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Impact of Initial Platelet Count on Baseline Angiographic Finding in Patients with Acute ST- Segment Elevation Myocardial Infarction Undergoing Primary Percutaneous Coronary Intervention

AMIR R. TALHA, M.Sc.; MEDHAT M. ASHMAWY, M.D.; EHAB A. HAMDY, M.D. and ENAS E. DERAZ, M.D.

The Department of Cardiology, Faculty of Medicine, Tanta University

Abstract

Background: Platelets play an important role in cardiovascular disease both in the pathogenesis of atherosclerosis and in the development of acute thrombotic events. Rupture of atheromatous plaque and subsequent occlusive thrombus formation are believed to be responsible for most acute myocardial ischemic events.

Aim of Study: The aim of this study is to assess the relation and effect of initial platelet count on baseline angiographic findings in patients presented with acute ST Segment Elevation Myocardial Infraction (STEMI) undergoing Primary Percutaneous Coronary Intervention (pPCI).

Patients and Methods: This study was conducted at the Department of Cardiovascular Medicine, Tanta University Hospital at the period between June 2017 to December 2017, It was carried out on 150 patients diagnosed definitively with acute STEMI and treated with pPCI. Blood samples were collected from the patient on admission to show initial platelet count before coronary intervention followed by assessment of the angiographic findings before wiring of the infract related artery by TIMI flow grade system and scoring of the coronary anatomy with SYNTAX score.

The patients were divided into two groups, group (1): Included patients who had TIMI flow grade 0 (82 patients) representing 54.7% and group (2): Patients who had TIMI flow grade 1-3 (68 patients) 45.3%.

Results: Group (1) who showed total occlusion of infract related artery (TIMI 0) patients had higher initial platelet count with a mean of (255.74±72.01) X 10^3/mm^3 compared to group (2) (TIMI 1-3) in which patients had lower initial platelet count with a mean of (194.94±47.54) X 10^3/mm^3. There was no significant difference between the two groups as regarding of complexity of coronary arteries anatomy calculated by SYNTAX score.

Conclusion: Initial platelet count in patients presented with acute STEMI had a role in predicting pre-interventional angiographic findings, higher initial platelet count is associated with higher incidence of total occlusion of infract related artery in STEMI patients treated with primary PCI, there was no significant relation between initial platelet count and SYNTAX score grade, initial platelet count alone has no effect on SYNTAX flow grade of coronary arteries. It seems that it is affected by multiple risk factors.

Key Words: *STEMI – Platelets – TIMI – SYNTAX – pPCI.*

Correspondence to: Dr. Amir R. Talha, The Department of Cardiology, Faculty of Medicine, Tanta University

Introduction

ISCHAEMIC heart disease is the single most common cause of death [1]. Acute ST-Elevation Myocardial Infarction (STEMI) results from the sudden obstruction of a coronary artery causing abrupt interruption of blood flow to the myocardium as a consequence of intimal rupture or erosion of an atherosclerotic plaque with superimposed thrombosis [2].

The primary goal in management of acute STEMI is reperfusion therapy with intravenous fibrinolysis or pPCI [3].

Primary Percutaneous Coronary Intervention (pPCI) is the preferred reperfusion strategy in patients with STEMI within 12 hours of symptom onset, provided it can be performed by an experienced well trained team. Lower mortality rates among patients undergoing primary PCI are observed in canters with a high volume of PCI procedures [4].

Platelets play an important role in cardiovascular disease both in the pathogenesis of atherosclerosis and in the development of acute thrombotic events. Rupture of atheromatous plaque and subsequent occlusive thrombus formation are believed to be responsible for most acute myocardial ischemic events, such as unstable angina and acute myocardial infarction [2].

Patients and Methods

This study was conducted at the Department of Cardiovascular Medicine, Tanta University Hospital at the period between June 2017 & December 2017. It was carried out on 150 patients diagnosed definitively with acute STEMI and treated with pPCI.

All patients were subjected to detailed history taking, full clinical examination, 12 lead electrocardiogram, echocardiography and primary PCI strategy. In all patients recruited in this study, blood samples were collected on admission before PCI from the ante-cubital vein by an atraumatic puncture and were sent to the laboratory for analysis of: Serum cardiac biomarkers, complete blood count (hemoglobin, platelets, total White Blood Cells (WBCs). All patient received 300mg acetyl salicylic acid, 600mg clopidogrel, 80mg of atorvastatin unfractionated heparin as a loading dose according to the body weight.

All patient underwent pPCI, then pre-intervention on the infract related artery angiographic findings were assessed by TIMI flow grade system [5]. Then complexity of coronary arteries were scored using the openly accessible web based score calculator (http://www.syntaxscore.com), SYNTAX score results were categorized as low score (SYNTAX score ≤22), intermediate score (SYNTAX score 23-32), and high score (SYNTAX score ≥33) [6].

The patients of the study were divided into two groups: Group (1): Included patients who had TIMI flow grade 0 (82 patients) representing 54.7% and Group (2): Patients who had TIMI flow grade 1-3 (68 patients) representing 45.3%.

Exclusion criteria:

Patients on antiplatelets, patients presented with previous STEMI, patients with chronic kidney disease (creatinine clearance <15mL/min), patients who previously underwent Coronary Artery Bypass Graft (CABG), patients with hematological disorders, patients with active hepato-biliary disease, patients with active infections, patients with neoplastic diseases and patients with recent major surgical procedure or trauma.

