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Clinical and Angiographic Co-relation of Slow Flow in the Patients with Myocardial Infarction (MI) Undergoing Primary Coronary Angioplasty Treatment and Outcomes

Shahzad[1,*], Nasir Ali[1], Altaf Hussain[2], Syed Mohammad Ali Irfan[1], Afzal Hussain[1], Aziz UR Rehman[2], Tarique Ahmed[1], Abdul Mueed[2]

1.Fellow interventional cardiology, NICVD, Karachi.

2.Assistant Professor, NICVD, Karachi.

Corresponding Author: Dr. Shahzad, Cardiologist, NICVD, Karachi.

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Abstract

Purpose: *The major aim and purpose of this research were to figure out the clinical and angiographic correlates as well as the link between sufferers with the sub-optimal coronary flow after primary percutaneous coronary interventions (PPCI).*

Background of the Research: *The clinical as well as angiographic correlates and effects of Thrombolysis in Myocardial Infarction (TIMI) 2 flow in sufferers cured with primary percutaneous coronary interventions usually aren't known.*

Methods: *274 patients were examined with STEMI enrolled in different Primary Angioplasty in acute myocardial infarction (MI) studies, who suffered primary percutaneous coronary interventions (PPCI) at the National Institute of Cardiovascular diseases from September 2019 to December 2019*

Results: *Post procedural TIMI 2 flow took place in 59 (21.5%) affected individuals. Multivariate analysis (MVA) recognized age below 75 years (odds ratio (OR), 1.6; 95% confidence interval [CI], 1.1 to 2.2), diabetes (OR 1.9; 95% CI, 1.3 to 2.7), symptom onset to emergency room presentation (OR) 0.68; 95 percent (Confidence Interval), 0.4 -1.16); initial TIMI-1 flow ≥ odds-ratio 0.6; 95% confidence interval (CI), 0.8 to 2.), and left-ventricular ejection fraction 50 percent (odds ratio ≤ 1.57; 95% confidence interval (CI), 0.88 -2.81) as independent cor-relates of ultimate TIMI 2 flow. In hospital (composite of re-infarction, death, or ischemic target vessel revascularization (TVR) and also these situations individually) and 1 year (reinfarction or fatality) events happened more often in sufferers with TIMI 2 flow. The Cox-proportional hazards model recognized TIMI 2 flow being independently related to 1 year fatality rate (threat percentage 1.9, 95% Confidence interval (CI), 1.25 to 2.85).*

Conclusions: *Final TIMI ≤ 2-flow, though not common after primary percutaneous coronary interventions (PPCI), was highly related to hospital and 1-year unfavorable events. The clustering of ultimate TIMI ≤ 2 flow in high-risk groups might partially clarify the bad prognosis of such patients. Knowledge of all these risks might be helpful to physicians to triage and cure sufferers undergoing primary percutaneous coronary interventions.*

Keywords: *Deaths, myocardial infarction (MI), slow flow or no-reflow, primary percutaneous coronary interventions (PCI), reperfusion.*

Introduction

Reperfusion therapy is considered the cure for sufferers with severe STEMI. Several randomized medical studies have revealed that primary percutaneous coronary intervention (PPCI) surpasses thrombolytic treatment for managing affected individuals with STEMI. On the other hand, the existence of Thrombolysis in Myocardial Infarction (TIMI) 2 ≤ flow continues to be the "Achilles heel" of PPCI that develops in about 10 % of patients (29), even just in the ages of the routine usage of stents as well as new antiplatelet and antithrombotic agents, techniques demonstrated to better the outcomes of sufferers going through PPCI. Moreover, TIMI 2 ≤ flow has been linked to the improved occurrence of major in-hospital undesirable events within these sufferers. Despite this, the clinical

correlates of TIMI ≤ 2-flow in sufferers experiencing PPCI haven't been adequately recognized. Furthermore, the in-hospital and long-term effects haven't been researched in a huge number of affected individuals experiencing primary percutaneous coronary interventions. The objective of this research was to rationally define modern clinical as well as angiographic factors related to the risk of TIMI ≤ 2-flow and the in-hospital and long-term results linked to it within a large cohort of affected individuals going through PPCI.

Objective of the Research Study

- The primary objective of this research study was to identify the clinical and angiographic correlation of no flow or slow flow in people having Myocardial infarction (MI).
- In this study, the people going through primary coronary angioplasty treatment methods were also analyzed.
- However, the clinical and angiographic correlation of no flow or slow flow was also identified.

