

CLINICAL PREDICTORS OF NO REFLOW PHENOMENON IN A HEALTH FACILITY
IN ABUJA, NIGERIA

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ABSTRACT

Background: No reflow phenomenon is not so uncommon. There are divergent view on this due to variation in patient presentation and available practice from one region of the world to the other. **Objectives:** We analyzed the incidence of no reflow phenomenon, its clinical predictors and length of hospital stay for the patients undergoing percutaneous coronary intervention (PCI) in a health facility in Abuja Nigeria. **Method:** This is a single center prospective observational cross-sectional study of patients who had PCI from September to November 2024. The demographic & clinical characteristics and length of hospital stay were compared between patients with or without no reflow phenomenon. **Results:** 78 patients had PCI, out of which 18 (23.1) had no reflow phenomenon with statistically significant longer duration of lesion ($p < 0.001$) and hospital stay ($p < 0.002$) however no record of mortality. **Conclusion:** No reflow phenomenon is common and strongly influenced by duration of the lesion with associated longer duration of hospitalization.

KEYWORDS: No reflow phenomenon, percutaneous coronary intervention and Duration.

INTRODUCTION

No reflow phenomenon (NRP) after thrombolysis, percutaneous coronary intervention (PCI) is a procedural complication associated with post procedural short and long clinical outcomes. This includes; persistent angina, long hospital stay, rehospitalisation, heart failure, ventricular arrhythmias, cardiogenic shock and death. NRP can be predicted based on clinical and procedural factors such as advanced age, male sex, history of hypertension, type 2 diabetes, alcohol, smoking, dyslipidaemia, duration of lesion, laboratory parameters such as creatinine level, hypercholesterolemia, hypertriglyceridemia, hyperglycaemia, Neutrophil lymphocyte ratio, uric acid level and prior left ventricular ejection fraction (LVEF). The pathophysiology of no reflow phenomenon is complex and not fully understood. Multiple factors such as; distal micro embolization, vasospasm, myocardial stunning, reperfusion injury, oxidative stress, endothelial dysfunction and release of vasoactive substances.

Diagnosis is mostly done by coronary angiographic contrast flow grading after thrombolysis or PCI. Thrombolysis In Myocardial Infarction (TIMI) grading. TIMI 0: complete occlusion of the infarcted artery, TIMI 1: some penetration of contrast material beyond the point of obstruction but without perfusion of the distal coronary bed, TIMI 2: perfusion of the entire infarct vessel into distal bed but with delayed flow. TIMI 3: Full

perfusion of the infarct vessel with normal flow. TIMI 0 - 2 grades is no reflow phenomenon while TIMI 3 is successful revascularization. There is other diagnostic parameter such as myocardial contrast echocardiography which is gold standard but this facility is not available. Others includes magnetic resonance imaging, myocardial blush grades, intracoronary pressure measurements, intracoronary ultrasound & Doppler, nuclear magnetic imaging, positron emission tomography and nuclear magnetic imaging. Intracoronary pressure measurements is seldom carried out while other facilities are non-existent.

There is no single regimented treatment for no reflow phenomenon. It depends on clinical predictors and adverse intra-procedural and post-procedural pathophysiological factors identified in the target patient. Nitroglycerin is a useful vasodilator for vasospasm. Other vasodilator includes, nicardipine, nitroprusside, verapamil and adenosine. Anticoagulant such as unfractionated heparin is very useful to prevent and treat thrombus formation. Antiplatelet premedication, aspirin and oral P2Y₁₂ inhibitors is a rule in all ST elevation myocardial infarction (STEMI) and parenteral form, cangrelor is also needed for thrombotic bailout. Glycoprotein 11b/111a inhibitors such as eptifibatide and tirofiban are very useful. A careful balance must be maintained between the risk of bleeding and thrombosis by monitoring of activated clotting time. This

medications reduces the incidence of no reflow phenomenon and improve clinical outcome.

METHODOLOGY

This study was carried out during my 3months clinical posting at LIM Cardio care Hospital, Abuja. 85 cases of PCI were carried but 7 cases were excluded on account of complex lesions such chronic total occlusion, bifurcation lesions, and multi-vessel diseases. Coronary artery bypass graft (CABG) was not done during this

period. Total 78 PCI were done, out of which 18 had no reflow phenomenon. The demographic characteristic and clinical predictors of no reflow phenomenon as (cases) were compared with successful revascularization (control). Successful revascularization were PCI with TIMI 3 while < 3 (TIMI 0 – 2) were no reflow phenomenon. Data were analyzed using mean \pm SD for continuous data while categorical data were expressed in proportions and percentages.