Patients in each group were matched to the other group regarding different demographic, clinical and laboratory parameters.

Duration of the study: This study was done in a period of six months from June 2017 to December 2017.

Statistical analysis: Data were fed to the computer and analyzed using IBM SPSS software package Version 20.0. (Armonk, NY: IBM Corp). Qualitative data were described using number and percent. The Kolmogorov-Smirnov test was used to verify the normality of distribution Quantitative data were described using range (minimum and maximum), mean, standard deviation and median. Significance of the obtained results was judged at the 5% level. The used tests were:

1- *Chi-square test:* For categorical variables, to compare between different groups.

2- *Fisher's Exact or Monte Carlo correction:* For correction of chi-square when more than 20% of the cells have expected count less than 5.

3- *Student t-test:* For normally distributed quantitative variables, to compare between two studied groups.

4- *Mann Whitney test:* For abnormally distributed quantitative variables, to compare between two studied groups.

5- *Kruskal Wallis test:* For abnormally distributed quantitative variables, to compare between more than two studied groups.

6- *Receiver operating characteristic curve (ROC):* It is generated by plotting sensitivity (TP) on Y axis versus specificity (FP) on X axis at different cut off values. The area under the ROC curve denotes the diagnostic performance of the test. Area more than 50% gives acceptable performance and area about 100% is the best performance for the test. The ROC curve allows also a comparison of performance between two tests [7].

Results

Patient demographics: Regarding the gender: 57 patients of the study population were males (38%) and 93 were females (62%). Group I included 29 males (35.4%) and 53 females (64.6%), Group 2 included 28 males (41.2%) and 40 females (58.8%). There was no satistically significant difference between the two groups (p-value=0.465) (Table 1). As regarding age: The age of the study population ranged from 39 to 80 years with a mean of 59.33±9.98 years. There was no statistically significant difference between the two groups (p-value=0.983) (Table 1).

Prevalence of risk factors: There was no statistically significant differences as regarding cardiovascular risk factors between the two groups except for family history of coronary artery disease (p-value=0.039) (Table 2).

Table (1): Comparison between the two studied groups according to demographic data.

	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		Test of sig.	*p*
	No.	%	No.	%	No.	%		
Sex:								
Male	57	38.0	29	35.4	28	41.2	χ^2 =	0.465
Female	93	62.0	53	64.6	40	58.8	0.533	
Age (years):								
Min.-max.	39.0-80.0		39.0-76.0		40.0-80.0		*t*=	0.983
Mean ± SD	59.33±9.98		59.32±10.18		59.35±9.80		0.022	
Median	60.0		60.0		60.0			

χ^2 : Chi-square test.
t : Student *t*-test.
p : *p*-value for comparing between the two groups.

Table (2): Comparison between the two studied groups according to risk factors.

	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		χ^2	*p*
	No.	%	No.	%	No.	%		
• Diabetic	99	66.0	58	70.7	41	60.3	1.805	0.179
• Hypertension	87	58.0	52	63.4	35	51.5	2.177	0.140
• Dyslipidemic	73	48.7	37	45.1	36	52.9	0.910	0.340
• Coronary artery disease.	55	36.7	31	37.8	24	35.3	0.101	0.751
• Family history of coronary disease	69	46.0	44	53.7	25	36.8	4.271*	0.039*
• Smoking	85	56.7	48	58.5	37	54.4	0.258	0.612

χ^2 : Chi-square test.
p : *p*-value for comparing between the two groups.
* : Statistically significant at $p \leq 0.05$.

Killip class: 114 patients of the study population presented with killip class I (76.0%), 29 patients presented with killip class II (19.3%), 2 patients presented with killip class III (1.3%), 5 patients presented with killip class IV (3.3%), there was no statistically significant difference between the studied groups as regarding killip class (*p*-value= 0.099) (Table 3).

Table (3): Comparison between the two studied groups according to Killip class.

Killip class	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		χ^2	*p*
	No.	%	No.	%	No.	%		
Class I	114	76.0	60	73.2	54	79.4	5.589	0.099
Class II	29	19.3	15	18.3	14	20.6		
Class III	2	1.3	2	2.4	0	0.0		
Class IV	5	3.3	5	6.1	0	0.0		

χ^2 : Chi-square test.
p : *p*-value for comparing between the two groups.

STEMI type: 89 patients of the study population were presented with anterior STEMI (59.3%), 38 patients were presented with inferior STEMI (25.3%), 5 patients were presented with lateral STEMI (3.3%), 7 patients were presented with inferior, right and posterior STEMI (4.7%), 8 patients were presented with inferior and right STEMI (5.3%), 3 patients were presented with inferior and posterior STEMI (2%), there was no statistically significant difference between the studied groups as regarding STEMI type. (*p*-value= 0.987) (Table 4).

Table (4): Comparison between the two studied groups according to type of STEMI.