Materials and Methods

The patient population of the Study

The primary PCI in Myocardial Infarction (MI) research studies prospectively enrolled sufferers experiencing ST-segment elevation myocardial infarction (STEMI) into three clinical tests. A couple of these clinical trials were also registered sufferers into concomitant registries. The rationale of the study, methodology, as well as the results of the individual, has also been discussed. Sufferers had been involved in this research if and when they were ≤ eighteen years old with STEMI showing in just twelve-hour of their symptom attack. Severe STEMI was described by the following factors: ST elevation for at least 1 millimeter in two continuous leads or even assumed new left bundle branch block to the presenting 12 lead electrocardiogram (ECG). Affected individuals had been omitted from these clinical trials in case they had advisable restrictions to reperfusion, had obtained thrombolytic therapy for STEMI (ST-segment elevation myocardial infarction), had kidney problems, cardiac shock, or life-span below 12 months; also ruled out were individuals with childbearing potential (except if the effect of a recent pregnancy test was not positive), or people that have known contraindications to heparin, ticlopidine, or aspirin in afterward Primary Angioplasty in Myocardial Infarction clinical trials.

Moreover, patients randomized towards the thrombolytic arm or even individuals in whom PPCI had not been attempted (described as no test to pass a guide-wire successfully) were also skipped over out of this research study. Informed consent was taken from all individuals through the research investigators or research directors at the particular associations. With regards to this research study,

the demographic, clinical, angiographic, as well as in-hospital clinical events and results of data on 274 patients pooled and enrolled in all these clinical trials that experienced PPCI.

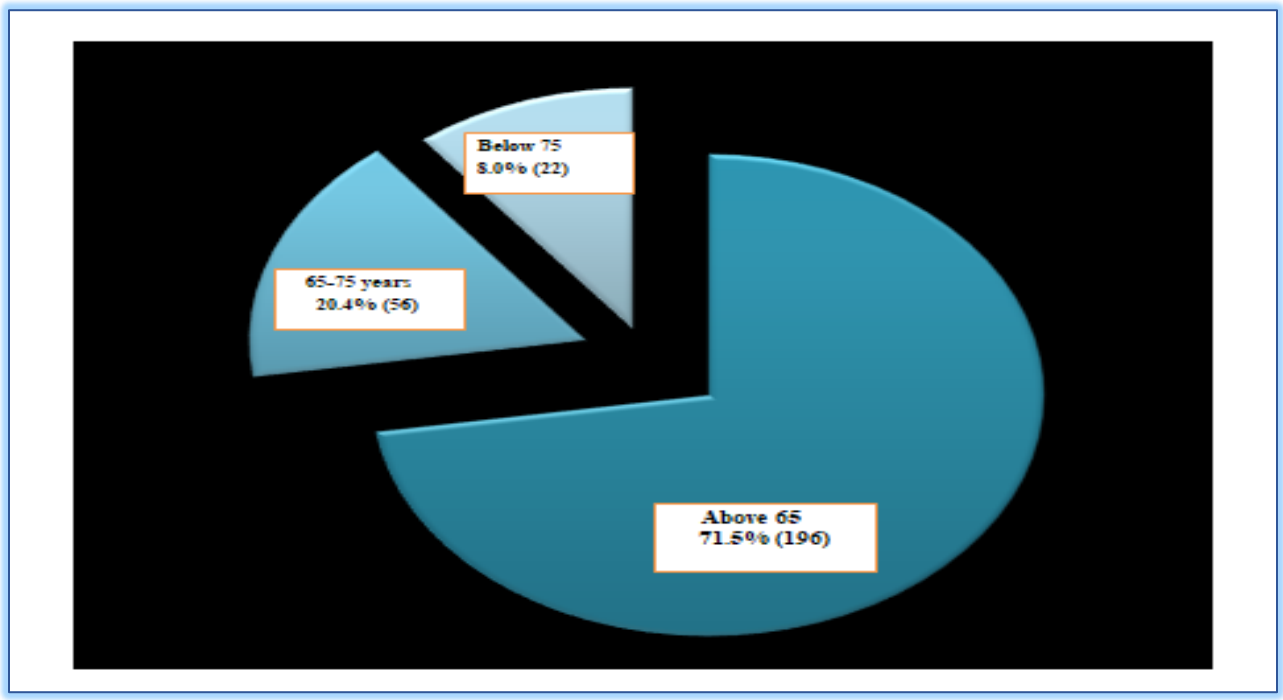
Collection of data as well as the angiographic analysis.

