-tests, Mann-Whitney U tests, Fisher's exact tests, or chi-square tests. Statistical significance was determined by P 0.05.

## RESULTS

Total 250 patients were included in the study. Age ranged between 35-75 years with a mean age of 55 years. There were 152(60%) male while 98(40%) females with a ratio of 1.6:1. Patient were divided into 2 group i.e. group A(149, 59.6%) patients & group B (101,40.4%) patients. Group A consists patients in whom Predilation ballooning was performed while Group B patients underwent Dottering and direct stenting. **Figure-1**

Presence of diabetes in group A was noted in 40(26.8%), while in group B 21(20.7%) p 0.035, mean left ventricular end-diastolic pressure (19 ± 8.1 mmHg vs. 18 ± 6.5 mmHg; p 0.042), median total ischemic time (392 [239–545] vs 360 [230–490]; p 0.025), Killip class III/IV 23(15.4%) vs 11(10.8%), mean total length of stent implanted (25.3 ± 11.1 mm vs. 22.1 ± 10.0 mm; p 0.024), three-vessel diseases 45(30.2%) vs. 22(21.7%), final TIMI flow III 121(81.2%) Vs 79(78.2%) and mean stent diameter (3.4 ± 0.4 mm vs. 3.5 ± 0.3 mm; p < 0.001). The incidence of intraprocedure slow flow /no reflow was significantly higher in group A as compare to group B 59(39.5%) vs. 28(27.7%) p 0.001. In-hospital complications was, stroke 3(2%) Vs 3(2.9%), arythmia 5(3.3%) Vs 3(2.9%), cardiogenic shock 6(4%) Vs 5(4.9%), stent thrombosis 4(2.7%) Vs 2(1.9%) and mortality 9(6.1%) vs. 7(6.9%) **Table-1**

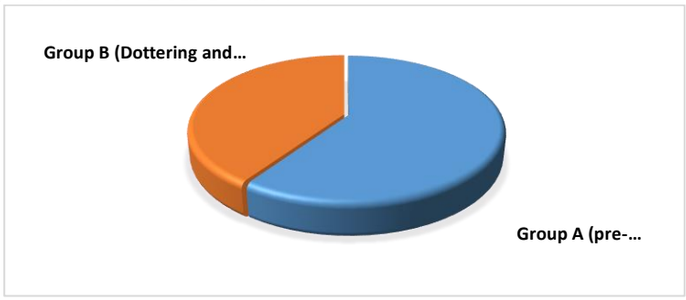


**Figure-1**

**Table-1: Outcome of the study groups**

| Outcome | Group 1 | Group 2 | P value |
|---|---|---|---|
| Diabetes | 40(26.8%) | 21(20.7%) | 0.701 |
| Lt ventricaular diastolic pressure (mean) | 19±8.1 | 18±6.85 | 0.042 |
| Total ischemic time (mean) | 392 | 360 | 0.025 |
| Killip class iii/iv | 23(15.4%) | 11(10.8%) | 0.751 |
| Total length of stent implanted (mean) | 25.3±11.1 | 22.1±10 | 0.024 |
| Triple vessel disease | 45(30.2%) | 22(21.7%) | 0.05 |
| Final TIMI flow III | 121(81.2%) | 79(78.2%) | 0.601 |
| Stent diameter (mean) | 3.4±0.4 | 3.5±0.3 | 0.001 |
| Intra-procedure slow flow/no reflow | 59(39.5%) | 28(27.7%) | 0.001 |
| Stroke | 3(2%) | 3(2.9%) | 0.910 |
| Arythmia | 5(3.3%) | 3(2.9%) | 0.601 |
| Cardiogenic shock | 6(4%) | 5(4.9%) | 0.711 |
| Stent thrombosis | 4(2.7%) | 2(1.9%) | 0.600 |
| Mortality | 6(6.1%) | 7(6.9%) | 0.710 |

## DISCUSSION

While preparing the thrombus-laden culprit lesion during PPCI, microthrombus fragments can become worse during pre-dilation ballooning, Patients with a high thrombus burden are more likely to experience slow flow or no reflow following pre-dilation [11]. The purpose of this study was to determine the effect of pre-dilation ballooning on intraprocedural slow flow or no reflow following primary PCI in patients with a significant thrombus burden (4 grade). In our investigation, group A greatly outperformed group B in terms of the incidence of intra procedure slow flow/no reflow. The design of the two groups, however, differed significantly in terms of a number of clinical factors, including total ischemia duration, Killip classes III and IV, diabetes, the presence of LVEDP, stent diameter, total length of stent placed, and three-vessel disease. Therefore, we compare group A and group B for the incidence of intra procedure slow flow and no reflow. We observed that group A still had a considerably greater frequency of intra procedure slow flow and no reflow than group B, with a rate of 39.5% compared to 27.7%, even after adjusting for variations in clinical characteristics.

In a study of 794 AMI patients, Shakiba et al found that thrombus burden was independent predictors of slow reflow after emergency PCI [12]. Another study by Sardella et al. revealed that the group with slow flow/no reflow had a larger percentage of people with significant thrombus load than the cohort with normal flow[13]. Additionally, the two covariates associated with slow flow or no reflow were TIMI flow and thrombus burden. Slow flow or no reflow is more likely to occur in patients who have large infarct sizes, significant thrombus burdens, decreased TIMI flow, and no collateral flow [13].

According to data from recent research, thrombus loads of four or more before PCI are one of the independent predictors of sluggish flow or no reflow [14,15]. Since late reperfusion leads to an increase in erythrocytes and thrombus buildup, prolonged ischemia duration is typically accompanied in a clinical setting by a large thrombus load. Prolonged ischemia can lead to poly-morphonuclear cell blockage, edoema in the myocardial cell and capillary bed and degradation of capillary integrity [16]. Distal embolization occurs due to red thrombi fragments washing into the distal end of the artery and reducing heart perfusion, especially during balloon dilatation. Because of this, microcirculatory dysfunction enhances myocardial reperfusion injuries, which increases the risk of heart failure and slow flow/no reflow. In a research using Doppler guidewires, Amabile et al [17] confirmed similar findings for patients who underwent PCI by detecting numerous embolic particles. A drop in myocardial blood flow that is irreversible has been linked to embolization when up to 50% of the coronary capillaries are blocked [18]. The pre-dilatation-induced slow flow or no reflow can be caused by many other factors in addition to thrombus fragmentation, including microembolization of mature, older thrombi, which can worsen when the plaque ruptures and results in an infarct-related artery occlusion and higher coronary wedge pressure [19,20].

The purpose of this study is to examine the effect of balloon dilation on the frequency of

slow flow or no reflow in patients with significant thrombus burdens.

## LIMITATION

One of the main shortcomings of this study is that it was primarily a descriptive observational one. Second, there was no data on myocardial blush grade (MBG) to compare between the two cohorts. In the setting of slow flow/no reflow, data from a randomized research using pre-dilation ballooning in patients with significant thrombus load can be convincing.

## CONCLUSION

When patients with a high thrombus burden undergo percutaneous coronary intervention, pre-dilation ballooning has been linked to delayed reflow or no reflow after the procedure. Predilation ballooning should be avoided in patients with significant thrombus burden, and the amount of equipment used during primary PCI should be kept to a minimum given the prognostic significance of slow flow / no reflow.

**ETHICS APPROVAL:** The ERC gave ethical review approval.

**CONSENT TO PARTICIPATE:** written and verbal consent was taken from subjects and next of kin.

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**CONFLICT OF INTEREST:** No competing interest declared.

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