Type of STEMI	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		χ^2	MC*p*
	No	%	No	%	No	%		
• Anterior	89	59.3	48	58.5	41	60.3	1.096	0.987
• Inferior	38	25.3	21	25.6	17	25.0		
• Lateral	5	3.3	2	2.4	3	4.4		
• Inferior + right + posterior	7	4.7	4	4.9	3	4.4		
• Inferior + right	8	5.3	5	6.1	3	4.4		
• Inferior + posterior	3	2.0	2	2.4	1	1.5		

χ^2 : Chi-square test.
MC : Monte Carlo.
p : *p*-value for comparing between the two groups.

Echocardiographic findings: As regarding ejection fraction%. In Group 1, ejection fraction% was (min.-max.=30.0-62.0) with mean ± SD=46.45± 7.17. In Group 2, ejection fraction% was (min.-max.= 32-62.0) with mean ± SD=48.13±6.87. There was no statistically significant difference between the studied groups (*p*-value=0.147) (Table 5) as regarding resting segmental wall motion abnormalities: RSWMAs were absent in 8 patients of the study population (5.3%), 70 patients had anterior wall hypokinesia (46.7%), 52 patients had inferior wall hypokinesia (34.7%), 3 patients had lateral wall hypokinesia (2%), 17 patients had RSWMAs in the form of global wall hypokinesia (11.3%). There was a statistically significant difference between the studied groups as regarding RSWMAs. (*p*-value=0.037) (Table 6).

Table (5): Comparison between the two studied groups according to ejection fraction %.

	Total (n=150)	TIMI 0 (n=82)	TIMI 1-3 (n=68)	*t*	*p*
Ejection fraction %:					
Min.-max.	30.0-62.0	30.0-62.0	32.0-62.0	1.457	0.147
Mean ± SD.	47.21±7.06	46.45±7.17	48.13±6.87		
Median	47.0	47.0	47.0		

t : Student *t*-test.
p : *p*-value for comparing between the two groups.
* : Statistically significant at $p \leq 0.05$.

Table (6): Comparison between the two studied groups according to resting segmental wall motion abnormalities.

Wall motion abnormalities	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		χ^2	MC p
	No.	%	No.	%	No.	%		
Absent	8	5.3	1	1.2	7	10.3	9.561*	0.037*
Anterior	70	46.7	36	43.9	34	50.0		
Inferior	52	34.7	30	36.6	22	32.4		
Lateral	3	2.0	2	2.4	1	1.5		
Global	17	11.3	13	15.9	4	5.9		

χ^2 : Chi-square test.
MC : Monte Carlo.
p : p-value for comparing between the two groups.
* : Statistically significant at $p \leq 0.05$.

Laboratory parameters:

- *Initial platelet count:* The initial platelets count of the studied population ranged from 73.0-562.0 ($x10^3/mm^3$) with a mean of 226.82±69.65 ($x10^3/mm^3$). In Group 1, it ranged from 73.0-562.0 ($x10^3/mm^3$) with a mean of 255.74±72.01 ($x10^3/mm^3$). In Group 2, it ranged from 90.0-320.0 ($x10^3/mm^3$) with a mean 194.94±47.54 ($x10^3/mm^3$). (Table 7).

There was statistically significant difference between the studied groups as regarding initial platelet count. (p-value=<0.001). (Table 7).

Table (7): Comparison between the two studied groups according to initial platelet count ($x10^3/mm^3$).

	Total (n=150)	TIMI 0 (n=82)	TIMI 1-3 (n=68)	U	p
Initial platelet count ($X10^3$)/mm³:					
Min.-max.	73.0-562.0	73.0-562.0	90.0-320.0	1013.5*	<0.001*
Mean ± SD.	226.82± 69.65	255.74± 72.01	194.94± 47.54		
Median	212.50	244.50	190.0		

U : Mann Whitney test.
p : p-value for comparing between the two groups.
* : Statistically significant at $p \leq 0.05$.

- *Haemoglobin:* The haemoglobin level of the studied population ranged from 8.50-16.30gm/dL with a mean of 12.51±1.64gm/dL. There was no statistically significant difference between the studied groups as regarding haemoglobin level. (p-value=0.513). (Table 8).
- *Total leukocytic count:* The total leukocytic count of the studied population ranged from 1.40-33.20 ($x10^3/mm^3$) with a mean of 9.17±4.63 ($x10^3/mm^3$). There was no statistically significant difference between the studied groups as regarding total leukocytic count. (p-value= 0.802). (Table 8).

Table (8): Comparison between the two studied groups according to hemoglobin level (gm/dL) and total leukocytic count ($x10^3/mm^3$).

	Total (n=150)	TIMI 0 (n=82)	TIMI 1-3 (n=68)	Test of sig.	p
Hemoglobin level:					
Min.-max.	8.50-16.30	8.80-16.0	8.50-16.30	t=	0.513
Mean ± SD.	12.51±1.64	12.59±1.52	12.42±1.78	0.655	
Median	12.25	12.40	12.05		
Total leukocytic count ($X10^3/mm^3$):					
Min.-max.	1.40-33.20	1.90-33.20	1.40-22.0	U=	0.802
Mean ± SD.	9.17±4.63	9.42±5.16	8.87±3.91	2721.5	
Median	8.50	9.55	8.20		

t : Student t-test.
U : Mann Whitney test.
p : p-value for comparing between the two groups.
* : Statistically significant at $p \leq 0.05$.