Research practitioners or coordinators at every site gathered data prospectively on pre-specified data factors on a case report form in all trials—the information involved baseline demographics, medicines, processes, problems, medical history and clinical events. Follow-up was received at 1-year with the aid of a mailed questionnaire, phone interview, or follow-up visit to the doctor. Independent data checking was conducted using an on-site visit of the contributing sites to evaluate the data of all affected individuals. The cine angiograms received during the time of index intervention were examined fundamentally laboratory-site, that evaluated coronary physiology, left ventricular ejection fraction (LVEF), TIMI-flow grades, percentage of diameter stenosis, and angiographic results of the treatment.

Statistical Analysis of the Results

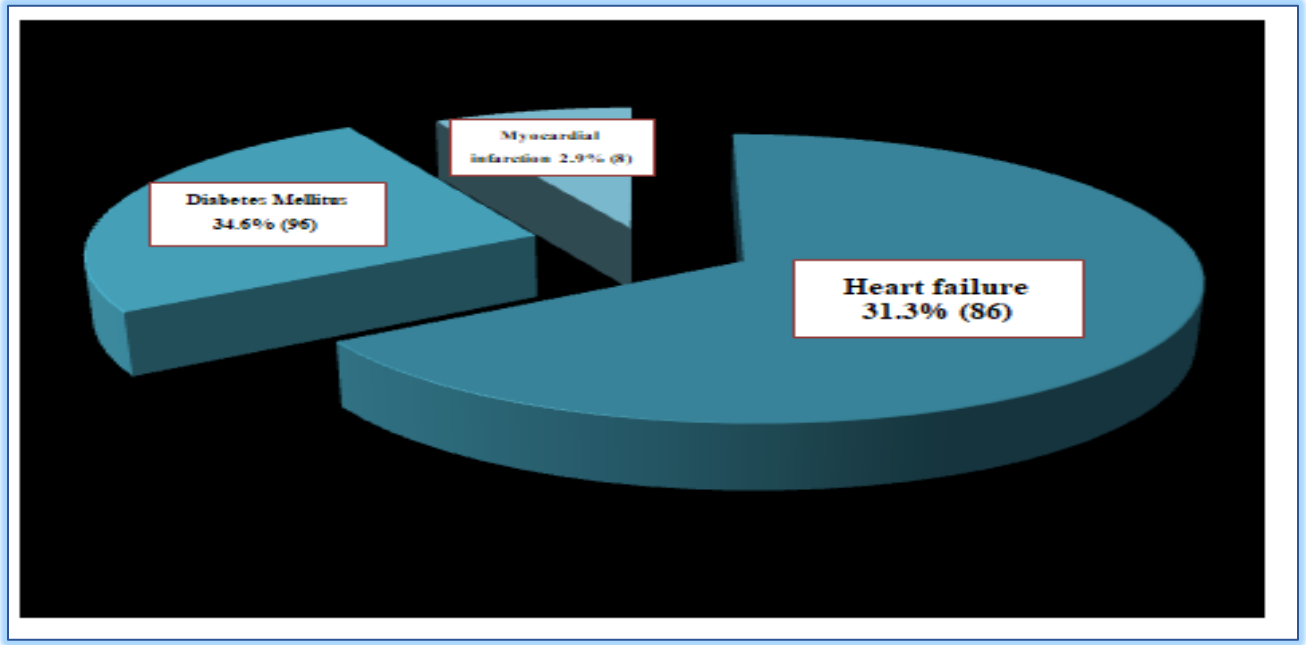
Of the 274 patients, 79.5% (218) were male, and 20.4% (56) were females. The age group that was considered during the research study was 65 to 74 years. However, during the research study, the total p-value of males and females was 0.474. 71.5% (196) patients have aged about 65 years, 20.4% (56) patients have aged from 66 - 70 years, and the remaining 8.0% (22) patients have age below 75. The p-value of the mean body mass index was 0.075. The assessment of systolic blood pressure, ST depression, and heartbeats per minute have done in the research study. The systolic blood pressure (systole) of the sufferers during the research was about 64.9 to 76, having a p-value of 0.399. The pulse rate or beats per minute of all the patients was between 41.8 to 52.9, with a p-value of 0.035. The comorbidity e was also found during the research study that cardiovascular disease, diabetes mellitus, high blood pressure, peripheral vascular disease and congestive heart failure are some additional factors in this disease. However, the percentage of left ventricular ejection fraction (LVEF) during the research was 19.5 to 24.5 having a p-value of < 0.0005. The past medical history of the participants was also discussed during the research study. However, some problems that were faced by the patients during the study were pulmonary edema, gastrointestinal hemorrhage, ventricular septal rupture, slow flow on no re-flow, cardio-pulmonary resuscitation, and low blood pressure cardiac shock. The fatality rate in the hospital during the research study was about 2.2 % (6), with a p-value of 0.0125.