RESULTS

Demographic Characteristics and Clinical Predictors of the study population

Parameter	No Reflow 18 (23.1)	Successful 60 (76.9)	P-value
Age 55.68 ± 12.886	57.66 ± 10.61	54.51 ± 14.02	0.301
Sex Male 58 (74.4)	22 (28.2)	36 (46.2)	0.815
Female 20 (25.6)	7 (9.0)	13 (16.6)	
Creatinine umol/L	1.252 ± 0.377	1.316 ± 0.881	0.709
Fasting Blood Sugar mmol/l	6.676 ± 2.188	8.441 ± 13.447	0.486
HbA1c %	7.031 ± 2.151	7.018 ± 1.911	0.979
Total Cholesterol mg/dl	205.03 ± 85.457	178.14 ± 57.120	0.113
Triglycerides mg/dl	133.07 ± 70.505	105.73 ± 45.583	0.41
LDL-Cholesterol mg/dl	128.76 ± 65.862	112.48 ± 48.802	0.26
Uric acid mg/dl	6.266 ± 2.411	5.763 ± 2.146	0.343
White blood cell count cells/uL	6.888 ± 3.244	7.133 ± 3.837	0.78
Neutrophil	5.399 ± 5.037	4.505 ± 3.311	0.347
Lymphocyte	2.178 ± 0.922	2.546 ± 0.975	0.103
Neutrophil Lymphocyte Ratio NLR	2.302 ± 2.255	13.214 ± 1.695	0.864
Haemoglobin g/dl	11.107 ± 3.212	13.214 ± 1.695	0.89
Platelets count	$249,550 \pm 93,041$	$223,760 \pm 77,595$	0.192
Duration of lesion (Days)	19.07 ± 18.32	8.06 ± 9.71	0.001*
LVEF	55.31 ± 11.26	55.71 ± 9.86	0.87
Hypertension 57 (73.1)	22 (28.2)	35 (44.9)	0.670
Alcohol 19 (24.4)	8 (10.3)	11 (14.1)	0.699
Smoking 11 (14.1)	5 (6.4)	6 (7.7)	0.540
Diabetes 29 (37.2)	10 (12.8)	12 (15.4)	0.690
Duration of hospitalization (Days)	9.82 ± 10.33	3.03 ± 3.24	0.002*

DISCUSSION

78 patients had PCI, out of which (18) 23.1% had no reflow phenomenon and (60) 76.9% had successful revascularization. Incidence of NRP varies widely, ranging from 2% to 26%. It may be up to 60% in ST elevation myocardial infarction patients undergoing primary PCI. There were more male 58 (74.4) compared to female 20 (25.6) who had PCI but male gender was not statistical significant predictor of NRP. History of hypertension, type 2 diabetes, smoking, alcohol were not related to NRP. Laboratory parameters such as; serum creatinine, fasting blood sugar, glycosylated hemoglobin, total cholesterol, triglycerides, LDL cholesterol, uric acid, white blood cell count, neutrophil, lymphocytes, neutrophil-lymphocyte ratio, hemoglobin, platelet count and left ventricular ejection fraction were not related to NRP. The duration of lesion was statistically longer in patient with NRP 19.07 ± 18.32 compared with successful revascularization 8.06 ± 9.71 ($p < 0.001$), with longer duration of hospitalization, NRP 9.82 ± 10.33 versus

successful revascularization 3.03 ± 3.24 ($p < 0.002$), however there was no record of mortality. The duration of myocardial lesion, often referred to as ischemic time or symptom to balloon time is an essential predictive factor of NRP and timely revascularization therapy can help mitigate the risk of NRP. Prolonged ischemia time results into micro vascular damage and increased infarct size and worsen reperfusion injury. There is clear recommendation that early revascularization with a door to balloon time of 90minutes or less in patients undergoing primary percutaneous coronary intervention is key. This is practically not feasible in our environment due to many negative factors ranging from delayed presentation, cultural and superstition beliefs, out of pocket financing, lack of home and ambulance services, poor health infrastructure and facilities and scarce interventional expertise. Average duration of lesion in this study is 9.5 days, ranging from 1day to 90days.

Conclusion and Recommendation

No reflow phenomenon is strongly influenced by duration of the lesion and associated with longer duration of hospitalization. There is growing need for revascularization therapy particularly primary PCI in our country. There is need for concerted effort among all stakeholders, particular government to address various socio-infrastructures factors responsible for delayed presentation of patient suffering from acute myocardial infarction and to optimize the door to balloon time.

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