Angiographic findings:

- *Culprit vessel:* In 89 patients of the study population the Left Anterior Descending artery (LAD) was the culprit vessel (59.3%), while in 45 patients it was the Right Coronary Artery (RCA) (30%), and in 11 patients the culprit vessel was the left circumflex artery (LCX) (7.3%), while in 3 patients it was the first diagonal branch (D1) (2%), in 1 patient it was the second diagonal branch (D2) (0.7%), and 1 patient it was the ramus branch (0.7%). There was no statistically significant difference between the studied groups as regarding the culprit vessel. (p-value=0.393) (Table 9).

Table (9): Comparison between the two studied groups according to culprit vessel.

Culprit vessel	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		χ^2	MC p
	No.	%	No.	%	No.	%		
LAD	89	59.3	48	58.5	41	30.3	4.978	0.393
RCA	45	30.0	26	31.7	19	27.9		
LCX	11	7.3	6	7.3	5	7.4		
D1	3	2.0	0	0.0	3	4.4		
D2	1	0.7	1	1.2	0	0.0		
RAMUS	1	0.7	1	1.2	0	0.0		

χ^2 : Chi-square test.
MC : Monte Carlo.
p : p-value for comparing between the two groups.

- *Number of diseased vessels:* 54 patients of the study population had a single vessel disease (36%), while 42 patients had two vessels disease (28%) and 54 patients had three vessels disease (36%). There was no statistically significant difference between the studied groups as regarding the number of the diseased vessel. (p-value= 0.400) (Table 10).

Table (10): Comparison between the two studied groups according to number of diseased vessels.

Number of diseased vessels	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		Test of sig.	*p*
	No.	%	No.	%	No.	%		
1	54	36.0	26	31.7	28	41.2	χ^2=	0.400
2	42	28.0	26	31.7	16	23.5	1.831	
3	54	36.0	30	36.6	24	35.3		
Min.-max.	1.0-3.0		1.0-3.0		1.0-3.0		U=	0.441
Mean ± SD.	2.0±0.85		2.05±0.83		1.94±0.88		2596.0	
Median	2.0		2.0		2.0			

χ^2 : Chi-square test.
U : Mann Whitney test.
p : *p*-value for comparing between the two groups.

- *Number of deployed stents during the procedure*: 2 stents were deployed in 19 patients of the study population (12.7%), while in 113 patients 1 stent was deployed (75.3%), deferred stenting in 18 patients (12%). In Group 1, 2 stents were deployed in 16 patients (19.5%), while in 52 patients 1 stent was deployed (63.4%), deferred stenting in 14 patients (17.1%). In Group 2, 2 stents were deployed in 3 patients (4.4%), while in 61 patients 1 stent was deployed (89.7%), deferred stenting in 4 patients (5.9%). There was statistically significant difference between the studied groups as regarding the number of deployed stents. (*p*-value=0.001) (Table 11).

Table (11): Comparison between the two studied groups according to number of deployed stents.

Number of stent	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		Test of sig.	*p*
	No	%	No	%	No	%		
1	18	12.0	14	17.1	4	5.9	χ^2=	0.001*
2	113	75.3	52	63.4	61	89.7	13.982*	
3	19	12.7	16	19.5	3	4.4		
Min.-max.	0.0-2.0		0.0-2.0		0.0-2.0		U=	0.624
Mean ± SD.	1.01±0.50		1.02±0.61		0.99±0.32		2690.0	
Median	1.0		1.0		1.0			

χ^2 : Chi-square test.
U : Mann Whitney test.
p : *p*-value for comparing between the two groups.
* : Statistically significant at $p \leq 0.05$.

- *Usage of ballon dilatation during the procedure:* In 100 patients of the study population ballon dilatation was used during intervention (66.7%). In Group 1, in 61 patients ballon dilatation was used (74.4%). In Group 2, ballon dilatation was used in 39 patients (57.4%). There was statistically significant difference between the studied groups as regarding intervention with ballon dilatation during the procedure. (*p*-value=0.028) (Table 12).
- *Intervention by direct stenting:* In 132 patients of the study population intervention was by direct stenting in the infract related artery (88%). In Group 1, 68 patients direct stenting was done (82.9%) while In Group 2, direct stenting was in 64 patients (94.1%). There was statistically significant difference between the studied groups as regarding intervention by direct stenting. (*p*-value=0.036) (Table 12).
- *Deferred stenting and intervention by only ballon dilatation:* 18 patients of the study population had intervention with only ballon dilatation with deferred stenting (12%). In Group 1, they were 14 patients (17.1%). In Group 2, they were 4 patients (5.9%). There was statistically significant difference between the studied groups as regarding deferred stenting and intervention by only ballon dilatation. (*p*-value=0.036) (Table 12).
- *Coronary artery dissection:* In 3 patients of the study population coronary intervention was complicated by dissection (2%). There was no statistically significant difference between the studied groups as regarding development of coronary artery dissection. (*p*-value=1.000) (Table 12).
- *Successful intervention:* In 145 patients of the study population coronary intervention was successful (96.7%). There was no statistically significant difference between the studied groups as regarding successful intervention. (*p*-value= 0.064) (Table 12).

Table (12): Comparison between the two studied groups according to different parameters.