Age group of Patients (With percentages) (n=274)



Graph – 1

Patients with different diseases (n=274)



Graph – 2

Baseline Characteristics of Research Participants

	TIMI Flow 3 (n 215)	TIMI Flow < 2 (n 59)	
	n (%)		
N	**274**	**215 (78.4%)**	**59 (21.5%)**	**P-value**
Gender				
Male	79.5% (218)	78.6% (169)	83.1% (49)	0.474
Female	20.4% (56)	21.3% (46)	17.0% (10)	
Age (years)	53.9 ± 11.4	53.1 ± 11.3	59.8 ± 9.95	<0.0005*
Above 65	71.5% (196)	79.1% (170)	61.0% (36)	0.001*
66 to 70 years	20.4% (56)	16.2% (35)	29% (18)	0.006*
Below 75	8.0% (22)	4.6% (10)	8.4% (5)	0.029
Mean BMI (SD), [median], kg per m2	13.45 ± 3.1	13.45 ± 3.3	13.15 ± 3.6	0.075
Ministroke	171.5 ± 73.5	169.3 ± 73.1	168.7 ± 74.2	0.025*
Systole, mean (SD), mm Hg	64.9 ± 11.4	64.9 ± 11.2	64.5 ± 13	0.399
Pulse mean (SD), beats per min	41.85 ± 9.37	41.6 ± 8.95	43.85 ± 11.65	0.035
Creatinine on Arrival	0.45 ± 0.1	0.45 ± 0.1	0.55 ± 0.15	<0.0005*
Initial TIMI-flow grade				
1	83.2% (228)	86.5% (186)	49.1% (29)	<0.0005*
2	11.3% (31)	6.5% (14)	32.2% (19)	<0.0005*
3	5.4% (15)	2.3% (5)	18.6% (11)	0.007*
4	0% (0)	0% (0)	0% (0)	-
Angiogram data—Initial Culprit Artery				
Left-anterior Descending	68.9% (189)	57.4% (102)	40.1% (26)	0.159
Right Coronary Artery	23.7% (65)	44.6% (96)	32.2% (19)	
Tracheal intubation	**6.2% (17)**	**5.5% (12)**	**20.3% (12)**	**<0.0005***
Brady arrhythmias	**1.5% (4)**	**3.35% (5)**	**3.39% (2)**	**0.0065***

Past medical history (PMH)				
Hypertension (HTN)	53.2% (146)	44.6% (96)	54.2% (32)	0.0545
Ever smoked	36.8% (101)	37.2% (80)	16.9% (10)	0.0135*
Diabetes Mellitus	34.6% (96)	36.7% (79)	52.5% (31)	0.006*
Myocardial infarction (MI)	2.9% (8)	1.8% (5)	3.3% (2)	0.0095*
Heart failure	31.3% (86)	35.3% (76)	69.4% (41)	<0.0005*
Peripheral vascular disease (PVD)	1.0% (3)	2.7% (6)	3.3% (2)	0.193
PPCI	10.5% (29)	8.3% (23)	6.7% (4)	0.03
Left ventricular ejection fraction LVEF (%)	21.3 ± 4.9	21.8 ± 4.3	19.5 ± 3.6	<0.0005*
Initial activated clotting time, mean (SD)	5.8% (16)	5.5% (12)	6.5% (14)	0.334
Intra-aortic balloon pump (IAPB)	1.5% (8)	0.8% (4)	6.7% (6)	<0.0005*
Saphenous vein graft (SVGs)	45.6% (125)	41.3% (89)	23.7% (14)	0.00125*
Infarct-related artery				
Left main	0.9% (5)	0.8% (4)	1.6% (1)	0.2695
Anterior interventricular branch	52.1% (143)	40.0% (86)	37.2% (22)	0.2665
Circumflex Artery	22.2% (61)	19.5% (42)	11.8% (7)	0.2665
Right coronary artery (RCA)	33.6% (184)	34.6% (168)	27.1% (16)	0.185
Thrombus Grade (TG)				
Final thrombus	58.7% (321)	57.1% (277)	71.1% (42)	0.185*
Final dissection	41.3% (226)	42.9% (208)	27.1% (16)	
Initial patency (TIMI flow 2/3)	3.2 ± 0.4	3.2 ± 0.4	3.2 ± 0.3	0.416
Initial percent stenosis, mean (SD) [median]	13.7 ± 11.2	13.5 ± 10	14.2 ± 11.3	0.15
In-hospital Problems				
No-reflow/Slow flow	22.6% (62)	18.1% (39)	42.3% (25)	<0.0005*
Pulmonary edema	1.8% (5)	1.8% (4)	6.7% (4)	<0.0005*
Sustained Low BP	0.7% (2)	0.9% (2)	0% (0)	0.236
Gastrointestinal hemorrhage (GIB)	1.4% (4)	0.4% (1)	1.69% (1)	0.1935