	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		χ^2	*p*
	No.	%	No.	%	No.	%		
• Intervention by ballon dilatation.	100	66.7	61	74.4	39	57.4	4.856*	0.028*
• Intervention with direct stenting.	132	88.0	68	82.9	64	94.1	4.409*	0.036*
• Deferred stenting.	18	12.0	14	17.1	4	5.9	4.409*	0.036*
• Ballon dilatation only.	18	12.0	14	17.1	4	5.9	4.409*	0.036*
• Successful intervention.	145	96.7	77	93.9	68	100.0	4.289	FE*p*= 0.064
• Dissection.	3	2.0	2	2.4	1	1.5	0.178	FE*p*= 1.000

χ^2 : Chi square test.
FE : Fisher Exact.
p : *p*-value for comparing between the two groups.
* : Statistically significant at $p \leq 0.05$.

- *Syntax score grade:* 124 patients of the study population had low syntax score grade (82.7%), 25 patients had intermediate syntax score grade (16.7%), while 1 patient had high syntax score grade (0.7%). In Group 1, 65 patients had low

syntax score grade (79.3%), 16 patients had intermediate syntax score grade (19.5%), while 1 patient had high syntax score grade (1.2%). In Group 2, 59 patients had low syntax score grade (86.8%), 9 patients had intermediate syntax score grade (13.2%). There was no statistically significant difference between the studied groups as regarding syntax score grade. (p-value=0.386) (Table 13).

Table (13): Comparison between the two studied groups according to Syntax score grade.

Syntax score grade	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		χ^2	MC$_p$
	No.	%	No.	%	No.	%		
Low	124	82.7	65	79.3	59	86.8	1.868	0.3 86
Intermediate	25	16.7	16	19.5	9	13.2		
High	1	0.7	1	1.2	0	0.0		

χ^2 : Chi-square test.
MC : Monte Carlo.
p : p-value for comparing between the two groups.

- *TIMI flow grade post coronary intervention:* 5 patients of the study population had TIMI 0 (3.3%), 5 patients had TIMI 1 (3.3%), 18 patients had TIMI 2 (12%), while 122 patients had TIMI 3 (81.3%). In Group 1, 5 patients had TIMI 0 (6.1%), 4 patients had TIMI 1 (4.9 %), 15 patients had TIMI 2 (18.3%), while 58 patients had TIMI 3 (70.7%). In Group 2, 1 patient had TIMI 1 (1.5%), 3 patients had TIMI 2 (4.4%), while 64 patients had TIMI 3 (94.1%). There was statistically significant difference between the studied groups as regarding TIMI flow grade post intervention. (p-value=0.001) (Table 14).

Table (14): Comparison between the two studied groups according to TIMI flow post intervention.

TIMI flow post intervention	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		χ^2	MC$_p$
	No.	%	No.	%	No.	%		
TIMI 0	5	3.3	5	6.1	0	0.0	13.744*	0.00 1 *
TIMI 1	5	3.36	4	4.9	1	1.5		
TIMI 2	18	12.0	15	18.3	3	4.4		
TIMI 3	122	81.3	58	70.7	64	94.1		

χ^2 : Chi-square test.
MC : Monte Carlo.
p : p-value for comparing between the two groups.
* : Statistically significant at $p \leq 0.05$.

- *Relation between Syntax grade and Initial platelet count in each group:*

- In Group 1 (TIMI 0) with initial platelet count mean ± SD=255.74±72.01 (X 10^3/mm^3): Patients with high Syntax flow grade was 1 patient with initial platelet count 73000/mm^3, patients with intermediate Syntax score grade who were 16 patients had initial platelet count mean ± SD= 244.94±56.95 (X 10^3/mm^3), while patients with low Syntax score grade (65 patients) had initial platelet count mean ± SD=261.22±72.26 (X 10^3/mm^3). There was no statistically significant difference between the initial platelet count and Syntax score grade. (p-value=0.148). (Table 15).

- In Group 2 (TIMI 1:3) with initial platelet count mean ± SD=194.94±47.54 (X 10^3/mm^3): No one was with high Syntax flow, patients with intermediate syntax score grade who were 9 patients had initial platelet count mean ± SD=177.33±65.55 (X 10^3/mm^3), while patients with low Syntax score grade (59 patients) had initial platelet count mean ± SD=194.17±44.49 (X 10^3/mm^3). There was no statistically significant difference between the initial platelet count and Syntax score grade. (p-value=0.328). (Table 15).

Table (15): Relation between Syntax grade and initial platelet count (x10^3/mm^3) in each group.

Initial platelet count (x10^3)/mm^3	Syntax grade			Test of sig.	p
	Low	Intermediate	High		
Total (n=150):	*(n=124)*	*(n=25)*	*(n=1)*		
Min.-max.	90.0-562.0	90.0-370.0	73.0	H=	0.211
Mean ± SD	229.31 ±69.14	220.60±67.50		3.155	
Median	214.50	211.0			
TIMI 0 (n=82):	*(n= 65)*	*(n= 16)*	*(n=1)*		
Min.-max.	90.0-562.0	165.0-370.0	73.0	H=	0.148
Mean ± SD	261.22±72.26	244.94±56.95		3.823	
Median	250.0	230.50			
TIMI 1-3 (n=68):	*(n=59)*	*(n=9)*	*(n= 0)*		
Min.-max.	108-320.0	90.0-313.0		U=	0.328
Mean ± SD	194.17±44.49	177.33±65.55		211.5	
Median	190.0	190.0			

H : Kruskal Wallis test.
U : Mann Whitney test
p : p-value for association between Syntax grade and initial platelet count (mm).

- *Periprocedural death:* 4 patients died during the procedure (2.7%). In Group 1, they were 3 patients (3.7%), while in Group 2, 1 patient died during the procedure (1.5%). There was no statistically significance between the studied groups. (p-value =0.627). (Table 16).

Table (16): Comparison between the two studied groups according to periprocedural death.

Periprocedural death	Total (n=150)		TIMI 0 (n=82)		TIMI 1-3 (n=68)		χ^2	FE$_p$
	No.	%	No.	%	No.	%		
No	146	97.3	79	96.3	67	98.5	0.686	0.627
Yes	4	2.7	3	3.7	1	1.5		

χ^2 : Chi-square test.
FE : Fisher Exact.
p : p-value for comparing between the two groups.

The Receiver Operating Characteristic (ROC) analysis showing the performance and predictive accuracy of initial platelet count in predicting TIMI flow grade 0. The Area Under the Curve (AUC) was 0.818 (p<0.001), with initial platelet count more than >212 (x10^3/mm^3), with 78.05% sensitivity and 83.82% specificity. (Table 17) Fig. (1).

Table (17): Agreement (sensitivity, specificity) initial platelet count (x10^3)/mm^3 to predict TIMI 0 cases.

	Cut off	Sensitivity	Specificity	PPV	NPV
Initial platelet count (x10^3)/mm^3	>211	78.05	83.82	85.3	76.0

AUC : Area Under a Curve.
p-value : Probability value.
CI : Confidence Intervals.

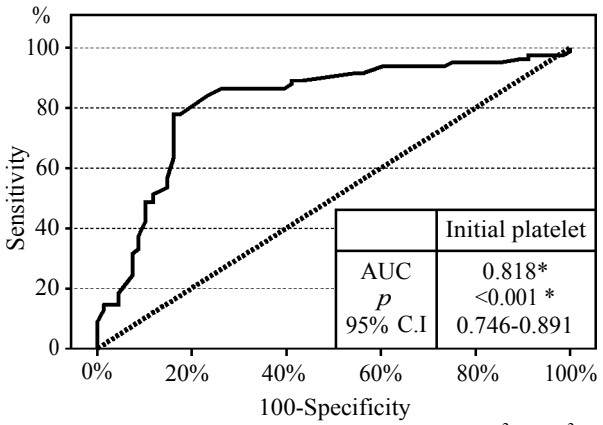

Fig. (1): ROC curve for Initial platelet count (x10^3)/mm^3 to predict TIMI 0 cases.

Discussion

ST-Elevation Myocardial Infarction (STEMI) is one of the leading causes of mortality and morbidity worldwide. However, survival after acute STEMI has considerably improved due to increasing symptom recognition, accurate diagnosis and effective timely reperfusion [8]. Reduction in STEMI mortality can be explained by greater use of Percutaneous Coronary Intervention (PCI), antithrombotic therapy and secondary cardiovascular prevention strategies [9]. Platelets play an important role in cardiovascular disease both in the pathogenesis of atherosclerosis and in the development of acute thrombotic events.

Coronary artery thrombosis is the final pathogenic mechanism of acute ischemic events, including myocardial infarction and sudden cardiac arrest.

In our study our aim is trying to show the effect of initial platelet count on baseline angiographic findings assessed with TIMI flow in STEMI patients undergoing primary PCI, in our study which was conducted on 150 patients presented with acute ST segment elevation myocardial infraction then underwent primary PCI. The study sample was divided into two groups: Group 1: Included patients who had TIMI flow grade 0 (82 patients). Group 2: Included patients who had TIMI flow grade 1-3 (68 patients), patients in each group were matched to the other group regarding different demographic, clinical and laboratory parameters.

As regard age and sex in our study there was no significant difference between the two groups as regarding age (p-value=0.983) and sex (p-value= 0.465). In our study most of the patients who presented with acute STEMI were females (93 patients) 62%.

As regarding 2017 ESC guidelines ischemic heart disease develops on average 7-10 years later in women compared with men. MI remains a leading cause of death in women. Acute Coronary Syndrome (ACS) occurs three to four times more often in men than in women below the age of 60 years, but after the age of 75, women represent the majority of patients [10]. Women tend to present more often with atypical symptoms, up to 30% in some registries [11] and tend to present later than men [12]. In the study conducted by Sharif et al., [13] there was no significant difference between age and sex in relation to TIMI flow grade in patients presented with STEMI undergoing pPC.

As regarding diabetes mellitus and systemic hypertension there were no statistically significant difference between the study groups as regarding those parameters in our study. Similarly, the study conducted by Sahin et al., [14] showed no significant difference between diabetes mellitus and systemic hypertension with TIMI flow grade in STEMI patients undergoing primary PCI.