Cardiopulmonary resuscitation	1.8% (5)	1.3% (3)	3.4% (2)	0.0095*
Ventricular Septal Rupture	0.7% (2)	0% (0)	1.69% (1)	0.0025*
Need for dialysis	0.7% (2)	0.9% (2)	5.0% (3)	0.007*
Death	2.2% (6)	2.3% (5)	6.7% (4)	0.0125*

Table 1

Changed Odd-Proportions of Medical Aspects Related to the Possibility of Ultimate TIMI 2-Flow

Factors	**Uni-variable**		**Multivariable**	
	OR [95% CI]	**P-value**	**OR [95% CI]**	**P-value**
Initial TIMI ≥1	0.68 [0.4 -1.16]	0.124	-	-
Intubated (per hour delay in arrival)	1.75 [0.85 -3.64]	<0.0005*	0.63 [0.25 -1.49]	0.2915
Start of chest pain to emergency room	1.27 [0.59 -2.73]	0.008*	1.02 [0.45 -2.34]	0.0445
Diabetes	0.98 [0.57-1.67]	0.0065*	0.44 [0.205 -0.94]	0.3705
LVEF ≤ 50%	1.57 [0.88 -2.81]	<0.00105*	0.92 [0.44 -1.74]	0.049

Table 2

Results

Clinical as well as angiographic features of affected individuals with and without ultimate TIMI <2 flow (Table 1). From the 274 affected people with STEMI suffering from Myocardial infarction (MI) during the research study, 9.1% (25) experienced partial reperfusion right after Primary Percutaneous Coronary Intervention (PPCI). The total afflicted individuals with TIMI-2, 1, and 3 flow were 83.2% (228) patients, 11.3% (31) affected people, as well as 5.4% (15) individuals, correspondingly. When comparing the past research studies with TIMI-3 flow, people who have partial reperfusion were more likely to be = 70 years or more aged, a person who has diabetes, hypertensive, or with any type of health-related history of earlier heart-related illnesses by-pass surgical procedure, yet much less predisposed to get used to smoke. There was a considerable postponement in the period to demonstration towards the ER after symptom assault in the group experiencing partial reperfusion.

Moreover, presentation with undesirable hemodynamics, including pulse rate 100 beats per minute (BPM), blood pressure levels Hundred mmHg, as well as two, were a lot more common in individuals with partial reperfusion. Angiographic characteristics at the same time differed among the groups. For that reason, afflicted individuals having partial reperfusion were much more susceptible to have primary TIMI flow-1, much higher preliminary proportion stenosis in arteries, left-anterior climbing down from cardio-arterial, and left ventricular ejection fraction (LVEF) less than 50 percent. Pharmacologic vasodilators (nitroglycerin, adenosine, verapamil and nitroprusside) had been employed in all affected individuals with short-term or ultimate partial reperfusion. At the same time, coils of heart vessels had been chosen more infrequently in individuals with partial reperfusion.

Limitations of the Study

Issues in the cardiac catheterization research laboratory in a medical Centre affected individuals with and without final gradual antegrade flow. Affected people with TIMI ≤ 2 had been very likely to have observed a negative event in the whole process. For that reason, the existence of continuous low blood pressure, requirement for Cardiopulmonary resuscitation (CPR), and the fatality rate were expected in this population group throughout Myocardial infarction (MI). These kinds of elevated problems in the catheterization laboratory had been demonstrated in the high rates of all undesirable events seen in the course of stay at the hospital in individuals with partial reperfusion, resulting in a long time of stay in these patients. However, the sample size in the research study was small. And this research project has been conducted on a small number of people.