As regarding dyslipidemia and history of coronary artery disease our study could not find significant difference between those parameters and TIMI flow grade. Similarly in the study conducted by Halit et al., [15] which was conducted on 324 patients presented with STEMI and aimed to assess novel predictors of infarct-related artery patency for STEMI that showed no significant difference between dyslipidemia, history of coronary artery diseases and pre-procedural infract related artery patency in patients presented with STEMI undergoing primary PCI. In contrast, a prospective study was conducted by Durmuş et al., [16] on 880 patients with STEMI patients undergoing primary PCI to predict pre-interventional coronary artery patency which showed a significant difference between

dyslipidemia and infract related coronary artery patency (*p*-value=0.049).

As regarding family history of coronary artery disease in our study there was a significant difference between the study groups. In Group 1 (TIMI 0), 44 patients had positive family history (53.7%), while in Group 2 (TIMI 1-3), 25 patients had family history of coronary artery disease (36.8%) (*p*-value =0.039). In contrast the study conducted by Durmщ et al., **[16]** on 880 patients with STEMI patients undergoing primary PCI to predict pre–interventional coronary artery patency which showed no significant difference between family history of coronary artery disease and infract related coronary artery patency.

As regarding smoking in our study there was no significant difference between the study groups and smoking. Similarly in the study conducted by Mathieu et al., **[17]** on 140 patients presented with STEMI undergoing primary PCI to assess effect of TIMI coronary flow in the culprit coronary artery on myocardial infarct and Microvascular Obstruction (MVO) size. There was no significant difference between smoking and pre-interventional TIMI flow.

As regarding KILLIP class: In our study there was no significant difference between the studied groups as regarding KILLIP class. In contrast a retrospective study was conducted by Halit et al., **[15]** on 324 patients to assess predictors of infarct-related artery patency for ST-segment elevation myocardial infarction showed significant difference between the study groups as regarding KILLIP class (*p*-value=0.031).

As regarding initial platelet count, in our study we found that Group 1 that showed total occlusion of infract related artery (TIMI 0) has higher initial platelet count with a mean of (255.74±72.01) $x10^3/mm^3$ compared to Group 2 (TIMI 1-3) that had lower initial platelet count with a mean of (194.94±47.54) $x10^3/mm^3$. There was statistically significant difference between the studied groups as regarding initial platelet count. (*p*-value <0.001).

A study was conducted to assess effect of platelet count on predicting angiographic finding in STEMI patient who underwent primary PCI by Sahin et al., **[14]**. The study was done on 140 patients and showed that patients with TIMI flow grade 0 had initial platelet count with mean of 293.7±59.8 $x10^3/mm^3$ which was higher than in patients who had higher TIMI flow grade (TIMI 1-3) whose mean platelet count was 237.7 ±50.9 $x10^3/mm^3$ (*p*-value=<0.0001).

Similarly in 2016 Sharif et al., **[13]** in their study to test the effect of platelet count on admission in patients with acute STEMI treated with pPCI on coronary flow, noted that patients who had low platelet count on admission had higher prevalence of TIMI flow grade 3, while patients with high platelet counts on admission has higher incidence of lower TIMI flow grade with more thrombotic infract related artery (*p*-value=<0.05).

A retrospective study was conducted by Halit et al., **[15]** on 324 patients to predict the patency of the infract related artery in acute myocardial infraction observed that patients who had high TIMI flow grade (TIMI 3) had low mean platelet count with (248.8±68.3) $x10^3/mm^3$ as compared to patients who had TIMI flow grade 0, 1, 2 whose platelet count was higher with a mean of 252.7 ± 63.4 $x10^3/mm^3$, but without significant difference.

In contrast, a study was conducted by Rui Wang et al., **[18]** to determine risk factors affecting the in-hospital prognosis of patients with acute ST segment elevation myocardial infarction after PCI and did not conclude that platelet count was an independent risk factor in severity of angiographic findings and in prognosis of coronary artery disease.

Retrospective study was conducted by M Bahrehmand et al., **[19]** to predict factors affecting thrombolysis in myocardial infraction (TIMI flow) in patients presented with acute STMI which showed that there was no significant difference between initial platelet and pre-interventional angiographic findings assessed with TIMI flow.

As regarding haemoglobin level, we could not find a significant difference between the studied groups as regarding haemoglobin level.

As regarding white blood cells count, we could not find a significant difference between the studied groups as regarding white blood cells count. Similarly a retrospective study was conducted by Halit et al., **[15]** on 324 patients to test novel predictors of infarct-related artery patency in STEMI demonstrated that no significant difference between white blood cells count and angiographic findings assessed with TIMI flow.

As regarding RSWMAs assessed by echocardiography in our study there was significant difference between the studied groups as regarding RSWMAs. In Group 1 (TIMI 0) 81 patients (98.8%) had RSWMAs while in Group 2 (TIMI 1-3) 61 patients (89.7%) had RSWMAs (*p*-value=0.037), as noticed most of the patients had RSWMAs similarly the study that was conducted by Sabia p

et al., [20] noted that most of patient admitted with acute STEMI had RSWMAs (*p*-value=>0.001).

As regarding Number of stents deployed during the procedure in our study there was significant difference between the studied groups as regarding number of stents used during the procedure. The usage of more than one stent was more in patients with TIMI 0 than in those with TIMI 1-3 (*p*-value= 0.001).

As regarding usage of ballon dilatation during the procedure, in our study there was significant difference between the studied groups as regarding usage of ballon dilatation during the procedure. The usage of ballon dilatation was more in patients with TIMI 0 than in those with TIMI 1-3. (*p*-value= 0.028).