Discussion

Conclusions of the research study

Lack of success to accomplish normal flow is progressively acknowledged as PPCI has become an extensively common mode of reperfusion for affected individuals with ST-segment elevation myocardial infarction (STEMI) at several centers. The breakthrough of contrast echo has permitted medical professionals to concentrate not just on epicardial coronary flow but additionally on microvascular perfusion. The analysis has provided an important understanding of the occurrence, medical/clinical correlates, risks, and 1 year and in-hospital results of final TIMI ≤ 2-flow within a large cohort of STEMI sufferers experiencing PPCI. The occurrence of TIMI ≤ 2-flow isn't unimportant; that develops in one of 14 people experiencing PPCI. Even though the likelihood of TIMI ≤ 2 flow in this research study is less than that noticed in research studies that made use of contrast echo together with a coronary angiogram, it measures up positively with that observed in most large scale clinical trials evaluating the efficacy of PPCI with thrombolysis or even those researching primary angioplasty along with primary stenting (1-4, 7-12).

Moreover, the research study discovered that the existence of TIMI ≤ 2 flow isn't a harmless event: it is linked to an elevated likelihood of problems not just in the cardiovascular-cath research laboratory as well as in-hospital but also in the long term follow-up. Unlike sufferers cured with thrombolytic therapy, exactly where rescue angioplasty in specified individuals who neglect thrombolysis might have a chance to better outcomes, there aren't any well-proven ways to enhance final TIMI ≤ 2 flow right after PPCI. Consequently, the fatality rate in individuals with TIMI 1, 2, and 3 flow in severe myocardial infarction (MI) patients cured with PPCI patients is substantially more than that noticed in individuals with identical TIMI flow levels after thrombolysis. Unsurprisingly, as a result of more problems in sufferers with TIMI ≤ 2 flow, the duration of stay and source usage may also be enhanced within these groups of affected individuals. Therefore, the study's research findings emphasize the significance of stopping the growth and development of TIMI ≤ 2 flow because of the exceptional process to better results and reduce resource usage in sufferers experiencing PPCI, as once slow flow or no-reflow occurs, the effects are comparatively disappointing.

Recommendations

It's visible from previous research and from the results of our study that partial reperfusion ends in bad in-hospital as well as 1-year results. For that reason, hard work should be made to attain not merely the best possible decline in stenosis of epicardial coronary heart arteries but also microvascular flow. The components found being linked to partial reperfusion during the research, just more time to Emergency room test can be changed with raised community knowledge of the indications and warning signs of heart attack as well as the value of searching for immediate medical treatment as soon as they occur. Furthermore, modern pre-emptive techniques proven to reduce the likelihood of ultimate partial reperfusion could be essential adjuncts to PPCI and should be applied in serious patients. Most of these methods include the use of distal safety systems, balloon percutaneous transluminal coronary angioplasty, as well as endovascular treatment having angiojet, with the help of adjuvant therapies like nitro-glycerine, nitroprusside, veralan, nicorandil, and intra-coronary adenosine.

Additionally, the downfall of infarct size better routine maintenance of stenosis, together with protection against dissection, may all help attain common flow after primary nitroprusside. Most of these techniques should be used in patients with ST-Elevation Myocardial Infarction suffering from primary nitroprusside, especially those having dangers for establishing TIMI = 2 flow as regarded in the study. Much more scientific studies are required to prove when the procedure for affected individuals experiencing primary nitroprusside might decrease the post-procedural sub-optimal pulse rate. The particular system using that final TIMI = 2 flow in patients having Cardiovascular related issues results in destructive consequences isn't yet identified. But an instantaneous causal connection could be attainable; this cannot be deduced through the research as a result of the retrospective

nature of the examination. Simultaneously, the clustering of partial reperfusion in greater risk individuals (ageing, diabetes mellitus, and postponement to the Emergency room, signifies the chance that partial reperfusion may be a surrogate endpoint of the greater risk person, explaining the limited diagnosis of such patients. Future scientific studies are needed to cope with all of these complications.

Conclusions

The study implies that partial reperfusion infrequently occurs in patients with STEMI dealing with cardiovascular disease. It is linked to the higher likelihood of undesirable events in the coronary angiography laboratory and the hospital. Furthermore, the research identified advanced angiographic factors associated with the probability of partial reperfusion after Myocardial infarction (MI). Being familiar with all these elements may help medical professionals understand the high-risk subgroup that may be centered on maintenance techniques before and all through treatment to reduce the probability of partial reperfusion after the cerebrovascular accident and ultimately reduce the undesirable events that always wreak havoc on this cohort.

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