As most of patients with total occlusion of infract related artery had high thrombotic burden with more distal lesions that appeared after wiring of the site of coronary occlusion usage of more than one stent and ballon dilatation was higher in patients with TIMI flow 0 than in patients with TIMI 1-3.

As regarding direct stenting without ballon dilatation, in our study there was significant difference between the studied groups. Direct stenting was more was more in patients with TIMI 1-3 (Group 2) than in those with TIMI 0 (Group 1) (*p*-value=0.036). This was due to less thrombotic field detected in patients with TIMI 1-3.

As regarding deferred stenting during the procedure and only intervention with ballon dilatation, in our study there was significant difference between the studied groups, it was done because of high thrombotic burden and the possibility of immediate stent thrombosis, in Group 1 (TIMI 0), deferred stenting was in 14 patients (17.1%). In Group 2 (TIMI 1:3), they were 4 patients (5.9%). (*p*-value=0.036).

As regarding TIMI flow grade post coronary intervention in our study there was signific ant difference between the studied groups that showed that prevalence of TIMI 3 was more in Group 2. In Group (1), 58 patients had TIMI 3 (70.7%), while in Group (2), 64 patients had TIMI 3 (94.1%). (*p*-value=0.001). In contrast, a study conducted by Schaaf et al., [17] to assess pre-PCI angiographic TIMI flow in the culprit coronary artery influences infarct size and microvascular obstruction in STEMI patients showed no significant difference between pre-interventional and post-interventional TIMI flow.

As regarding the complexity of coronary arteries lesions which were assessed by Syntax score in our study there was no significant statistical difference between initial platelet count and complexity of coronary artery disease. In our study there was no significant difference between TIMI flow grade and complexity of coronary artery lesions assessed by syntax score.

In contrast to our study a study was conducted by Alparslan Kurtul et al., [21] to evaluate the association of platelet to lymphocyte ratio with severity and complexity of coronary artery disease in patients with acute coronary syndromes that noted that patients with high Syntax score had higher mean platelet count than patients with low Syntax score (*p*-value=>0.001).

Limitations of the study: The study had some limitations. This is a single-center experience and represents a limited number of patients.

Many patients presented with acute STEMI have been excluded from the study because they had previous STEMI and others in whom the reperfusion strategy was fibrinolytic therapy.

Conclusion:

Initial platelet count in patients presented with acute STEMI had a rule in predicting pre-interventional angiographic findings, higher initial platelet count is associated with higher incidence of total occlusion of infract related artery in STEMI patients treated with primary PCI.

There is no significant relation between initial platelet count and SYNTAX score grade, initial platelet count alone has no effect on SYNTAX flow grade of coronary arteries, it seems that it is affected by multiple risk factors.

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تأثير العد الآولى للصفائح الدموية على نتائج قسطرة الشرايين التاجية فى مرضى الإحتشاء القلبى الحاد الذين يخضعون للقسطرة القلبية العلاجية الآولية

شملت الدراسة مائة وخمسين مريضا آصيبوا بإحتشاء عضلة القلب الحاد وتمت المعالجة عن طريق القسطرة العلاجية الآولية على الشرايين التاجية فى مستشفى جامعة طنطا فى الفترة من يوليو ٢٠١٧ حتى نهاية ديسمبر ٢٠١٧.

وقد كان الهدف من هذه الدراسة هو دراسة العلاقة بين العدد الآولى للصفائح الدموية بالدم ونتائج القسطرة القلبية فى المرضى المصابين بالإحتشاء القلبى الحاد الذين يخضعون للقسطرة العلاجية الآولية للشرايين التاجية.

تم تقسيم حالات الدراسة إلى مجموعتين تبعا لدرجة دفق الشريان بمقياس TIMI إلى:

- المجموعة الآولى: والتى كانت درجة دفق الشريان بمقياس TIMI هى صفر.
- المجموعة الثانية: والتى كانت درجة دفق الشريان بمقياس TIMI هى من ١ إلى ٣.

خضع جميع مرضى الدراسة لإستيفاء التاريخ المرضى الكامل والفحص الإكلينيكى الكامل وعمل رسم قلب وموجات فوق صوتية على القلب وإجراء بعض التحاليل بالدم (صورة الدم الكاملة وعدد الصفائح الدموية والسكر العشوائى، وظائف الكلى والكبد) ثم خضع جميع مرضى الدراسة إلى القسطرة القلبية العلاجية الطارئة.

وقد خلصت هذه الدراسة إلى آن العد الآولى للصفائح الدموية له تآثير على درجة إنسداد الشرايين التاجية فى مرضى الإحتشاء القلبى الحاد الذين خضعوا للقسطرة القلبية العلاجية الآولية حيث وجد آن المرضى الذين لديهم إرتفا ع بعدد الصفائح الدموية بالدم صوحبوا بنسبة إنسداد آكبر فى الشريان التاجى مقارنة بالمرضى الذين لديهم عدد آقل من الصفائح الدموية. وتبين من هذه الدراسة آيضا آنه لا يوجد فروق ذات دلالة إحصائية بين العدد الآولى للصفائح الدموية ودرجة تعقد الشرايين التاجية بمقياس Syntax.